

**KINDERGARTEN DESIGN AND ENHANCEMENT:
A CASE STUDY IN LIBYA**

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
ÇANKAYA UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
INTERIOR ARCHITECTURE

FEBRUARY 2018


Title of the Thesis : Kindergarten Design and Enhancement – A Case Study in Libya

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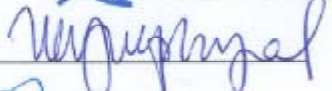

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ABSTRACT

KINDERGARTEN DESIGN AND ENHANCEMENT: A CASE STUDY IN LIBYA

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February 2018, 91 pages

The preschool education is considered as an important phase of early education, which aims to increase children's creativity and social interaction with their peers. As the studies demonstrate, the education received in the kindergarten enables children to find answers to phenomena around them, increases their sense of curiosity, and creates a strong base for a better performance in the grade school. The literature also shows that the design of the educational spaces of kindergartens effectively influences children's behaviour and learning, as it provides the essential tools for interaction, communication and discovery. In this framework, this study aims to evaluate the enhancement opportunities of the kindergartens in Libya, through aligning its objectives with the design criteria acquired from the relevant literature, guidelines and standards.

This study is composed of two main sections, which are the literature survey of the subject area and the case study conducted in Libya. In the literature survey, the impact of kindergarten design and design elements to children's behaviour and education has been examined and several design guidelines and kindergarten models are reviewed from countries developed in this area, such as Canada, USA, Japan and Finland, in order to understand the basic requirements that are needed to be incorporated in the kindergarten design. In the case study, nine kindergartens from three Libyan cities, namely Tripoli, Misrata and Zlitan, are evaluated for compliance with fifty key design criteria through an architectural assessment and a subjective assessment has been made through a survey questionnaire carried out on the staff and parents on the studied kindergartens.

It was observed that the results conveyed a high incompliance with the kindergarten design criteria, as the case study kindergartens scored 56% to 32% of the required criteria. The questionnaire results also confirmed the architectural assessment findings; however, the compliance differed from one kindergarten to another. Based on the findings of the research, a design guideline for the design and enhancement of kindergartens in Libya has been provided as the outcome of this study.

Keywords: Kindergarten education, kindergarten design, kindergarten design guidelines and standards, Libya



ÖZ

KINDERGARTEN TASARIMI VE GELİŞTİRİLMESİ: LİBYA'DAKİ BİR VAKA ÇALIŞMASI

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Şubat 2018, 91 Sayfa

Okul öncesi eğitim, çocukların yaratıcılığını ve sosyal etkileşimini güçlendirmeyi amaçlayan erken eğitimin önemli bir aşaması olarak kabul edilir. Araştırmaların da gösterdiği gibi, anaokulunda alınan eğitim, çocukların merak duygularını artırıp, çevrelerindeki fenomenlere cevap bulmalarını sağlayarak, onların ileriki sınıflarda daha iyi bir performans gösterebilmeleri için güçlü bir temel oluşturur. Literatür ayrıca, anaokulu eğitim alanlarının tasarımının, çocukların davranışlarını ve öğrenimlerini etkilediğini, etkileşim, iletişim ve keşif için gerekli araçları sağladığını göstermektedir. Bu çerçevede, bu çalışma, ilgili literatür, yönerge ve standartlardan edinilen tasarım kriterleriyle uyumlu olacak şekilde, Libya'daki anaokulu mekanlarının tasarımlarını geliştirme fırsatlarını değerlendirmeyi amaçlamaktadır.

Bu çalışma, konuyla ilgili literatür araştırması ve Libya'da yapılan vaka çalışması olmak üzere iki ana bölümden oluşmaktadır. Literatür taramasında, anaokulu tasarım ve tasarım öğelerinin çocukların davranışlarına ve eğitimine etkileri incelenmiş ve Kanada, ABD, Japonya ve Finlandiya gibi bu alanda gelişmiş ülkelerin tasarım kılavuzları ve anaokulu modelleri gözden geçirilerek, anaokulu tasarımına dahil edilmesi gereken temel şartlar belirlenmiştir. Vaka çalışmasında, Tripoli, Misrata ve Zliti'den oluşan üç şehirdeki toplam dokuz anaokulu incelenmiş ve elli önemli tasarım kriterine uygunluk

açısından mimari olarak değerlendirilmiştir. Ayrıca, bu anaokullarının velileri ve çalışanlarına yönelik bir anketyoluyla da öznel bir değerlendirme yapılmıştır.

Araştırma sonuçları, çalışılan anaokullarının tasarım kriterleriyle uyum içerisinde olmadığını ve gerekli kriterlerin %56'sından %32'sine uygun olduğunu göstermiştir.. Anket sonuçları de bu mimari değerlendirme bulgularını doğrulamaktadır. Araştırmanın bulgularına dayanarak, bu çalışmanın sonucu olarak, Libya'daki anaokullarının tasarımı ve geliştirilmesinde kullanılacak bir tasarım kılavuzu oluşturulmuştur.

Anahtar kelimler: Anaokulu eğitimi, anaokulu tasarımı, anaokulu tasarım kılavuzları ve esasları, Libya

ACKNOWLEDGMENTS

To my family and friends, thanks for the support and prayers

A special thanks to Assist. Prof. Dr. Zeynep iğdem UYSAL ÜREY for her advice, support and guidance that impacted the quality of this research

Thanks to the participating Libyan Kindergartens for assistance and information that were provided for the study

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1. INTRODUCTION

1.1 The Background and Significance of the Study

The primary grade school plays a major role in determining the potential of students and growing their talent. However, experts in the education field consider the kindergarten phase prior to the grade school as one of the most influential years in a child's life as the child is discovering in this phase of his/her education, the necessary social skills to communicate with his/her peers and engaging in different activities, which enhance his/her creativity and critical thinking ability.

Research indicates that the impact of kindergarten education extends as to affect the development of the pedagogical, physiological, and biological aspects of children's personality (Yalçın, Bozdayı, & Ertek, 2017). Correspondingly, there are researches that link the kindergarten experience to the further performance in the grade school. A study performed in Turkey shows that children who had a full kindergarten experience achieved the following in the first few years in the primary school:

1. High level of scientific thinking, which allowed them to answer questions about themselves and their surroundings.
2. Establishing a sense of the world and build curiosity for discovery.
3. Scoring better grades in their academic curriculum (Kumtepe, Kaya, & Kumtepe, 2009).

Many other studies have shown that children who engage earlier in the kindergarten experience have the ability to develop stronger critical thinking ability, which helps them translate that into academic achievements that continue throughout their lives (Buten, 2010). The literature also shows that art activities carried out by children in the

guidance of their teachers in preschool education increases children's creativity and ability to express themselves via art works (Novakovic, 2015).

From a design perspective, several studies have proven that the design and design elements of educational spaces have significant impact on the learning experience, which is mostly critical in the early years of education (Ketchum, 2015). Research indicates that the spaces where the kindergarten education take place affects the cognitive and behavioral aspects of children's personality. A study performed in Turkey about the relationship between the physical environment of the kindergarten and the educational, cultural and social development of the children has shown that the aesthetic quality of the interior environment has a major influence on the non-physical aspects of the kindergarten education (Yalçın, Bozdayı, & Ertek, 2017).

When it is observed with this perspective, it becomes clear that the design of kindergartens in Libya is still immature and undeveloped due to several sociological, financial and political reasons, which makes it significant to understand and contribute into its development (LOOPS, 2016). As well as their educational structure that requires enhancement to the international level of developed countries, the design of kindergartens in Libya are also considered as underdeveloped, having no specific regulations or codes (AlJamili, 2011).

1.2 Aim, Scope and Research Questions

The aim of this study is to examine the design and enhancement opportunities of the kindergartens in Libya from a design perspective and to develop a guideline that may contribute to the design and enhancement of kindergartens in Libya. There are several studies about the educational and intellectual goals, social constraints and physical design considerations about kindergartens in the literature. Being aware of the theories about the educational goals and social constraints of kindergartens, this thesis focuses mainly on the physical design considerations of the kindergartens and attempts to evaluate them in the Libyan context. In this framework, the objectives of this research can be stated as the following:

1. Surveying the literature on kindergarten design for understanding the necessary factors to be evaluated.
2. Examining design considerations and guidelines developed worldwide to form an educated approach to kindergarten design and enhancement.
3. Studying the impact of the design of kindergartens on children's behavior and education.
4. Reviewing the exemplary kindergartens and the ideal designs worldwide to understand the enhancement methods of kindergarten design, as well as their constraints and challenges.
5. Studying the local constraints of the case study area theoretically before moving on to the field assessment.
6. Assessing the current gap in the design of the Libyan kindergartens and measuring the awareness of their users.
7. Developing a design guideline for kindergartens in Libya in order to enhance their design and to set minimum requirements, based on international regulations and codes, for the children's education and talent discovery.

Subsequently, the scope of this study and its limits can be described as the following:

1. Reviewing the current kindergarten design conditions in Libya and assessing its compliance with international standards.
2. Forming a collective idea about the minimum requirements in kindergarten facilities in terms of their design and functionality.
3. Selecting case studies from Libya to evaluate their design and provide practical recommendations for design enhancement.

The initial questions that are raised in this study are as the following:

- How does the design of the kindergarten impact the learning experience of the child?
- What is the ideal design for kindergarten according to the international standards?

- What are the main design considerations when enhancing the design of kindergartens?
- What are the current design issues in the kindergartens in Libya?
- How can the design of the kindergartens in Libya be enhanced to support the functionality of the facilities and the learning experience of the children?

The answers to these questions are examined via the literature review about the subject and the case study that is conducted in Libya.

In relation with the research questions, the main hypothesis that is tested in this research can be stated as the following: “ H_0 = the design of the existing kindergartens in Libya is not sufficient in terms of the design characteristics stated in various acknowledged guidelines and standards about kindergarten design”. This hypothesis is again tested via the literature review about the subject and the case study that is conducted in Libya.

1.3 Thesis Methodology and Structure

This research examines the design of the Libyan kindergartens in terms of their physical design considerations and attempts to evaluate them according to the acknowledged kindergarten design standards and guidelines. In order to accomplish this, in the first part of the research, a literature review is conducted about the kindergarten design, its impact on education, kindergarten design standards and guidelines and developed kindergarten designs throughout the world. This literature review is used to identify the gaps between the needs and the current situation and to evaluate the use of similar techniques that are suitable for the Libyan case.

In the second part of the research, a case study is conducted in order to detect and evaluate the condition of the Libyan kindergartens in terms of their physical design considerations. The case study includes an architectural assessment that studies several kindergartens in Libya and a subjective assessment that includes a questionnaire survey.

The architectural assessment is conducted on nine kindergartens in Libya, from three different cities of Zliten, Misrata and Tripoli. Three different kindergartens are selected from each three cities of Zliten, Misrata and Tripoli by random convenience sampling, in order to assess their current designs according to the different regulations and standards in developed countries. In all the studied kindergartens, the ages of the affected children were between 3 and 6 years old. The literature review about the kindergarten designs standards throughout the world is used in this phase to assess and identify the gaps between the ideal cases and the current situation in the Libya.

After the architectural assessment, a subjective assessment is conducted by way of a questionnaire survey. The questionnaire is developed and a sample of users of kindergartens in Libya is surveyed to measure their awareness of the issue and the needs that they express to be sustained. The participants of the survey are selected through random convenience sampling according to the availability of the subjects that are willing to take the questionnaire.

In the last part of the research, making use of the information attained via the literature survey and the results of the case study, a guideline is built to show the possible design recommendations that could be followed by the existing facilities and any new kindergartens that might be established in the country. This guideline that proposes the design recommendations forms the outcome of this study. Figure 1.1 below illustrates a summary of the thesis methodology and structure.

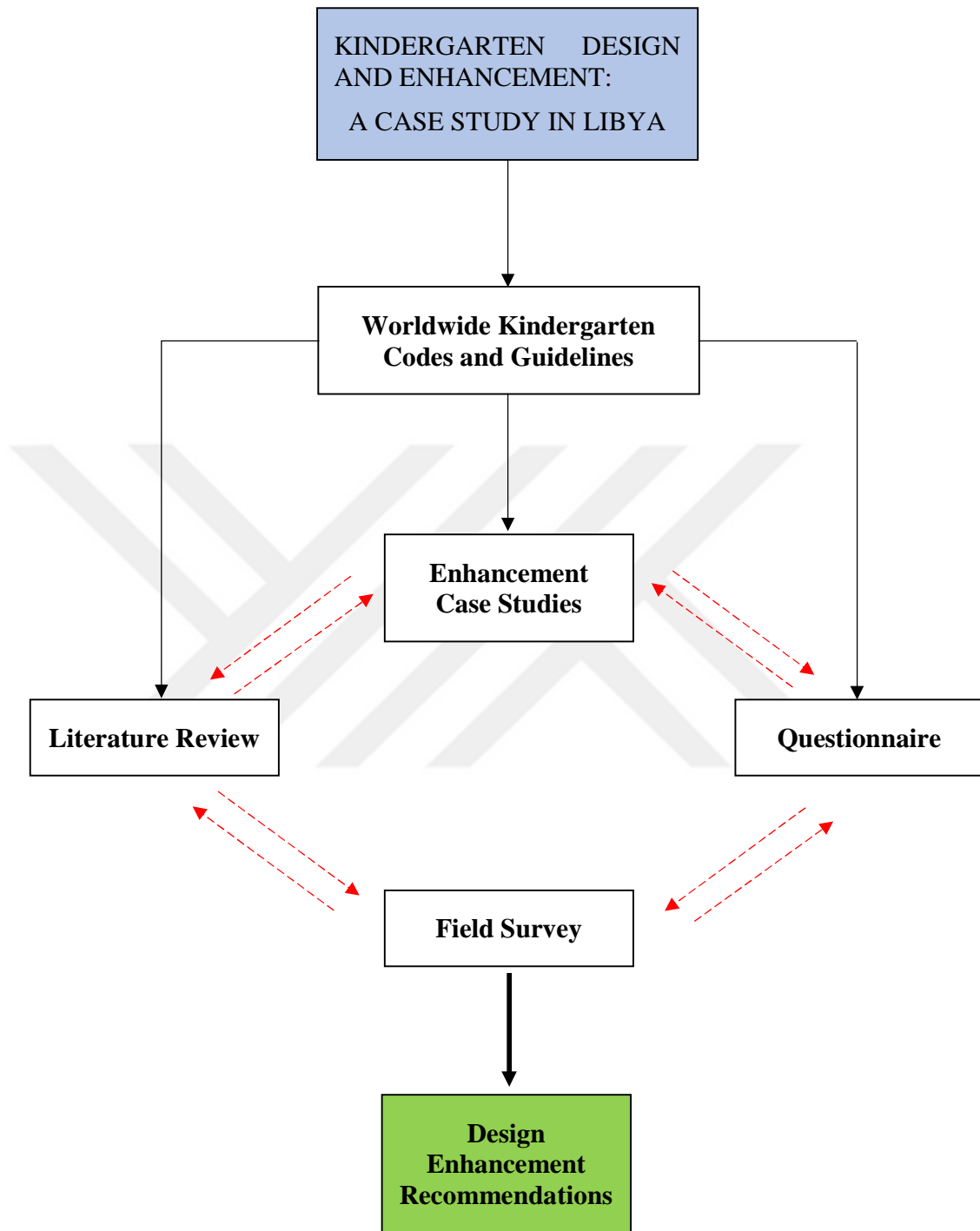


Figure 1.1: Methodology Summary and Structure

2. KINDERGARTEN: HISTORY, DEVELOPMENT AND DESIGN

2.1 History of Kindergarten and its Educational Value

2.1.1 Development of Kindergartens in History

Kindergarten or preschool education evolved in Germany in the 19th Century by the German education specialist Friedrich Froebel, who based this initiative on the thoughts of Rousseau in France and Pestalozzi in Switzerland. The idea was initially faced with criticism, especially that it accompanied the industrial revolution, which believed that schools are meant to produce productive adults (Passe, 2010). In 1886, France pioneered the movement by including the kindergarten into the official education system. Nonetheless, the spread of the idea started in the 1960's with more countries adopting the preschool education as part of their curricula led by the UNESCO (Kammerman, 2006). A survey by UNESCO, which included more than 67 countries in 1974, identified the objectives of preschool education as:

1. Providing the necessary care for the children in order to enable the mothers to work.
2. Providing a means for social interaction between children at an early stage.
3. Developing the critical thinking skills of children.
4. Developing children's capabilities as a preparation for grade school.
5. Enabling an overall development of the children (Kammerman, 2006).

Moreover, the goal of Froebel when establishing the preschool project was to expose children to different learning environments and methods such as using music, storytelling and games to implant the needed social and national value into children's minds (Passe, 2010). The idea then spread widely after its implementation in Europe and the United States around the 1910s. The First kindergarten in the United States, which was based on Froebel's philosophy, was opened in Wisconsin in 1856, while other initiatives based on the same model were opened in Boston in 1860 and Saint Louis in

1873 (Larner, 2014). With the development of the idea, the kindergarten became a basic educational phase in many developed countries as a means of empowering their education system.

However, it is observed that the institutionalization of kindergarten education is still a problematic issue in the Middle Eastern countries. In the 1990's, the rate of development of kindergarten education had many differences of application in several Middle Eastern countries. While some countries had significant kindergarten enrollment ratios, such as Saudi Arabia with 21% and Jordan with 38%, the Libyan enrollment ratio remained only at 4% (Kameran, 2006).

2.1.2 The Educational Goals of the Kindergarten

The main goal of the preschool education is described as to enable the child to establish a self-awareness within his/her social surrounding (Mindes, 2005). In order to maintain this goal, the kindergarten education was based on three main elements:

1. Knowing the child, which means that a positive and close relation shall be established with the child by the teacher; providing the needed flexibility to enable the child to adapt to the environment, including the traditional and cultural contexts within the curriculum.
2. Establishing the class community, which means making the children a team with the environment by establishing them as the responsible owners of the belongings of the classroom environment, such as the chairs and closets; enabling each child to share their home culture; familiarizing the children with the rules of interaction; and developing the team work spirit between the children.
3. Building the classroom structure, which assigns specific functions to the parts of the classroom according to children's different activities, such as circle area, activities area and storage areas (Gullo, 2006).

Based on Froebel's philosophy, the kindergarten is described as a way to stimulate the child's learning and thinking ability through games and playing activities, which makes

the classroom activities and the playground the most important elements in the pre-school setting. As identified by Froebel as “the highest phase of child development”, playing is one of the most important natures in the child that could be utilized to achieve the objectives of the pre-school phase (Russell & Aldridge, 2009). There are several abilities that need to be developed in the educational programs of kindergartens, including critical thinking, creativity, problem solving, and social integration techniques (Buten, 2010; Novakovic, 2015).

In child education and development, several teaching and learning theories were developed in order to ensure the best quality of education through a set of defined goals. As stated previously, one of the first teaching theories was developed by William Froebel in the 19th century, who is considered as the father of kindergarten education. According to Froebel, education mainly emerges from the relationship between the human being and God. Therefore, Froebel believed that the best way of education is the one that enables the person to lead himself to knowledge. Froebel established a kindergarten in 1840, where children were allowed to establish their own experiences, observe different phenomena, and socialize with each other in order to discover new knowledge. The teaching methods adopted in the theory of Froebel relied primarily on discovering the God’s gifts given to the children by letting them show their creativity, using certain songs that were authored by him, and utilizing games to strengthen the sense of community and socialization (Baidya, Mondal, & Saha, 2015).

At the beginning of the 20th century, Carl Gustav Jung established his ten pillars to education. The Jungian theory explained that the teacher, the student and knowledge are three components of the educational process and the education should not be focused only on technical knowledge and rationality. Jung considered pitfalls in the education process as constructive incidents that could be learned from for better enhancements in the educational relationships, as well as considering education as part of fixing any psychological issues associated with the process. Nonetheless, the Jungian theory focused on the spirituality of the education process, which explained its relationship with religion and culture (Mayes, 2005).

There appeared several theories about child development and learning in 20th century, such as the Maturationist Theory, which was developed by Arnold Gessell, who attributed child development to a sequential biological process that happened over time; Environmentalist Theory, which was developed by theoreticians such as B.F. Skinner and Albert Bandura, who claimed that the learning and behavior of the child is shaped by the surrounding environment; and Constructivist Theory, which stated that learning and development took place when children interacted with their environment as active participants(KENPRO, 2010).

Under the scope of Constructivist Theory, we might list several different theories such as the Cognitive Theory of Jean Piaget, educational theory of Maria Montessori and contextual theory of Lev Vyogotsky(KENPRO, 2010). In his Cognitive Theory, Jean Piaget examined child learning and saw it as a sequential process that increases its maturity with age, as the child developed his/her knowledge base or schemas. Maria Montessori on the other hand, developed an educational theory and method, where ideas from many previous scientific disciplines were gathered, such as anthropology, medicine and education(KENPRO, 2010). The Montessori method, which was developed in 1903, appeared one of the techniques that considers the child as the center of the education, where the academic and social skills of the curriculum is mainly targeted on an interaction with the child and the learning environment is seen as an integral part of this system (Mallett & Schroeder, 2012). Several studies have proven Montessori method's positive impacts on the social, emotional and cognitive abilities of the children. In a study that compared the method with the traditional method in India, children with schools adopting the Montessori method have demonstrated a better understanding of the self-concept, which reflects on their confidence (Shivakumara, Dhiksha, & Nagaraj, 2016).

Today in many parts of the world, the educational methods followed by pre-schools are in line with the theories of the Constructivists (KENPRO, 2010).The preschool education is accepted to have several important goals and advantages that are identified through advanced models in developed countries, such as Finland. It is accepted that the kindergarten education develops the child's sense of connection with his/ her

environment including the society, family, nature and life in general. It develops child's learning and thinking ability through playing activities where the child is able to interact with natural materials such as wood and sand and it also enables the child to interact with technology and virtual realities through computers, internet and gaming (Uusiautti, Happonen, & Maatta, 2014). Therefore, child education is not seen to be limited to numbers, language and discipline, but it is extended to include communication and social skills (KENPRO, 2010).

2.2 Kindergarten Design and Impact on Children

2.2.1 Kindergarten Design and Its Relationship with Children's Behavior

Many research results demonstrate that the design of kindergartens has a crucial impact on children's behavior and the implementation of the educational goals of a kindergarten. It has been shown that the interior environment of the kindergarten and its exterior playground have major effects on the development of the learning and thinking skills of the children. The research verifies that the design environment affects the physical, intellectual, perceptual, motor and sensual development of children (Sternberg & Lubart, 1991).

In a research that examined the impact of kindergarten design on the social skills of the children, it has been found out that the spaces of the preschool education have a significant impact on the child's perception of learning, ability to control social behavior, personal interaction with peers and teachers, and problem-solving approaches (Kumtepe A. , 2006). It has been confirmed by this study that the design of the physical environment of the kindergarten has an impact on the behavior and performance of children in the classrooms. For instance, children exposed to more natural lighting have found to be performing better than other students. In addition to that, other indoor environmental qualities including temperature, acoustics, and air quality were also proven to be effective in increasing the attendance and learning of children, if the adequate limits were satisfied (Kumtepe A. , 2006).

The classroom layout, colors and objects used in the classroom environment were also found to influence the interaction of the children and their relationship with their environment (Cheryan, Zeigler, Plaut, & Meltzoff, 2014). Especially in relation to the colors that are used in kindergarten spaces, several studies have shown that different colors had different impacts on children and their cognitive performance and learning in kindergarten spaces. The results of a study that surveys the impact of different colors in kindergarten spaces show that the purple color used in interior spaces simulated the highest levels of happiness and excitement, in comparison with other colors. Moreover, the yellow color helped the children to perform better in reading and figure analysis and, the orange color showed the best results in terms of the motor skills. (Brooker & Franklin, 2016). A different study again on color has shown that among three colors; red, grey and green, the red color has simulated the most negative emotional effect on children between five and ten years old (Gil & Le Bigot, 2015).

In relation with the impact of the spaces of a kindergarten on children's behavior, an American study, which examined the performance of three types of playgrounds in kindergartens, has shown that children had their preferences of specific types of spaces in relation to their support towards their interactive playing patterns. The study examined the traditional, contemporary and adventurous types of playgrounds and the authors monitored these playgrounds in order to measure children's behaviors in each type and conducted interviews in order to ask the playground's users their opinion and preferences. The type of the playground is categorized as traditional, contemporary and adventurous, according to the playing equipment that are supplied for the children. The traditional playground is the one, which is supplied with equipment that can be found in the public parks, such as swings, slides and climbing bars. The contemporary playground includes the equipment that are similar to the traditional playgrounds' but with more simulating textures, forms and heights, using sand and concrete to stimulate the creativity of the children. The adventurous playgrounds on the other hand are those that do not include traditional playing equipment but depend mainly on materials that can be found in real-life settings, such as houses, walls, fences, and wooden structures (Hayward, Rothenberg, & Beasley, 1974).

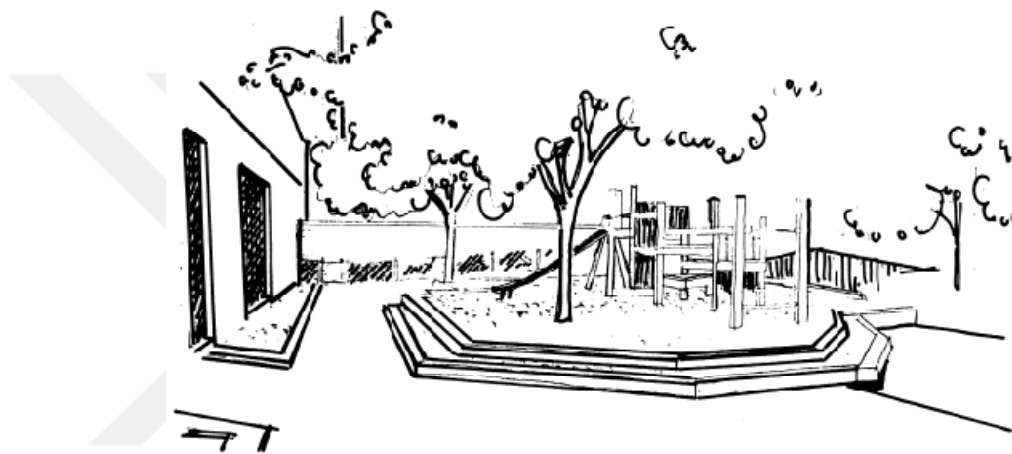
In this study, the pre-school age category formed 29.48%, 35.23% and 1.74% of the traditional, contemporary and adventurous playgrounds, respectively. The study found that although children in different age groups gained an enjoyment in all types of playgrounds, pre-school children preferred the slides in the traditional playground more and created more interactive playing patterns (Hayward, Rothenberg, & Beasley, 1974)

However, another study that examined children's preferences for playground designs in kindergartens suggested that children prefer using contemporary playgrounds more than traditional playgrounds, as their designs enabled the educational purpose of the facility more through interaction with natural materials like sand and rocks. In this study, six playgrounds were selected from different kindergartens and the study involved 72 pre-school children distributed equally to each one of them. The study evaluated the time the children spent on different parts of the playgrounds and examined children's behaviors in seven headings:

1. Positive social behavior
2. Negative social behavior
3. Language usage
4. Energy levels
5. Motor ability
6. Balance
7. Object handling

The results showed that the children exhibited better social behavior in two specific sites, which contained more contemporary elements (Brown & Burger, 1984). These two specific sites, as a result of their use of contemporary elements, provided the children with more opportunity to interact, enabling different groups to use the playground and allowing them to observe social interactions between their peers. They enabled children to explore the environment, and experiment with natural materials and allowed children to experience physical stability, space and dimensions. These two sites were also more accessible, more protected from outside hazards, had more storage space and had easy maintenance.

The authors also added that these results were strengthened with the more pleasing aesthetics of the sites, the use of natural materials such as wood and sand, and use of multiple platforms, which allowed the children to climb on them (Brown & Burger, 1984). Figure 2.1 below show the two playgrounds sketches provided by the study.



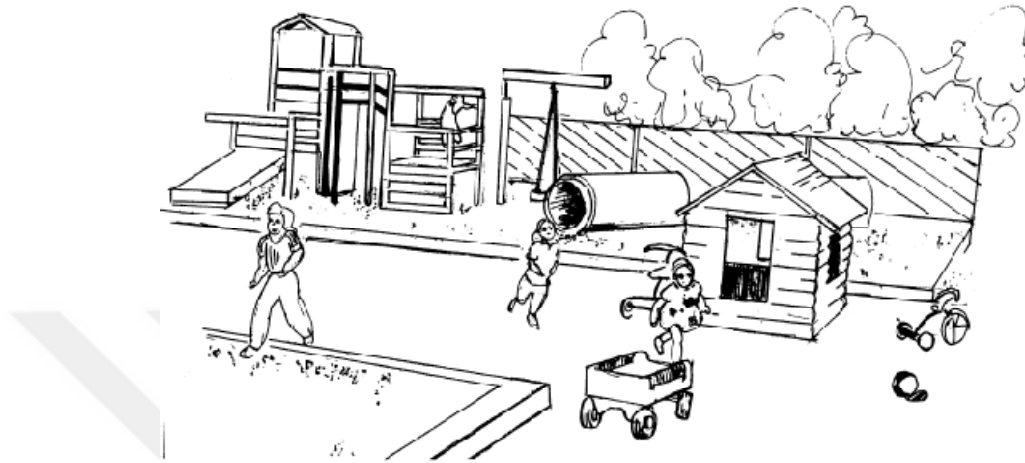


Figure 2.1: Children response to pleasing, natural and more dynamic playgrounds (Brown & Burger, 1984)

The studies that are discussed in this section show that the design of kindergarten spaces and the way different facilities are housed within the kindergarten have a direct and indirect impact on the behavior of the children. The kindergarten should empower the interaction between the children and their environment through communication and observation. Therefore, kindergarten design should allow the children to strengthen their bond with nature and human beings, while protecting them from any possible hazards.

2.2.2 Gender and Age Response to Kindergarten Design Elements

The design elements used in kindergartens also affect the behavior of children depending upon their genders and ages. The role of the age and gender factors in the preferences and usage patterns of educational facilities is confirmed through the

literature (Lang, 2010). Studies show that different age groups and genders feel that they need to be distinguished through the different design elements included in the kindergarten (CP, 2012).

A study that examined the response of young children to six different environmental characteristics, which are the size, shape, color, complexity, texture and lighting, found out that the age and gender played a major role in children's choices and preferences of design elements. The study involved 74 children from the pre-school and first grade ages, who were introduced to three different models of kindergartens. It was shown that both boys and girls responded strongly to color, however the girls selected more rich, detailed and brighter color than boys. Also, girls chose brighter lighting and more complex textures than boys, which indicated the presence of complexity in their choice. However, it was also shown that the boys responded stronger to sizes and dimensions through paying more attention to these factors. For the age parameter, it was shown that younger children responded stronger to the size and texture elements, while elder children responded stronger to the shape, complexity, color and lighting elements (Cohen & Trostle, 1990).

A study on kindergartens in Malaysia showed that the design elements affected the behavior of children of different ages and genders in the kindergarten in terms of four main aspects, which are movement, comfort, competence and control. The results of the study show that designing the kindergarten's classroom with scales that fit children's sizes allows them to navigate through the environment, while providing a quality indoor environment that enhances their performance and interaction. Moreover, considering the age and gender of the children in designing the different elements of the kindergarten enables them to expand their learning abilities according to their personalized characteristics and allows the kindergarten staff to have more control on the performed activities for the children's safety (Mohidin, Ismail, & Ramli, 2015).

The above studies show that considering the age and gender in kindergarten design and the use of kindergarten design elements is essential in identifying the design criteria that are included in the preschool facility. The main consideration is that the users of the space are children within the early years of their life, who differ with adults in judgment

and size. Moreover, in mixed-gender facilities, the differences in gender shall be considered through the different activities that are implemented in the kindergarten design, including classroom, playground and supportive facilities for sanitary and dining.

2.3 Kindergarten Design Considerations and Guidelines

2.3.1 General Design Considerations

As it has been observed in the previous section, the design of kindergartens has a crucial impact on children's behavior and the implementation of the educational goals of a kindergarten. The design of the preschool facility has to support its goals in reinforcing the ability of the child to discover himself/ herself and his/ her environment. The design should simulate the creativity in the child, while allowing him to critically think about issues and interact with their peers in order to enhance their social skills. These goals can be stimulated through implementing a design that provides a healthy indoor environment, as well as using design elements that motivate children to perform various activities.

The studies show that the connection between children and their environment allows them to socially strengthen their bonds with their peers and nature. Creativity in implementing design elements, especially in the playground area, enables children to simulate real life situations, where different social activities can be practiced. Furthermore, taking into consideration the age and gender differences in kindergarten design is important in facilitating and improving the user experience.

2.3.2 Kindergarten Design Guidelines

In order to understand the necessary factors to be evaluated in terms of the design of kindergartens, the design considerations and guidelines developed from around the world should be examined to form an educated approach to kindergarten design and enhancement. The following section will include a review of codes and guidelines,

which are developed in terms of the design aspects of kindergartens and child care centers in Canada and USA.

2.3.2.1. Kindergarten Design Guidelines in Canada

In the design guideline for child care centers of the Ministry of Children and Youth Services in Ontario County, Canada (MCYSOC, 2006), the following general conditions are deemed suitable for preschool children's kindergarten's environment:

1. The design of the classroom for children in the preschool level should enable them to *interact in events and activities* of all types in order to improve their sense of independence and personal skills.
2. The classroom should be equipped with a *carpet* in order to let the children to sit and talk and form social relationships.
3. *A designated and separated area should be given to each activity* performed in the classroom, which means that there should be an area for reading and another area to examine science and similarly for other activities. This designation could be achieved *through the way the tools and furniture are located*. This aims to grow the sense of organization within the children and ease the stream of activities in the learning environment.
4. The *toilets* should be spacious and equipped with *amenities that are sized for the children* aiming to teach them to depend on themselves.
5. The environment should *include variety of colors and textures* in order to enable them to discover their environment and learn.

Moreover, the guidelines provide the following specifications:

1. The activity room should *include 24 children only at 2.8 m² per child*.
2. The kindergarten should have *hand washing areas, clothing area, bathrooms, a place for privacy and a store*.
3. If children stay more than six hours in the kindergarten, the space specifications should be considered as the following:
 - a. *Windows* should be clear, and their total area should not be less than ten percent of the space's floor area.

- b. A *store* should be provided for *the beds, mattresses, sheets and pillows*.
 - c. A *designated area* should be available for *eating and resting*.
 - d. An *area* for *preparing meals*.
 - e. An *area* for *management and teacher's offices*.
 - f. A *store* for *outside activities' equipment*.
4. The area of the *activity and play room* should have *no obstructions* and it should be designed for a *maximum of twenty children* with 2.8 m^2 for each child.
 5. Kindergarten should have *specific bed for each child* with the dimensions of $0.6 \text{ m} \times 1.575 \text{ m}$.
 6. If *beds are* located *in the activity area*, they should be considered *asan obstacle* and their area should be subtracted from the activity area.
 7. The space *should allow for tables to be provided for meals*.
 8. The *storage shelf of each child should be separated* from each other for lice transfer prevention.
 9. The kindergarten should be equipped with *apreparation counter*, with the height of 90 centimeters, with a sink and lockable cabinets.
 10. *Sinks* should be provided for children with a *maximum height of 55 centimeters*.
 11. *Wheelchairs* should be provided for emergencies and special needs.

The supporting facilities of the kindergarten should have a minimum of the following along with their guidelines:

1. *Entrance Area*: this area should be *hospitable* and provided with *supervision* and should be *linked* to the facilities directly. There should be no corridors between the entry and the children area. If the entry is far from the children area, signage should take that into consideration especially for that purpose. No other exits and entrances should be placed at the area and it should accommodate the children, their parents and the kindergarten's staff. The children storage should be located the closest to the entrance.
2. *Corridors*: These facilities should be at the *minimum number and length*.

3. *Offices*: including meeting tables and storages. The location of the offices should be with a *good sight of the entries and exits*, and it should be equipped with all communication means.
4. *Room for the kindergarten's staff*: located for the best area for *emergencies*. This facility should enable the staff to rest and store their belongings. Moreover, the facility should be equipped with phone and internet, book shelves, whiteboards, sofas and a fridge.
5. *Toilets*: According to the age category, a set of a toilet and a sink should be provided for every 10 children as a minimum.
6. *Staff toilets*: Standard adult toilets.
7. *Children toilets*: Should be *located away from public access*. The sinks with mirrors, soap dispenser and towel places should not exceed *the 55-cm height*. The toilets should be accessible by children, provide privacy, and easy to supervise from the activity area.
8. *Store*: should be organized and considering a *0.55 m² per child*.
9. *Staff closet*.
10. *Equipment store*.
11. *Beds store*.
12. *Diapers changing area*.
13. *Laundry*.
14. *Kitchen*.

2.3.2.2. Kindergarten Design Guidelines in USA

The General Services Administration Guideline of USA provides specific instructions on the different parts of the pre-school environment by making special emphasis on the constant required visibility of all the children by their teachers at all times, especially when they are at the infant phase (GSA, 2003). The guidelines stress on not treating all the children within the kindergarten environment as of one level, which means that infants and toddlers shall be given specific facilities to use according to their age, such as:

1. Distributing the storage facilities according to child's needs.

2. Adopting the height of the shelves to be on the level of the children so they can reach the teaching material and toys.
3. Providing an excessive floor area for the children to perform the different activities.

Figure 2.2 below shows the adoption of the school facilities according to the child's age as per the GSA standards.

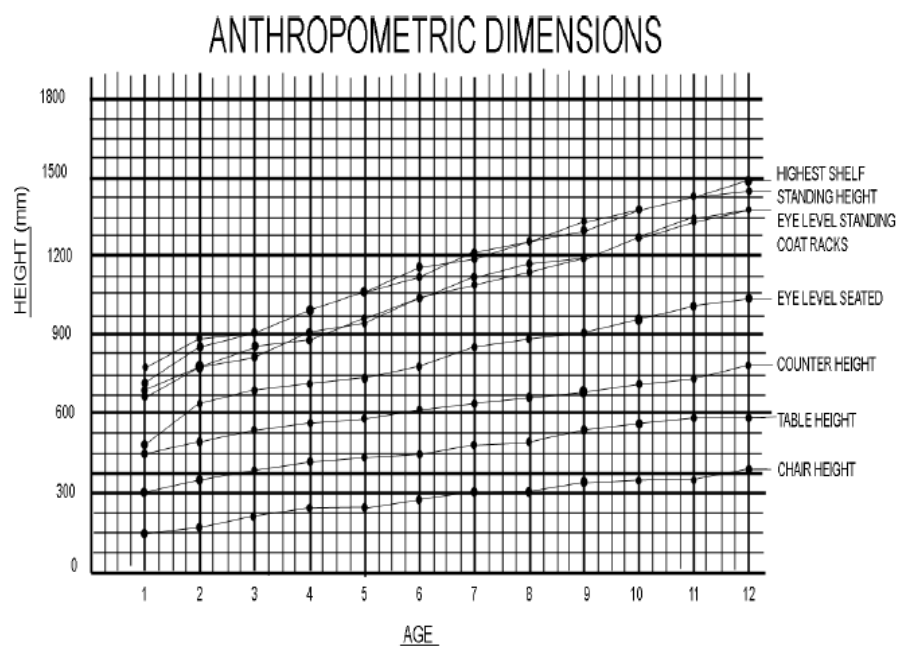


Figure 2.2: Adaption of school facilities according to the GSA guidelines(GSA, 2003)

The GSA identified the goal of the kindergarten's physical environment as "fosters optimal growth and development through opportunities for exploration and learning". Therefore, these guidelines specified the design requirements of the kindergarten as follows:

- *Location:* the kindergarten facility shall not be developed on a site that is primarily an agricultural land, its elevation shall be 5 feet or less than the flood plane in the past century, inhabited by endangered species, or 100 feet closer to water planes.

- *Capacity*: the minimum capacity of the kindergarten is 74 children and the maximum capacity is 150 children.
- *Space*: the space measurements ratio of the facility shall be according to the specification of Figure 2.3 below.

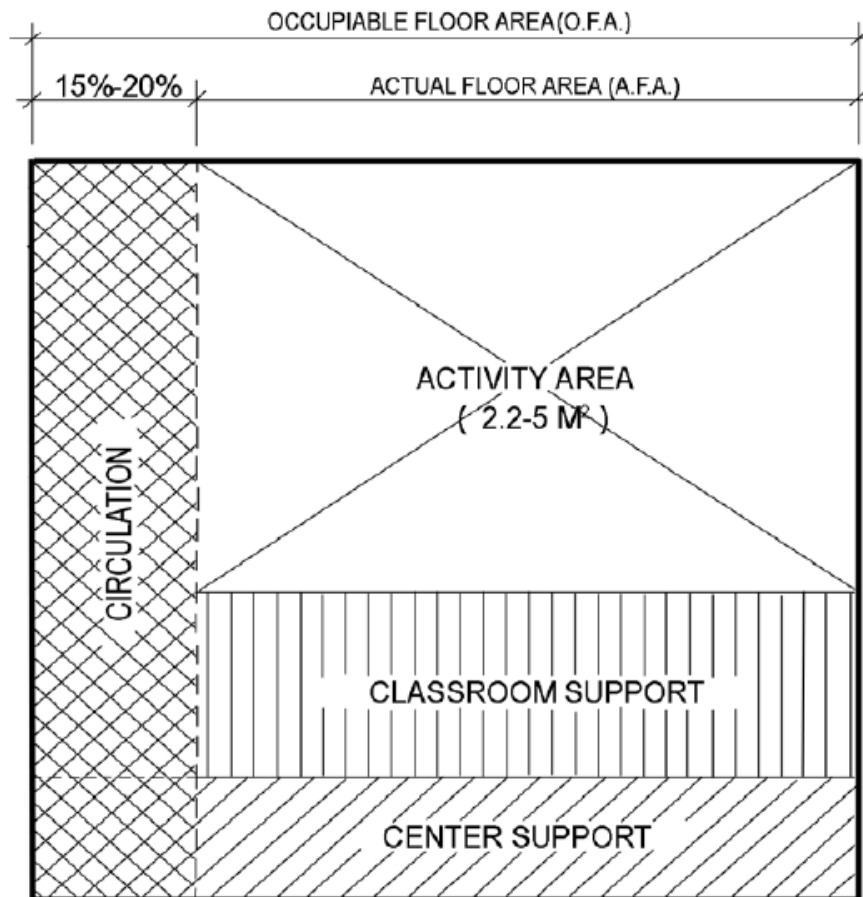


Figure 2.3: Space measurement ratio as per GSA (GSA, 2003)

The Figure 2.3 above provides the general guidelines for dividing the areas in the kindergarten facility between Occupational Floor Area (OFA) and the Actual Floor Area (AFA). Tables 2.1, 2.2, 2.3 and 2.4 summarize the spaces' requirements per child according to the GSA guidelines as per the child's age, which are divided into 4 main age categories; infants, young toddlers, old toddlers and pre-school, and shown in an example of a kindergarten design.

Table 2.1: GSA areas for infants (n=8)(GSA, 2003)

Area	Area size AFA per child	Unit OFA	Total OFA Area
Activity area	2.2 m ²	+25%	23.0 m ²
Cubby Storage	0.43 m ²	+25%	4.6 m ²
Food preparation	0.43 m ²	3.5 m ²	3.5 m ²
Eating area	0.57 m ²	4.6 m ²	4.6 m ²
Nursing	0.22 m ²	1.8 m ²	1.8 m ²
Sleeping	2.52 m ²	+25%	26.9 m ²
Diapering	0.45 m ²	3.6 m ²	3.6 m ²
Adult toilet	0.72 m ²	5.8 m ²	5.8 m ²
Storage	0.17 m ²	+25%	1.8 m ²
Total		9.45 m² OFA per child	75.6 m²

Table 2.2: GSA areas for young toddlers (n=12)(GSA, 2003)

Area	Area size AFA per child	Unit OFA	Total OFA Area
Activity area	3.80 m ²	+25%	57.0 m ²
Cubby Storage	0.52 m ²	+25%	8.4 m ²
Food preparation	0.28 m ²	3.4 m ²	3.4 m ²
Napping	0.41 m ²	4.9 m ²	4.9 m ²
Two handwashing sinks	0.19 m ²	2.3 m ²	2.3 m ²
Two toddler toilets	0.31 m ²	3.8 m ²	3.8 m ²
Diapering	0.38 m ²	4.6 m ²	4.6 m ²
Storage	0.30 m ²		3.6 m ²
Total		7.3 m² OFA per child	88.0 m²

Table 2.3: GSA areas for old toddlers (n=14)(GSA, 2003)

Area	Area size AFA per child	Unit OFA	Total OFA Area
Activity area	4.0 m ²	+25%	70.0 m ²
Cubby Storage	0.53 m ²	+25%	9.8 m ²
Art sink	0.16 m ²	2.2 m ²	2.2 m ²
Two handwashing sinks for children	0.25 m ²	3.5 m ²	3.5 m ²
Two children's toilets	0.39 m ²	5.6 m ²	5.5 m ²
Diapering	0.33 m ²	4.6 m ²	4.6 m ²
Storage	0.18 m ²	+25%	3.4 m ²
Total		4.95 m² OFA per child	99.0 m²

Table 2.4: GSA areas for pre-school children (n=20) (GSA, 2003)

Area	Area size AFA per child	Unit OFA	Total OFA Area
Activity area	4.4 m ²	+25%	110.0 m ²
Cubby Storage	0.53 m ²	+25%	14 m ²
Art sink	0.20 m ²	4.0 m ²	4.0 m ²
Two handwashing sinks for children	0.25 m ²	5.0 m ²	5.0 m ²
Two children's toilets	0.40 m ²	8.0 m ²	8.0 m ²
Storage	0.18 m ²	+25%	4.5 m ²
Total		7.28 m² OFA per child	145.5 m²

- *Outdoor play areas*: these areas shall support age separation. For instance, infants' play area shall allow the children to crawl by using soft material, while pre-school children can be introduced to water and sand areas to empower their

creativity. Nonetheless, all play areas shall be equipped with safe toys that eliminate injuries such as open non-metal slides with high sides.

Furthermore, the GSA guidelines put many requirements on other kindergarten elements, as the following:

- *Fences/openings* shall be larger than 87 mm to avoid finger and hand injuries, with 1830 mm height, which increases to 2440 mm if the fence was adjacent to dangerous areas such as roads. The maximum bottom gap of the fence shall be 76 mm.
- *Plants* in the kindergarten facility shall be non-toxic.
- *Pathways* shall be ranging from 1830 mm to 2440 mm with slopes less than 1:20 ratio.
- *Railing* shall be made for the minimum height of the children of 510 mm and the maximum of 915 mm, which means two railings at each handrail. Moreover, guardrails shall be provided for any two areas with height difference of 300 mm.
- *Shading* shall be provided for all outdoor areas.
- *Soft corners* shall be provided at all edges.

The GSA guidelines provide many details on the facilities of the kindergarten. However, the main concern of these instructions is to provide the safest environment for the children considering the age difference requirements.

2.4 Kindergarten Design Reviews

2.4.1 Review of Kindergarten Designs from USA

In this section, the results of a thesis comparing the interior designs of two schools in the United States are reviewed; Candor and Fort River. The two schools contained kindergarten facilities, in addition to the primary school grades. However, in studying the preschool parts of each school, the author criticized the different design elements of both facilities(Cole, 2011).

At the Candor elementary school's kindergarten, shown in Figure 2.4 below, the author highlighted the following(Cole, 2011):

1. The space provides cubbies for children's belongings.
2. Although the area is divided into activity areas, the design seems compact, which would not allow the school to provide larger educational material.
3. One of the unique designs is the U-shaped table which allows interaction between the teacher and all the students.

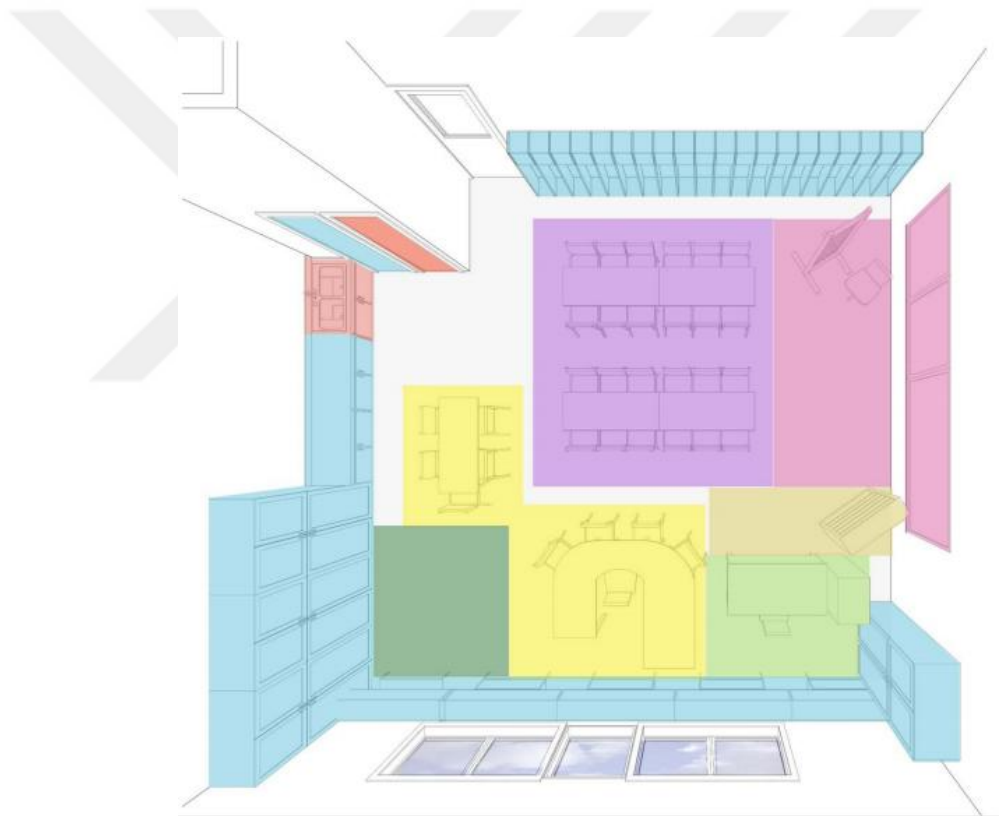


Figure 2.4: Kindergarten design at Candor Elementary School(Cole, 2011)

At the Fort River elementary school's kindergarten, shown in Figure 2.5 below, the author highlighted that the areas are more distinct and larger than the reviewed design at the Candor, which allows for more activities (Cole, 2011).



Figure 2.5: Kindergarten design at Fort River Elementary School (Cole, 2011)

2.4.2 Review of Kindergarten Designs from Japan

The Japanese model is one of the most significant examples in this field due to the continuous work performed to enhance the education services in the different grades and levels. Therefore, the Ministry of Education, Culture, Sports, Science and Technology in Japan issued a report where five ideal kindergarten design examples are recognized for other facilities to implement similar design strategies. The Five kindergartens where evaluated are based on six parameters(MECSST, 2010):

1. Designing the kindergarten environment to support a diversified life experience for the children.
2. Improvement of facilities to empower the connection between the school, the family and the area.
3. Making a design that supports the smoothest transition from the kindergarten to grade school.
4. Providing spaces to enhance children's fitness.
5. Designing and educating for special needs.
6. Making a sustainable and environmental design.

On those criteria, each kindergarten has complied with three points, which qualified them to be part of the exemplified per-school facilities in the country. Table 2.5 below shoes the five kindergartens and their compliance with the targeted design parameters.

Table 2.5: Compliance of the Japanese kindergarten's examples with the design parameters (MECSST, 2010)

Design Parameters	Yotsuka Satsuki	Fuji	Hachiman	Takachiho	Nakajima
Designing the kindergarten environment to support a diversified life experience for the children	●		●	●	●
Improvement of facilities to empower the connection between the school, the family and the area.	●	●	●		●
Making a design that supports the smoothest transition from the kindergarten to grade school			●		
Providing spaces to enhance the children's fitness	●	●		●	
Designing for special needs				●	

Making a sustainable and environmental design		●			●
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Based on the above design parameters, one example of each design parameter is reviewed from the different kindergartens.

- **Diversified life experiences**



Figure 2.6: Children at Hachiman kindergarten harvesting vegetable and cooking them as part of the daily program (MECSST, 2010)

- **Sustainable and environmental design**



Figure 2.7: An environmentally friendly design of the rooftop at Fuji kindergarten, part of the playground, designed to sustain an existing tree and strengthen the children's tie with the environment (MECSST, 2010)

- **Supporting smooth transition from kindergarten to grade school**



Figure 2.8: A gallery play area, with vision walls, that is designed to allow children from elementary school to play with the kindergarten children establishing a social bond through playing at the Hachiman kindergarten (MECSST, 2010)

- **Empower connections with the community**



Figure 2.9: Parents are allowed to enter the lunchroom at the Fuji kindergarten establishing the tie between the kindergarten and the community (MECSST, 2010)

- **Designing for special needs**



Figure 2. 10: A toilet designed for special needs at the Takachiho kindergarten (MECSST, 2010)

- **Supporting Children’s fitness**



Figure 2.11: Designing an open floor area, with the same floor level, to allow children to run and play at the Takachiho kindergarten(MECSST, 2010)

2.4.3 Review of Kindergarten Designs from Finland

The Finnish preschool education is built to empower playing as a means of education, taking into consideration the children's nature at the kindergarten level and their fondness of games, which helps delivering the expected results (Kitta & Kapinga, 2015). The Finnish kindergarten experience is becoming an example for developed countries, such as the United States, as a means to empowering more play time to replace the intensive literature and science education. Moreover, due to the fact that children tend to play more than be disciplined in a classroom environment, experts insist that implementing a curriculum that is based on playing with educational purposes is more effective than the traditional preschool curricula (Walker, 2015).

A study that was performed in a kindergarten in Helsinki, where teachers who implement the "playful" kindergarten were asked about their view of play in education, the methods used to implement the idea, and the types of play that are used in the Finnish kindergarten. The research concluded that the teacher plays a major role into implementing the strategy with the children, in addition to providing the necessary facilities and tools by the kindergarten. The teacher takes the role of the "leader" to perform certain playing types such as educational play, the role of the "allower" when children are playing freely, and the role of the "afforder" when the education process requires a learning process in order to challenge the children and protect them (Hyvonen, 2011). Figures 2.12 illustrate an example from a kindergarten in Finland.



Figure 2.12: Focusing on outdoor playing and learning through storytelling and circles at the Finnish American kindergarten in Helsinki (Fin-Am Kindergarten, 2017)

3. CASE STUDY: KINDERGARTENS IN LIBYA

The Libyan context possesses a different sociocultural and educational background than the context of the standards and cases reviewed in the literature survey. In order to approach this case study with a more accurate perspective, these differences, as well as the existing similarities in the Libyan context should be put forward at the beginning of the case study.

The sociocultural and educational context of Libya is very much influenced by the practices of the Islamic religion. The curricula adopted in the public and private grade schools in Libya are generally influenced by the Islamic teachings and the extent of its application in the Libyan society. The literature shows that the Libyan culture and religion effectively influence the way the organizations of different types operate in the country (Bezweek & Egbu, 2007). The curricula adopted in the pre-school level however show similarities with that of the cases reviewed in the literature survey.

In accordance with the Islamic custom, gender segregation is applied in several schools according to the cultural views of the city that they are located in Libya. Cities like Tripoli do not segregate genders until the secondary school education and cities like Zlitan apply segregation in grade schools. Generally however, there is no gender segregation in pre-school education.

The grade school education in Libya consists of twelve main obligatory grades, which are preceded by a pre-school education. The preschool education however, is not obligatory and the studies show that only 9% of the Libyan children attend the early childhood care and education program. There are four main methods for pre-school education in Libya, which are the clubs, home education, mosques and kindergartens. Of the 9% that attend the early childhood care and education program, 63% attend kindergarten. The socioeconomic, geographic and educational status of the Libyan society affects the life quality and development that are provided to children. The

poorest 20% of the Libyan society has only 5% chance to attend an early childhood care and education program (El-Kogali & Krafft, 2015).

The research shows that although there are apparent differences between the sociocultural backgrounds of the reviewed cases in the literature survey and the Libyan case, the educational program and space usage in kindergartens carries many similarities that makes the comparison and conformity analysis possible in terms of the physical design considerations of the kindergartens in Libya. On these terms, this case study will examine the design of the Libyan kindergartens in terms of their physical design considerations and will attempt to evaluate them according to the acknowledged kindergarten design standards and guidelines.

In order to make a more detailed conformity analysis in terms of the physical design considerations of the kindergartens in Libya, the case study of this research is divided mainly into two parts: an architectural assessment, which studies nine kindergartens in Libya and a subjective assessment, which involves a survey questionnaire filled out by the staff and parents of the each of the studied kindergartens. In order to have a representative assessment of the Libyan case, the nine kindergartens are chosen from three different cities in Libya, which are Tripoli, Misrata and Zlitan. Three kindergartens are selected from each of the three cities. In all the studied kindergartens, the ages of the affected children is between 3 and 6 years old. In the following paragraphs the selected kindergartens will be architecturally analyzed and compared with the acknowledged kindergarten design standards and guidelines.

3.1 Architectural Assessment of Kindergartens in Libya

As reviewed in the previous chapter, according to the acknowledged kindergarten design guidelines, there are minimum specifications that are set for kindergartens and pre-school facilities for allowing the healthiest experience by the users, as well as for ensuring that the kindergarten is safe and suitable for the purpose and the age of the children. In this architectural assessment, a conformity analysis is made to evaluate the studied kindergartens with respect to these design guidelines. In the scope of the

architectural assessment, a description of each of the nine participating kindergartens is made and the floor plan of each kindergarten was prepared based on the field survey done by the researcher. The researcher has used code names for the kindergartens depending on the city that they are located in for confidentiality (such as Tripoli A, Tripoli B etc.). As a result of the assessment, a conformity analysis was carried out and a compliance table was prepared in order to demonstrate the compliance extent of each kindergarten with the guidelines of the (MCYSOC, 2006) and (GSA, 2003), due to the lack of pre-school design requirements in Libya.

3.1.1. Architectural Assessment of the Kindergartens in Tripoli

Tripoli, which is the first city of the research, is the capital of Libya and the largest city in the country. The municipal area of the city exceeds the population of two million people since 2005. The city lies on the northern African coast and is considered one of the most important seaports in the continent due to its close geographic location to Europe. The climate of the city is Mediterranean, which is wet in winter and dry in summer, and the highest precipitation is in November. In terms of our subject matter, it is observed that currently there are 60 kindergartens in Tripoli. Figure 3.1 shows the location of Tripoli on the map.



Figure 3.1: Location of Tripoli in Libya

The first kindergarten in Tripoli, which will be called as Tripoli A, is a one-story building, with a plan as shown in Figure 3.2. It is observed that the playground zone in the plan is a connector between the main gate of the facility and the entrance to the main building. A distribution hall leading to a corridor is the main circulation facility. The entrance hall directly leads to the toilet and staff area, where good supervision on entries and exits can be facilitated. A single corridor from the main hall distributes to five classrooms, the kitchen and the activity room. This kindergarten has an average of 25 children per classroom, its activity area has an area of 96 m² and each of its classrooms have an area of 16 m², which gives an average area of 1.3 m² per child in the activity room and 1.56 m² in the classroom. Both averages are below the minimum of 2.8 m² per child that are set by (MCYSOC, 2006). However, the number of children in the kindergarten are below the 150 children maximum set by (GSA, 2003).

Out of the fifty points that are set in this research for compliance with well-established standards, Tripoli A kindergarten have scored 19.5 points out of 50 indicating lack of compliance with significant requirements (Table 3.1), including but not limited to:

1. Classrooms are not well-prepared for activities and interaction between children.
2. Lack of privacy for students for changing and storage.
3. Lack of sufficient sleeping equipment and their storage areas.
4. Windows are not compliant with the minimum requirements, which is necessary for daylight availability in the classrooms.
5. Lack of age and size appropriate sanitary facilities, toilets and sinks.
6. Design does not allow for a community interaction between children, parents and staff due to size restrictions.
7. Staff facilities do not provide a healthy working environment. Safety measures are limited.

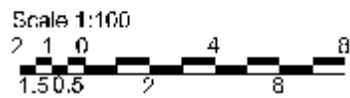
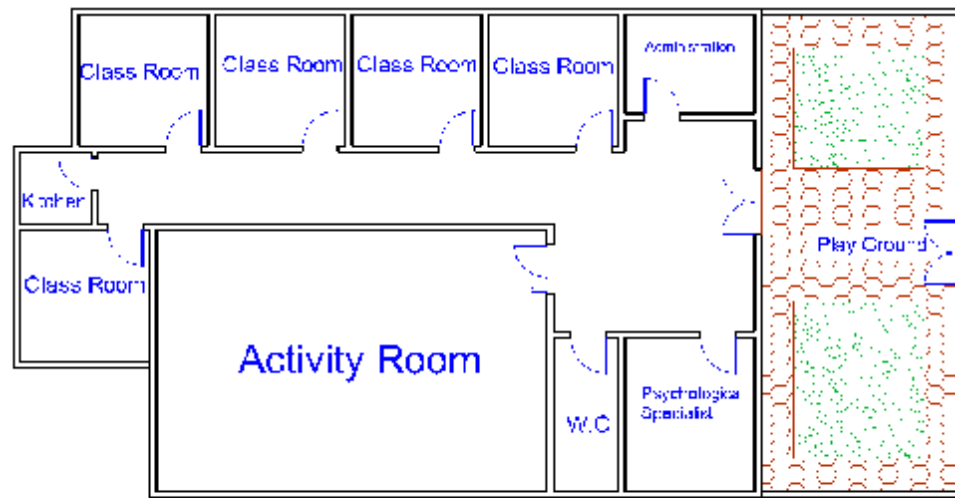


Figure 3.2: Floor plan of Tripoli A Kindergarten (Drawn by author).

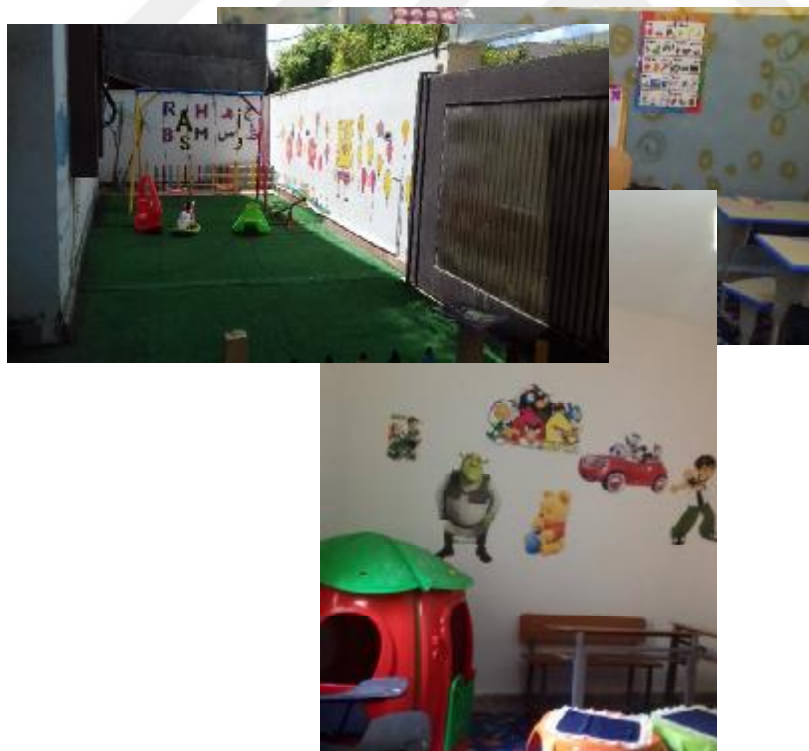


Figure 3.3: Pictures from Tripoli A kindergarten: playground (upper left), learning area (lower left) and activity area (right) (Pictures taken by the author)

Tripoli B kindergarten is also a one-story building, with a plan as shown in Figure 3.4. It is observed that the entrance to the facility goes through a playground leading to the main entrance of the kindergarten indoors. The lobby area is considered the corridor of the kindergarten, with one administration office looking at the only entrance of the facility. The kindergarten has three classrooms with an average classroom area of 20 m² designated for 14 children per classroom. The Tripoli B kindergarten has a kitchen and a toilet. However, the activity area which is considered essential is not provided as designated area. Instead the classrooms are mainly provided for playing and interaction. According to the area compliance, each child has 0.48 m², which is less than the minimum set by (MCYSOC, 2006).

This kindergarten scored 16 out of 50 points in compliance with the kindergarten design requirements reviewed in this study, which shows that many steps need to be taken to achieve an acceptable compliance (Table 3.1). The issues that Tripoli B kindergarten has are similar to the issues of Tripoli A kindergarten. Nonetheless, other issues rise including the lack of designated activity area, lack of adequate space, inadequate storage facilities for children, staff and activities, and unavailability of appropriate toys in the playground area.

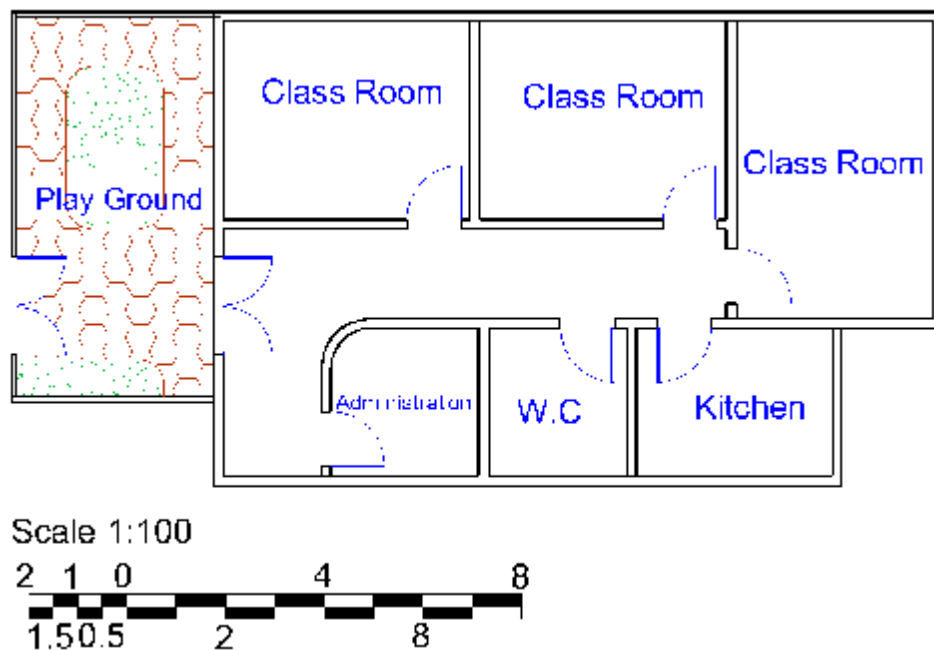


Figure 3.4: Floor plan of Tripoli B Kindergarten (Drawn by author)

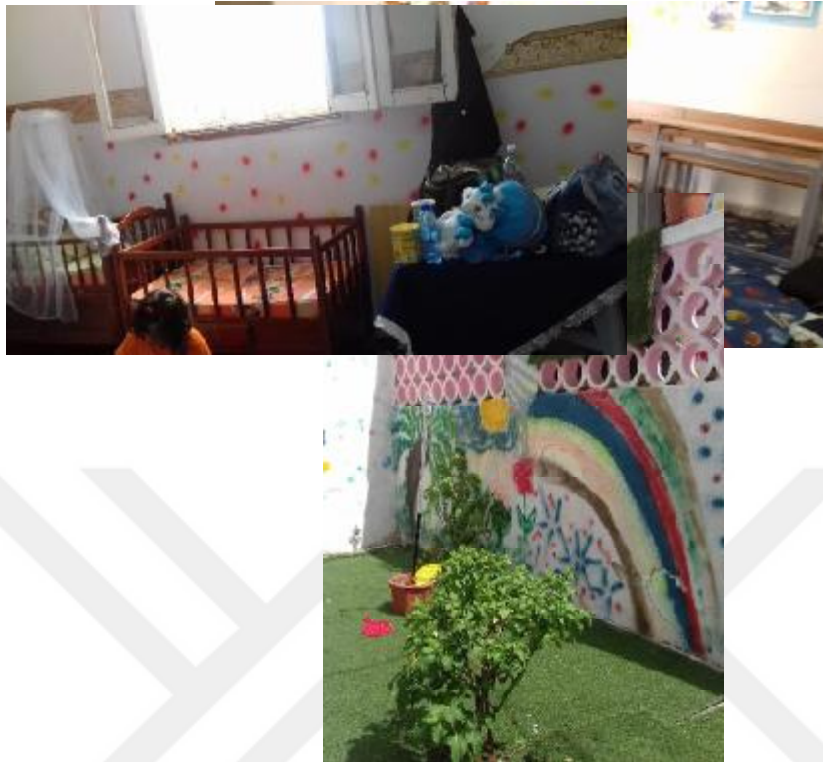


Figure 3.5: Pictures from Tripoli B kindergarten; infants' area (upper left), activity area (lower left) and playground (right) (Pictures by the author)

Tripoli C kindergarten is similar to the other kindergartens analyzed by having one story, whose plan is shown in Figure 3.6. However, structure of the division is different as the main entrance leads directly to the indoor facilities with the administration and psychological specialist offices. The kindergarten has six classrooms with a total area of 288 m² designated for around 240 children. Although this kindergarten is more spacious in terms of area, the average area per child is 1.2 m², which is below the standards' requirements with the number of students exceeding the maximum of 150.

The kindergarten has a small activity room of 6 m², which is considered inadequate. Nevertheless, the Tripoli C kindergarten provides a bigger playground than its counterparts in the city with well-equipped, more interactive and age appropriate toys. Furthermore, a big dining area with 20 m² is available. No kitchen is available as the parents are expected to provide the meals for their children. Tripoli C kindergarten has

achieved a score of 21.5 points on the fifty key requirements that are set by the standard reviewed in this study for the kindergarten facility design (Table 3.1). The main issues are the inadequacy of the activity area and the non-compliance with some of the safety requirements. However, the playground design of the kindergarten played a major role for gaining a relatively high score in comparison with the other kindergartens.

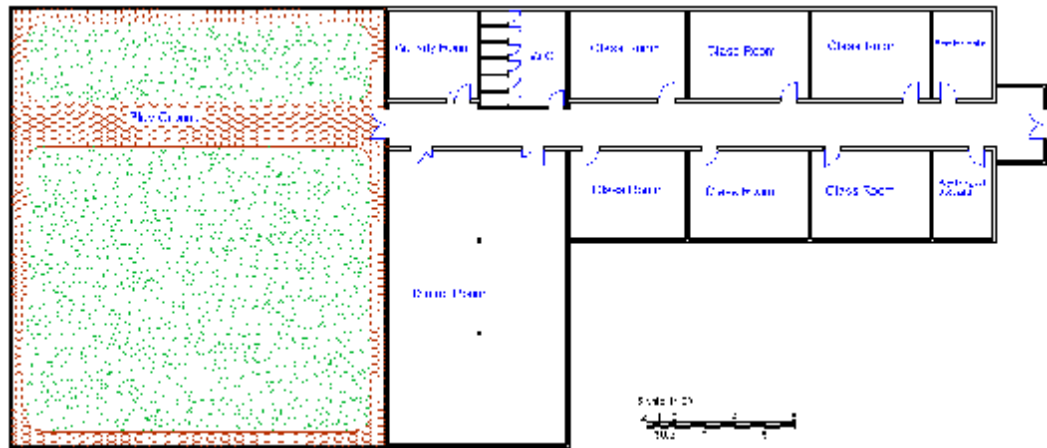


Figure 3.6: Floor plan of Tripoli C Kindergarten (Drawn by author)



Figure 3.7: Pictures from Tripoli C kindergarten; Activity area (up) and Playground (down)
(Pictures by author)

The pictures in Figure 3.7 show the activity area of kindergarten Tripoli C, which is free of obstacles and allows children to move freely. Moreover, the other picture shows the playground of the kindergarten equipped with low altitude playing equipment and special flooring is used to minimize injuries.

3.1.2. Architectural Assessment of the Kindergartens in Misrata

The research covered kindergartens from a second city in Libya, which is Misrata. Misrata is the third largest city in Libya after Tripoli and Benghazi. The city lies geographically near to Tripoli and was used by Phoenicians as a secondary port due to its location on the Mediterranean. The economy of the city depends on steel manufacturing and trading. The population of the city according to 2012 population data is around 280,000 (Shraim, 2017). The climate of the city is Mediterranean, which is wet in winter and dry in summer, and the highest precipitation is in November. There are approximately 25 kindergartens in Misrata. Figure 3.8 shows the location of Misrata in the map of Libya.



Figure 3.8: Location of Misrata in Libya

As shown in Figure 3.9, Misrata A kindergarten has a one floor plan with the main entrance of the facility opening directly to a 300 m² playground. The layout proceeds then to the indoor facilities, where a straight corridor starts at the administration office and the toilets, followed by eight classrooms with a total area of 153.6 m². With approximate children count of 160, the average classroom area per student is 0.96 m², which is below the recommended average. There is no indoor activity area, as they are mostly carried out in the classrooms or the playground. Moreover, the kindergarten lacks a kitchen, resting, and storage facilities for children and staff.

According to the compliance adopted in this research, Misrata A kindergarten have achieved 19.5 points out of the fifty available (Table 3.1). The main issues that are noted on the design of this kindergarten are the lack of storage areas and suitable toilet facilities for the children. Despite the spacious playground area, there are few toys that are provided within unshaded areas. The playground area is used for public meetings and events, which is not recommended by the standards that specify the lobby area for this purpose.

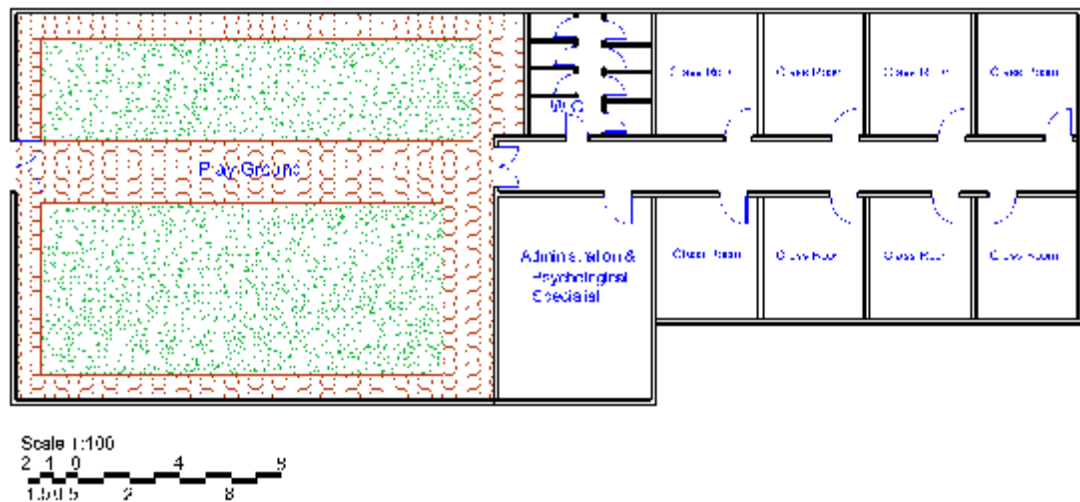


Figure 3.9: Floor plan of Misrata A Kindergarten (Drawn by author)



Figure 3.10: Pictures from Misrata A kindergarten; Classroom (left) and playground (right) (Pictures by author)

Misrata B kindergarten, as shown in Figure 3.11, consists of one floor, where the main entrance leads to an outdoor separated area. The indoor facility starts at the administration offices, toilets and a spacious activity room with an area of 64 m^2 . The kindergarten includes a nursery equipped for young children. The total classroom area is 74 m^2 distributed over four rooms. Since the kindergarten hosts 150 children, the average area per child is 0.92 m^2 for the activity room and classrooms combined. A

playground is provided at the backside of the kindergarten with age appropriate toys and fairly acceptable design.

The overall design of Misrata B kindergarten achieved 23 points on the fifty requirements that are chosen for measurement in this study (Table 3.1). Having a decent activity area and a nursery contributed into achieving a relatively good score. However, the kindergarten lacks a sufficient storage area generally, as well as resting facilities for the staff and children. The toilets are not equipped with suitable toilets for children and changing areas that give privacy other than the toilet cabinets. The natural lighting is provided into the classrooms, but it is not in accordance with the standards' requirements.

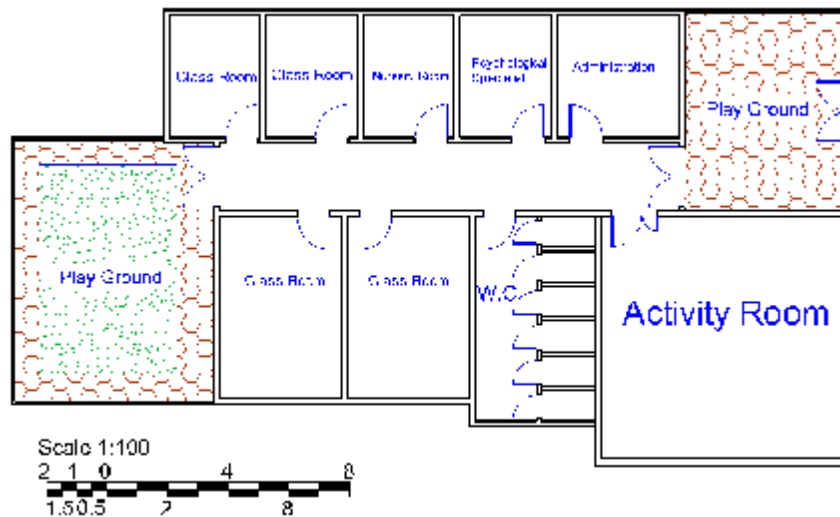


Figure 3.11: Floor plan of Misrata B Kindergarten (Drawn by author)



Figure 3.12: Pictures from Misrata B kindergarten; activity area (up) and playground (down)
(Pictures by author)

Misrata C kindergarten is structured on a one floor plan, as shown in Figure 3.13. The entrance of the facility opens to a spacious playground area with 120 m² with a parallel access to the indoor facilities. The lobby is spacious with an approximate area of 180 m², with the administration and psychological specialist offices at the main entrance. The lobby contains a small buffet and a main corridor for the classrooms and activity room areas. The activity room has an area of 64 m² and classrooms have a total area of 150m². The kindergarten has total children count of 180, which gives an average of 1.19 m² per child for the activity and classroom areas combined. Misrata C kindergarten has a dining room with an area of 60 m².

This kindergarten has achieved 28 points out of fifty in compliance with the key standards' requirements (Table 3.1). There are several significant compliances including

a spacious lobby area that fits children, their parents and staff, as well as a big dining room and a cafeteria. The children activity zone is separated with an entrance to a corridor leading to the classrooms and the activity room, which provide carpets and different activities in each one of them. However, some incompliances are found in regard to the toilet sizes, rest areas for the children, the playground shading and toys, and adaptability for special needs.

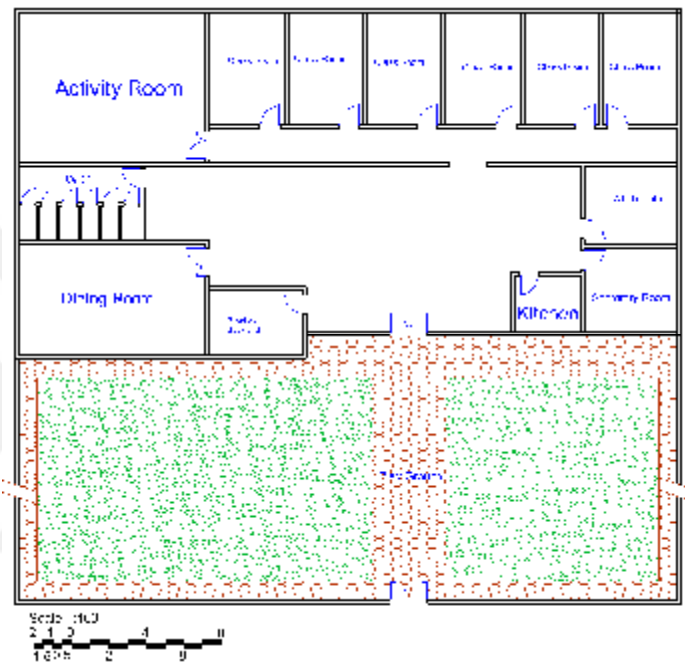


Figure 3.13: Floor plan of Misrata C Kindergarten (Drawn by author)



Figure 3.14: Pictures from Misrata C kindergarten.; Classroom (left) and playground (right) (Pictures by author)

3.1.3. Architectural Assessment of the Kindergartens in Zliten

Zliten, which is the third city of the research, is a coastal city that is located between Tripoli and Misrata. The city was established during the Roman rule of Libya, and has an approximate population of 230,000 according to 2012 population data. The main economic income of the city is generated from agriculture due to the availability of soil and water (Alsao, 2017). The climate of the city is Mediterranean, which is wet in winter and dry in summer, and the highest precipitation is in November. There are approximately 12 kindergartens in Zliten. Figure 3.15 shows the location of Zliten in Libya.



Figure 3.15: Location of Zliten in Libya

The first kindergarten in Zliten (Zliten A) has a one-floor plan, as shown in Figure 3.16. The entrance of the facility is to the playground leading to an elevated entrance to the indoor facilities. The playground is 126 m² and the indoor area entrance leads to a small lobby area with the secretary room and computer lab. The kindergarten has four classrooms with a total area of 139 m² including the computer lab. The average area per child is calculated as 1.39 m² considering 25 children per classroom.

On the fifty key standard requirements that are adopted by this study, Zliten A kindergarten have achieved 19 points due to the lack several important criteria (Table 3.1), such as; activity room, dining room and a clear sight of the entrances and exits by the staff. However, this kindergarten is one of a few that have computer labs for the

children in order to cope up with the technological advances and new teaching methods of today.

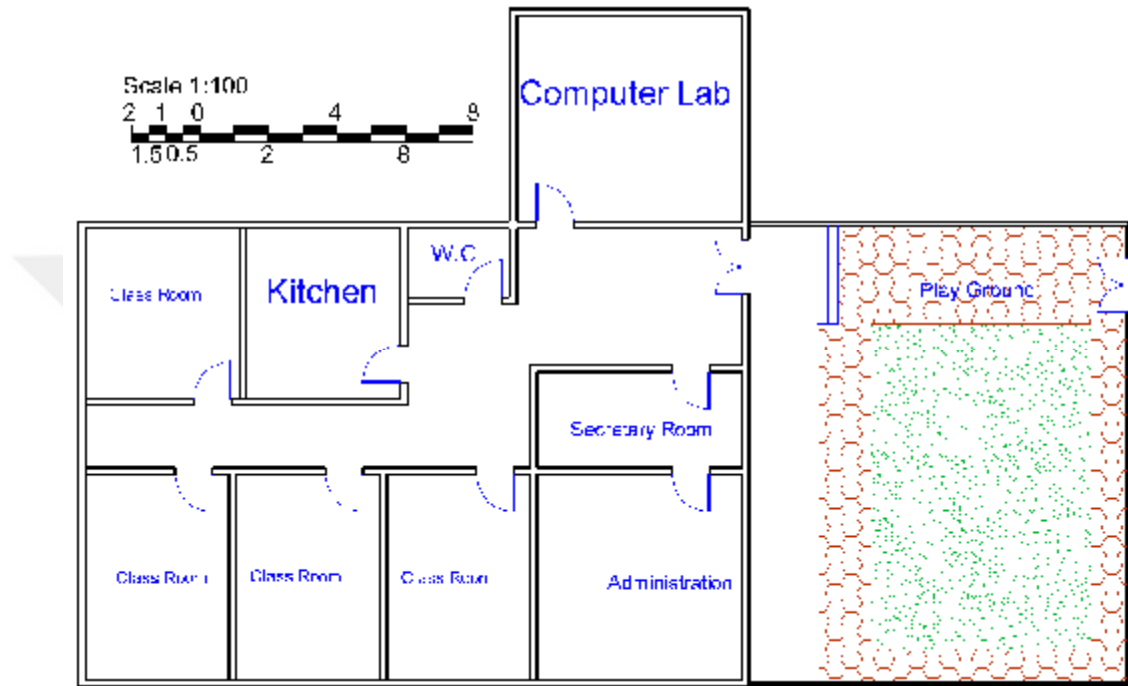


Figure 3.16: Floor plan of Zliti A Kindergarten (drawn by author)





Figure 3.17: Pictures from Zliti A kindergarten; Classroom (up) and computer lab (down)
(Pictures by author)

Zliti B kindergarten, whose plan is shown in Figure 3.18, is built on a single floor plan. The outdoor entrance leads to a corridor ending with the toilets, kitchen and a playground that has an area of 252 m². At the entrance of the indoor facilities, a spacious corridor serves as a lobby with an area of 204 m². The classroom area is 430 m², with an average of 1.75 m² per child. The staff rooms are located at the end of the corridor with a view to both facility entrances.

Zliti B kindergarten has achieved 20 points on the fifty key standards' requirements (Table 3.1). However, it is evident that the facility has inadequate toilets for children and staff, which are located in the outdoor area. Moreover, the kitchen is not utilized for meal preparation and classrooms are used as a dining area for home prepared snacks. The storage area provided for the students are acceptable, with further enhancement possibility. The staff facilities are humble and poorly coordinated with the kindergarten layout.

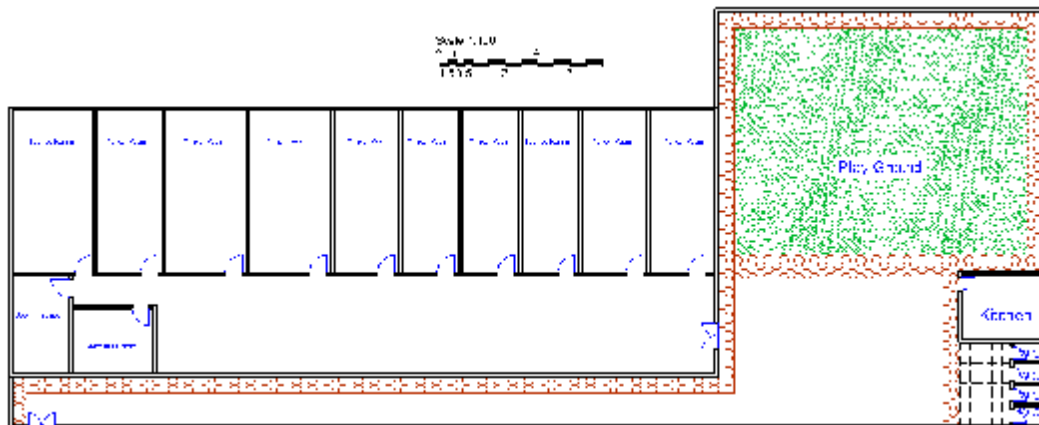


Figure 3.18: Floor plan of Zliti B Kindergarten (Drawn by author)



Figure 3.19: Pictures from Zliti B kindergarten; playground (up) and classroom (down)
(Pictures by author)

The last kindergarten evaluated is Zliti C, which similar to all included case studies in this study are structured on a one floor plan, as shown in Figure 3.20. The main entrance opens to a small playground leading to the indoor facilities' entrance, which has the administration offices at it. The kindergarten has four classrooms for different activities

with a total area of 100 m², where the average child area is 1.25 m². The corridor is wide leading spacious toilets and a second shaded playground with age appropriate toys and design.

Zlitin C kindergarten has achieved 23 points out of the fifty key pre-school facilities' standard requirement (Table 3.1). The interior division of the kindergarten is one of its advantages, as well as complying with the supervision and age separation requirements. However, the storage areas and toilets are further enhancements that could be implemented. Moreover, the kindergarten lacks a dining area, kitchen and a designated activity room.

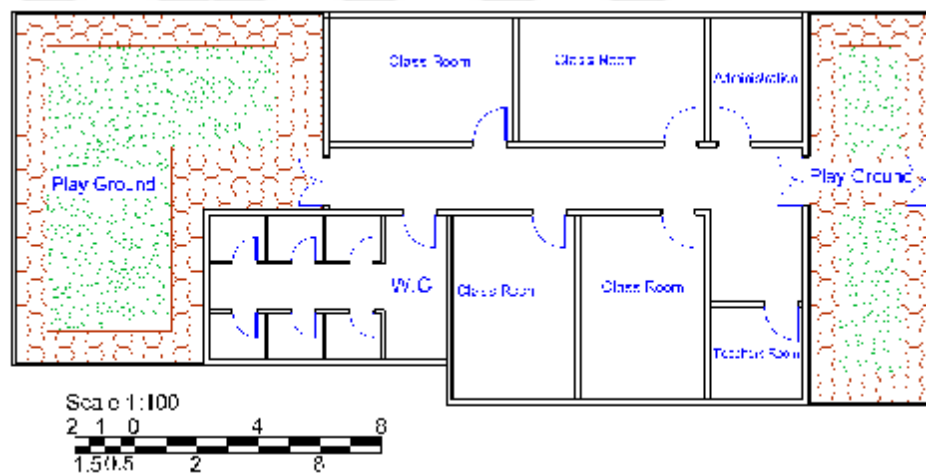


Figure 3.20: Floor plan of Zlitin C Kindergarten (Drawn by author)



Figure 3.21: Pictures from Zlitan C kindergarten; Classroom (left) and playground (right)
(Pictures by author)

Based on the previous architectural assessment, Table 3.1 provides the compliance of the nine selected kindergartens with the fifty key pre-school facilities' standards that were reviewed in the previous chapter through (MCYSOC, 2006) and (GSA, 2003). A solid circle (●) indicates an acceptable compliance, a hollow circle (○) indicates a compliance to a certain extent, and a dash (-) indicates non-compliance with the requirement. Each kindergarten is symbolized with two letters; the first letter representing the city and the second letter representing its serial code as used before in the architectural analysis, e.g. ZA: Zlitan A.

Table 3.1: Compliance of the Libyan kindergartens included in the case study with the pre-school standards of (GSA, 2003) and (MCYSOC, 2006)

(●) =acceptable compliance, (○)=compliance to a certain extent, (-) =non-compliance									
Criteria	Compliance								
	TA	TB	TC	MA	MB	MC	ZA	ZB	ZC
Design enable children to interact in events and activities	●	●	●	●	●	●	●	●	●
Classrooms equipped with carpet	-	●	○	-	○	●	○	○	●
Classrooms divided according to activities	○	-	-	○	○	●	●	●	●
Toilets are spacious and sized for children use	-	-	-	-	-	-	-	-	○
Environment include variety of colors and textures	○	○	○	○	○	-	-	○	○
Activity room account for 2.8 m ² per child	○	-	○	-	-	○	-	○	○
Washing area is available in activity room	-	-	-	-	-	-	-	-	-
Clothing/ dressing area is available with privacy	-	-	-	-	-	-	-	-	-
Storage facilities are provided for each child	○	-	○	-	-	○	○	●	-
Windows are clear	-	○	○	○	○	○	-	-	○
Windows are not less than 10% of the space floor area	-	-	○	○	-	○	-	-	-
Storage for mattresses, beds, sheets and pillows is available	-	-	-	-	-	-	-	-	-
There is a designated area for eating and resting	○	-	●	-	○	●	-	-	-
There is a designated area for preparing meals	●	●	-	-	-	○	●	○	-
There is an area designated for teachers and management	●	●	●	●	●	●	●	○	●
A store for activities equipment is available	○	-	○	-	-	○	-	-	-
Activity and playroom have no obstructions	○	-	○	-	●	●	-	-	○
A bed is available for each child with the specified dimensions	○	-	-	-	-	○	-	-	-

Table 3.1 (Continued): Compliance of the Libyan kindergartens included in the case study with the pre-school standards of (GSA, 2003) and (MCYSOC, 2006)

Criteria	Compliance								
	TA	TB	TC	MA	MB	MC	ZA	ZB	ZC
Space allows for tables for dining	-	○	●	-	●	●	-	○	○
Storage space of each student is separated physically from the storage of other students	-	-	-	-	-	○	-	○	-
Suitable preparation counters are provided	-	-	-	-	-	○	-	-	-
Sinks have a maximum height of 55 cm	-	-	-	-	-	-	-	-	-
Wheelchairs are provided for emergency and special needs	-	-	-	-	-	-	-	-	-
Entrance area hospitable, supervised and linked directly to the facilities	●	○	○	○	●	●	○	●	○
No corridors between entrance and children area	●	●	●	●	●	●	●	●	●
Appropriate signage is provided for children to understand	-	-	-	-	-	-	○	-	-
Entrance area can accommodate the children, their parents and the kindergarten's staff	-	-	-	-	○	●	○	●	-
Storage area is located near the entrance	-	-	-	-	-	○	○	●	-
Corridors comply with the minimum dimensions	○	●	○	○	○	●	○	●	●
Offices are provided with meeting tables and storage for staff	-	-	-	○	○	○	-	-	-
Offices are located with a clear sight to entrances and exits	●	●	●	●	●	●	○	○	●
Offices are equipped with communication means (Phone and internet)	●	●	●	●	●	●	●	○	●
Staff area allows for resting	-	-	-	○	○	○	-	-	-
Staff area equipped with bookshelves, whiteboard, sofas and fridges	○	-	○	○	○	●	-	-	○
Appropriate toilets are provided for staff	●	●	●	●	●	●	○	-	●
Storage dimensions allow for 0.55 m ² per child	-	-	-	-	-	-	-	○	-

Table 3.1 (Continued): Compliance of the Libyan kindergartens included in the case study with the pre-school standards of (GSA, 2003) and (MCYSOC, 2006)

Criteria	Compliance								
	TA	TB	TC	MA	MB	MC	ZA	ZB	ZC
Diapers changing area is provided	-	-	-	-	●	-	-	-	-
Kitchen is provided at the facility	●	●	-	-	-	○	●	●	-
Location of kindergarten is suitable for health and safety requirements (main roads, water surfaces, high elevation)	○	-	●	●	●	●	○	○	●
Number of children have a maximum of 150	●	●	-	●	●	○	●	-	●
Play area allow for age separation	-	-	○	●	-	○	-	-	●
Playground is built with soft material and allows crawling	●	○	●	●	●	○	○	○	●
Children are introduced to sand and water	-	-	●	●	○	●	○	○	●
Fences are of adequate height, sizes and comply with safety requirements	●	●	●	●	●	●	●	●	●
Plants are non-toxic	●	●	●	●	●	●	●	●	●
Pathways have a minimum of 1830 mm	-	○	○	○	○	○	○	●	●
Safety railings, handrails and guardrails are available	-	-	-	○	○	●	●	-	-
Shading provided for outdoor areas	-	-	●	○	○	-	●	●	●
Playground toys are age appropriate with non-metal elements and low heights	●	-	●	○	●	○	○	○	●
Soft corners are provided on edges	-	-	-	-	-	-	-	-	-
Totals	19.5	16	21.5	19.5	23	28	19	20	23
Percentile (%)	39.0	32.0	43.0	39.0	46.0	56.0	38.0	40.0	46.0
Ranking	6	9	4	6	2	1	8	5	2

3.2 Subjective Assessment of Kindergartens by Survey Questionnaire

In addition to the architectural assessment carried out in the previous section, a subjective assessment using a self-reporting method is used to evaluate the awareness and perception of the kindergarten users. A questionnaire is designed for this purpose. The following sections elaborate on the design of the questionnaire, sampling, participants' information, analysis techniques and findings.

3.2.1 Questionnaire Design

As several objectives of this research aim to develop a guideline to enhance the kindergarten design in Libya, a questionnaire is used in order to measure the awareness of the staff and parents of the importance of the design of the kindergarten and the issues that their facilities are facing. Therefore, the questionnaire is divided into several sections (template available in Appendix A), as the following:

- A. Personal information including gender, relation to kindergarten and the name of the kindergarten.
- B. General awareness evaluation that assesses the knowledge of the staff and parents about the ideal kindergarten design, its importance and influential factors.
- C. A general evaluation of the design of the learning environments and activity areas of kindergarten.
- D. Playground design evaluation
- E. Kindergarten facilities and safety evaluation
- F. Toilets evaluation
- G. Possible enhancement suggestions

Except for the first part of the questionnaire, the remaining questions are evaluated on a 6-point Likert scale of agreement; I totally disagree, I disagree, I partially disagree, I partially agree, I agree, and I totally agree.

3.2.2 Sampling, Participants and Analysis

The participants of the questionnaire are selected as evenly as possible amongst the nine kindergartens that are included in the case study. The participants and the kindergartens were sampled through random sampling according to the available subjects that were willing to take the questionnaire. Table 3.2 shows the distribution of the participants on the selected kindergartens. The participants are also selected from the management, staff and parents that are related to a selected kindergarten in order to get a specific assessment on that kindergarten, and on the kindergartens in Libya generally. The only users that are not surveyed are the children, due to psychological and physiological factors that may disturb the results of the questionnaire.

The participants of the questionnaire were of both genders, the researcher ensured a close distribution between the two genders. However, due to the fact that a lot of the staff working in pre-school education in Libya are females, the researcher tried to balance this factor by focusing on male parents. As shown in Figure 3.22, the males formed 41.04% of the participants, while the females formed 58.96%. Moreover, the distribution of the participants according to their relation to the kindergarten is shown in Figure 3.23.

Table 3.2: Distribution of participants on the kindergartens

Kindergarten	Frequency (N)	Percent (%)
Misrata A	18	10,4
Misrata B	18	10,4
Misrata C	19	11,0
Tripoli A	22	12,7
Tripoli B	20	11,6
Tripoli C	20	11,6
Zlitn A	18	10,4
Zlitn B	19	11,0

Zlitr C	19	11,0
Total	173	100,0

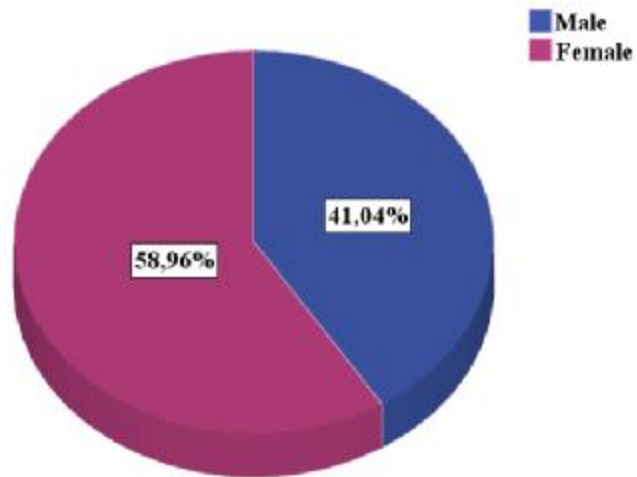


Figure 3.22: Gender of the participants

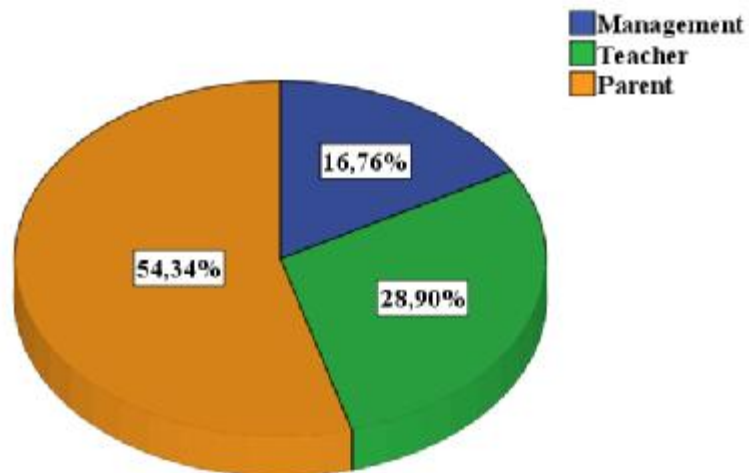


Figure 3.23: Distribution of questionnaire participants according to their relation to the kindergarten

After completing the questionnaire design, 180 questionnaires were distributed, of which 173 are returned. The participation level is 96.1%. Once all forms were received, results are entered into SPSS and analyzed for results. Cronbach's alpha is calculated for the survey as 0.785, which is considered acceptable and reinforces the reliability of the research. The results of the questionnaire are analyzed in descriptive technique, and any significant correlations or variances are presented and discussed further.

3.2.3 Questionnaire Results

The aim of the second part of the questionnaire is to measure the awareness of the staff and parents to the design issues of their kindergartens and the factors that affect it. As shown in Table 3.3, the highest mean score is for agreeing that further development is necessary to the design of the kindergartens, as they also disagree that the current facilities are sufficient for the children's development. However, the participants strongly believe that there are external constraints that prevent such a development. The participants also believe that the design of the kindergarten is an influence on the children and their learning and creativity. There is also an agreement that culture and society shall influence the design of the kindergarten.

Table 3.3: Participants' awareness of kindergarten design influence and needed change

Statement	Mean Score	Std. Deviation
This kindergarten is originally designed for its current function.	3.47	1.453
The design of the kindergarten has an influence on the kids.	4.93	0.804
The culture and society structures should influence the design of a kindergarten.	4.82	0.889
The current facilities of the kindergarten are enough for the kids' development.	2.86	1.264
There are more developments that should be done to this kindergarten.	5.04	0.911

There are external constraints that hinder the development of the Kindergarten design.	4.94	0.884
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Furthermore, the participants evaluated the design of the learning environments and activity areas of their kindergartens, where they mainly agreed that the current designs can be further enhanced. Moreover, it was stated and noticed from the architectural assessment that the kindergartens in Libya are mostly separated from grade school. Neutral to disagreement is shown for other design aspects such as the easiness to clean the furniture, the IAQ quality, establishing a specific design theme and the suitability of the current colors for inspiration and creative simulation for the children. This shows that these aspects need to be developed and worked on in any future design enhancements.

Table 3.4: Participants' evaluation of the design of learning environments and activity areas

Statement	Mean Score	Std. Deviation
The kindergarten is fully separated from other school levels.	4.66	0.844
The current colors chosen for the kindergarten are suitable to inspire the children.	3.21	1.353
The design of the kindergarten can be further enhanced.	4.80	3.992
The current furniture and floor coverings are easy to clean and maintain.	3.44	1.036
The kindergarten has a good indoor environment quality (Air, heat, ventilation, sun exposure, shade)	3.35	1.054
The kindergarten has a specific design theme that stimulates the kids' personalities.	3.23	1.042

Moreover, the participants evaluated the playground designs, where a slight agreement is indicated on the safety measurements taken, such as; falling matts, cleanness, handrails and fences. This indicates that further and urgent developments shall be implemented in order to increase the safety level of the playgrounds. Also, the participants indicated neutral responses on the playground size sufficiency and the age suitability of the provided toys, which requires further investigation into the matter to determine any possible issues.

Table 3.5: Participants' playground evaluation

Statement	Mean Score	Std. Deviation
The size of the playground(s) satisfies the needs of the kindergarten.	3.51	1.119
The playgrounds have age appropriate toys.	3.60	1.104
The playing facilities consider the child safety. (Falling Matts at climbing toys, clean, handrails, fences, etc.)	4.06	1.007

The participants have also evaluated the facilities in their kindergartens and safety measurements. The participants agreed that the kindergartens are overall safe. Furthermore, they agreed that the building having a single story and one-floor plans and the protection provided on the stairs and handrails are sufficient for fall protection. Nonetheless, there is a disagreement on the availability of first aid kits in the kindergartens. There is also a disagreement on the adaptability of the kindergartens to children with special needs, availability of separate food preparation and dining areas, availability of sports facilities, and sufficient storage equipment for the children.

Table 3.6: Participants' facilities and safety evaluation

Statement	Mean Score	Std. Deviation
The stairs are not high for children and protected by handrails and fall barriers.	4.60	0.969
The kindergarten facilities are adapted for the children with special needs.	2.39	1.292
The kindergarten has a medical center that is equipped for first aid cases.	2.71	1.176

There are separate areas for dining and food preparation.	2.95	1.150
The kindergarten has sports and activities facilities.	3.21	1.127
There are personal storage equipment for the children.	3.02	1.128
The kindergarten is overall safe.	4.95	0.957

While the participants agreed that the toilets are adjacent to the classroom and easy to access by the students, they disagreed that the toilets are designed for children in terms of size and dedication. This is considered a significant point as most of the design guidelines recommend installing child-friendly toilets and sink in order to ease its access for the children without anyone's assistance.

Table 3.7: Participants' toilet evaluation

Statement	Mean Score	Std. Deviation
There are toilet sets that are dedicated for the children.	2.57	1.177
The toilet and sink fixtures sized for the children.	2.58	1.146
The toilets are located adjacent to the classrooms.	4.55	0.838

A one-way ANOVA testing is conducted to the different aspects assessed in the questionnaire with respect to the different kindergartens in order to confirm the differences that were found during the architectural assessment by the researcher. The table presented in Appendix B shows significant differences between the nine kindergartens on sixteen out of the twenty-two statements. In order to understand the nature of the difference, a post-hoc test is conducted, scheffe, which is presented in the same Appendix B.



4. A DESIGN GUIDELINE PROPOSAL FOR THE DESIGN AND ENHANCEMENT OF KINDERGARTENS IN LIBYA

The following design guideline is prepared in the light of the architectural assessment of the nine selected kindergartens in Libya and the subjective assessment of their staff and parents by a questionnaire survey. The guideline shows which standards should be provided for the enhancement of the designs of kindergartens in Libya according to the overall and specific facilities within the kindergarten.

4.1 General and Distribution Facilities

- Regarding the overall goals and aims of the preschool facilities in Libya, the kindergarten should take the following into consideration during the conceptual design of the facilities:
 1. The design of the kindergarten should allow the child to discover his or her strengths and establish positive and close relations with the other children and the teachers.
 2. The design should empower the sense of community through group and team activities. Moreover, the facilities provided within the classroom and the activity areas should establish the sense of ownership and responsibility, as well as sharing, through chairs and closets' distribution.
 3. The design of the kindergarten shall should the children to strengthen their connection with their environment; society, school, family and nature.
- The location of the kindergarten should not be near to water plains or highways.
- Kindergarten should have a minimum capacity of 74 children and a maximum capacity of 150 children.
- Indoor environment qualities; light, acoustic, temperature, indoor air quality, should be within the acceptable standards that drives the children's performance and allow them to perform their activities comfortably.

- The playground and activity areas should enable children to interact with each other and with nature through participation and observation, by incorporating different terrains, textures, colour, and variety of activities.
- Four main aspects should be considered when designing the playground area, which are the social interaction, cognitive development, equipment interaction and practicality.
- Age and gender differences should be taken into consideration while designing the different facilities in the kindergarten in order to satisfy individual preferences, as well as providing a friendly environment for children to navigate and interact.
- Kindergartens should have handwashing areas, changing areas, bathrooms and storage facilities.
- Entrance area should be spacious, with no corridors, with a single exit, and should allow for teacher/ children/ parents' gatherings.
- Staff offices should be located near to the main entrance, with a clear view of all entrances and exits.

4.2 Learning Environment and Activity Areas

- Carpet covering should be provided in the classroom and activity areas to allow for crawling and establishing social relationships between the children.
- Classroom and activity areas should be divided according to the several activities conducted throughout the day; such as reading, science education, storage, resting, dining, etc. Different areas can be marked through the organization of the furniture and tools in order to establish the sense of organization among the children.
- Classroom and activity rooms are preferred to include different colours and textures for promoting discovery and interaction.
- The activity room should be designed for a maximum capacity of 24 children with 2.8m² for each child, and must not have any obstructions.

- Windows should be clear, allowing natural lighting to pass, with an area not less than 10% of the classroom's or activity room's floor area.
- The classroom should allow for a minimum of 20% circulation area and 30% classroom support area.

4.3 Playground and Outdoors

- The playground area should allow age segregation and should be furnished with soft materials, while allowing children to be introduced to nature through sand and water.
- Soft toys should be provided to avoid injuries, and no metal slides shall be used.
- Plants provided should be non-toxic.
- Pathways and corridors should have minimum dimensions of 1800mm and slopes shall be less than 1:20.
- Handrails and guardrails should be provided for heights differences more than 300mm, which should be appropriate for children's height (minimum 510mm and maximum 915mm – two railings).

4.4 Other Facilities

- The areas given for the toilets should be spacious and equipped with amenities that have suitable sizes for children use according to the different ages. Sink maximum height is 55 cm.
- Special storage should be provided for beds, mattresses, sheets and pillows.
- A separate facility should be provided for dining with tables, as well as a separate area for meal preparation with counters with 90 cm height and lockable cabinets.
- A set of toilets and sink should be provided for each 10 children. Toilets should be accessible to children and well-supervised by the staff, while allowing privacy.
- A separate facility should be provided for staff, which is equipped for resting and dining.

- A separate storage should be provided for activity equipment.
- Special beds should be provided for children, along with their specific area, with the dimensions of 0.6 x 1.575 meters.
- If the bed area is included in the activity area, it should be subtracted from the activity area, as it forms an obstruction.
- Storage for each child should be separated from other children's storages for health reasons. Children storage facilities should be located near the main entrance. Storage shall account for 0.55 m² per child.
- Wheelchairs should be provided for emergency and special needs.



5.CONCLUSIONS

The results of the architectural assessment of the nine kindergartens studied from Libya within the framework of the case study and their evaluation according to the physical design considerations stated in accepted kindergarten standards and requirements show that the majority of the kindergartens studied in this research lack compliance with the standards on many mutual points, such as: the suitable toilet size for the children, suitable washing area in the activity rooms, suitable dressing areas with privacy for the children, suitable sleeping amenities for each student with its designated storage and laundry, suitable general storage for every student with a minimum of 0.55 cm² area located near the main entrance, availability of special needs requirements, availability of child-friendly signage, and availability of soft corners on edges for safety. On these terms, the hypothesis of the study stating that “the design of the existing kindergartens in Libya are not sufficient in terms of the design characteristics stated in various acknowledged guidelines and standards about kindergarten design” can be accepted as proven.

However, it was also observed that the majority of the kindergartens covered in the case study have acceptable compliance with standards in enabling children to interact in events and activities, in dividing the classrooms between different activities, in designating areas for management and staff, in allowing for dining facilities, in avoiding corridors between entrance and children area, in locating the management offices with sight to entrances and exits and in supplying them with communication means, in providing toilets for staff, in allowing for safe and suitable fencing, avoiding toxic plantations, and in providing age appropriate and safe toys at the playground.

It was seen that, in spite of the many non-compliances, there were few kindergartens that succeeded to implement key requirements to achieve a relatively high scoring. Misrata C kindergarten have achieved 28 points out of 50 (56%) by implementing similar layouts that were studied in the Japanese case study, where the lobby area is separated from the children’s area (MECSST, 2010). In addition to that, most of the kindergartens studied

provided a wide and natural playground that allows the children to discover and widen their creativity (MCYSOC, 2006). The enhancement points are apparent in the compliance evaluation provided in Table 3.1 and further recommendations are provided in Chapter 4 via the proposed design guideline for the design and enhancement of Kindergartens in Libya.

The results of the subjective assessment, which involved the survey questionnaire filled out by the staff and parents of each of the studied kindergartens from Libya, showed that the participants shared the idea that the facilities of the kindergartens required further enhancement and development as the current designs were not sufficient for the children. These results are supported with the architectural assessment as the average square meter per child is less than the recommended value in all of the kindergartens. The perception of the participants that the design affects the experience of the children also confirms the research results (Hayward, Rothenberg, & Beasley, 1974), which showed that kindergarten's environment influences the behavior of the children.

The differences presented through the ANOVA and post-hoc testing (Appendix B) confirm the findings of the architectural assessment of several variances in compliance with the pre-school guidelines and specifications. On account of this, several design enhancement practices are possible in the Libyan kindergartens in order to raise them to an acceptable level as per kindergarten standards, such as expanding their facilities, enhancing the safety features and accounting for children with special needs. The detailed recommendations, both for the studied kindergartens and for the reevaluation of the Libyan kindergartens in general, are provided in Chapter 4, via the proposed design guideline for the design and enhancement of Kindergartens in Libya.

Yet, it has to be noted that, the main responsibility in ensuring the implementation of the adequate standards and guidelines lies mainly on the shoulders of the ministry of education and the municipal authorities in Libya. These authorities have to establish and ensure a national set of standards based on the international guidelines, such as the one presented in this thesis. Even ensuring a compliance with the technical points that are presented in this research (in Table 3.1) used the evaluation of the studied kindergartens, would enhance the children's experience in Libyan kindergartens, as well as the

experience of their staff and management. A healthy and well-built kindergarten would ensure that the learning and discovering experience of the Libyan children rises to the level of international standards.



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APPENDIX A
(QUESTIONNAIRE FORM)

A Survey about Enhancing the Design of Kindergartens in Libya

Staff & Parents survey

The Kindergarten is one of the most important levels that our children pass in order to preparing for school and discover their passions and talents. As our kids are growing very fast at this age, it is important to put them in the most appropriate and studied environment possible. The architectural design of the kindergarten is one of the most influential factors that plays a major role into the kid's mind, interaction and personality.

A. Personal Information

1. Gender	<input type="radio"/> Male	<input type="radio"/> Female	
2. Relation to Kindergarten	<input type="radio"/> Management	<input type="radio"/> Teacher	<input type="radio"/> Parent
3. Name of Kindergarten and city		

B. General Information (Awareness)

What do you think of the below statements?	I totally agree	I agree	I partially agree	I partially disagree	I disagree	I totally disagree
1. This kindergarten is originally designed for its current function.						
2. The design of the kindergarten has an influence on the kids.						
3. The culture and society structures should influence the design of a kindergarten.						
4. The current facilities of the kindergarten are enough for the kids' development.						
5. There are more developments that should be done to this kindergarten.						
6. There external constraints that hinder the development of the kindergarten design.						

C. Learning Environment and Activity Area Evaluation						
What do you think of the below statements?	I totally agree	I agree	I partially agree	I partially disagree	I disagree	I totally disagree
7. The kindergarten is fully separated from other school levels.						
8. The current colors chosen for the kindergarten are suitable to inspire the children.						
9. The design of the kindergarten can be further enhanced.						
10. The current furniture and floor coverings are easy to clean and maintain.						
11. The kindergarten has a good indoor environment quality (Air, heat, ventilation, sun exposure, shade)						
12. The kindergarten has a specific design theme that stimulate the kids' personalities.						

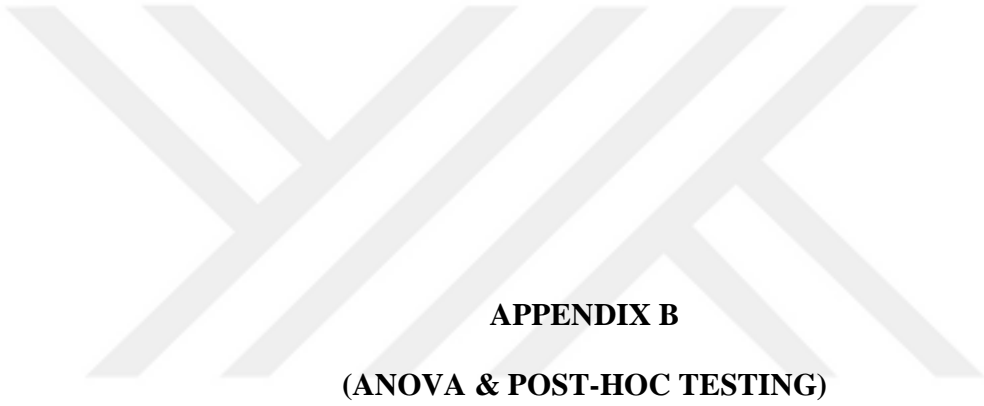
D. Playground Evaluation						
What do you think of the below statements?	I totally agree	I agree	I partially agree	I partially disagree	I disagree	I totally disagree
13. The size of the playground(s) satisfies the needs of the kindergarten.						
14. The playgrounds have age appropriate toys.						
15. The playing facilities consider the child safety? (Falling Matts at climbing toys, clean, handrails, fences, etc.)						

E. Facilities and Safety Evaluation						
What do you think of the below statements?	I totally agree	I agree	I partially agree	I partially disagree	I disagree	I totally disagree
16. The stairs are not high for children and protected by handrails and fall barriers.						
17. The kindergarten facilities are adapted for the children with special needs.						
18. The kindergarten has a medical center that is equipped for first aid cases.						
19. There are separate areas for dining and food preparation.						
20. The kindergarten has sports and activities facilities.						
21. There are personal storage equipment for the children.						
22. The kindergarten is overall safe.						

F. Toilets Evaluation						
What do you think of the below statements?	I totally agree	I agree	I partially agree	I partially disagree	I disagree	I totally disagree
23. There are toilet sets that are dedicated for the children.						
24. The toilet and sink fixtures sized for the children.						
25. The toilets are located adjacent to the classrooms.						

G. Enhancement Suggestions	
26. Are there any other facilities and enhancements that you believe should be added to the kindergarten?
Thank you for your time!	





APPENDIX B
(ANOVA & POST-HOC TESTING)

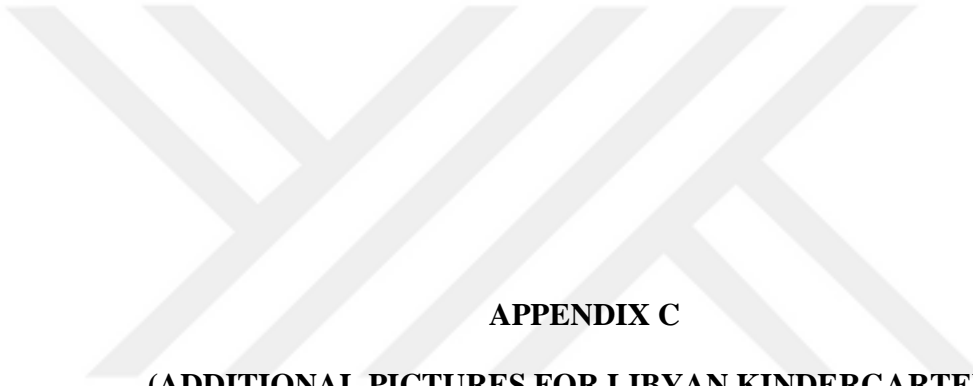
Table B1: One-way ANOVA Testing for different design aspects evaluations by the participants with respect to the different kindergartens ($p < 0.05$)

		Sum of Squares	df	Mean Square	F	Sig.
Building designed for kindergarten	Between Groups	106,482	8	13,310	8,507	,000
	Within Groups	256,593	164	1,565		
	Total	363,075	172			
Design shall depend on culture	Between Groups	18,445	8	2,306	3,214	,002
	Within Groups	117,636	164	,717		
	Total	136,081	172			
Current facilities sufficient for children development	Between Groups	48,298	8	6,037	4,374	,000
	Within Groups	226,372	164	1,380		
	Total	274,671	172			
There are external constraints for development	Between Groups	18,367	8	2,296	3,248	,002
	Within Groups	115,934	164	,707		
	Total	134,301	172			
IAQ quality in Kindergarten	Between Groups	20,191	8	2,524	2,421	,017
	Within Groups	171,000	164	1,043		
	Total	191,191	172			
Effect of design theme on personality	Between Groups	16,794	8	2,099	2,026	,046
	Within Groups	169,957	164	1,036		
	Total	186,751	172			
Satisfaction from playground size	Between Groups	31,835	8	3,979	3,558	,001
	Within Groups	183,402	164	1,118		
	Total	215,237	172			
Adoption for special needs	Between Groups	83,833	8	10,479	8,457	,000
	Within Groups	203,219	164	1,239		
	Total	287,052	172			
Availability of first aid cases	Between Groups	48,852	8	6,107	5,296	,000
	Within Groups	189,113	164	1,153		
	Total	237,965	172			
Availability of separate dining area	Between Groups	49,613	8	6,202	5,713	,000
	Within Groups	178,017	164	1,085		
	Total	227,630	172			
Availability of sports activities	Between Groups	49,986	8	6,248	6,081	,000
	Within Groups	168,523	164	1,028		
	Total	218,509	172			
Availability of personal storage	Between Groups	23,659	8	2,957	2,484	,014
	Within Groups	195,289	164	1,191		
	Total	218,948	172			
Safety	Between Groups	18,717	8	2,340	2,762	,007
	Within Groups	138,913	164	,847		
	Total	157,630	172			
Availability of dedicated toilets for children	Between Groups	53,369	8	6,671	5,915	,000
	Within Groups	184,978	164	1,128		
	Total	238,347	172			
Availability of toilet & sink fixtures sized for children	Between Groups	46,915	8	5,864	5,369	,000
	Within Groups	179,120	164	1,092		
	Total	226,035	172			
Availability of toilet adjacent to the classroom	Between Groups	20,216	8	2,527	4,119	,000
	Within Groups	100,616	164	,614		
	Total	120,832	172			

Table B2: Scheffe post-hoc testing for the differences between the kindergartens on the

design assessment points by the participants

Parameter	i	j	Mean Difference (i-j)	Std. Error	Sig.
Building designed for kindergarten	Misrata B	Tripoli C	-1.850	0.406	0.011
	Tripoli A	Tripoli C	-1.895	0.386	0.004
	Tripoli A	Zlitin C	-1.624	0.392	0.034
	Tripoli B	Tripoli C	-2.550	0.396	0.000
	Tripoli B	Zlitin C	-2.279	0.401	0.000
	Tripoli C	Zlitin A	1.961	0.406	0.005
	Zlitin A	Zlitin C	-1.690	0.411	0.038
Current facilities sufficient for children development	Misrata A	Zlitin C	-1.556	0.386	0.046
	Tripoli B	Zlitin C	-1.850	0.376	0.003
Adoption for special needs	Misrata A	Zlitin B	-1.465	0.366	0.049
	Misrata B	Zlitin B	-1.854	0.366	0.002
	Misrata B	Zlitin C	-1.696	0.366	0.009
	Tripoli A	Zlitin B	-1.404	0.349	0.046
	Tripoli B	Zlitin B	-1.982	0.357	0.000
	Tripoli B	Zlitin C	-1.824	0.357	0.002
	Tripoli C	Zlitin B	-2.032	0.357	0.000
	Tripoli C	Zlitin C	-1.874	0.357	0.001
Availability of first aid cases	Misrata A	Zlitin C	-1.675	0.353	0.006
	Misrata B	Zlitin C	-1.898	0.353	0.001
	Tripoli B	Zlitin C	-1.492	0.344	0.020
Availability of separate dining area	Misrata B	Zlitin C	-1.564	0.343	0.010
	Tripoli C	Zlitin C	-1.442	0.334	0.021
Availability of sports activities	Misrata A	Zlitin C	-1.439	0.333	0.022
	Misrata B	Zlitin B	-1.342	0.333	0.046
	Misrata B	Zlitin C	-1.605	0.333	0.005
	Tripoli B	Zlitin C	-1.555	0.325	0.005
Safety	Tripoli A	Zlitin C	1.191	0.288	0.035
Availability of dedicated toilets for children	Misrata B	Zlitin C	-1.693	0.349	0.004
	Tripoli B	Zlitin C	-1.626	0.340	0.005
Availability of toilet & sink fixtures sized for children	Misrata B	Zlitin C	-1.632	0.344	0.006
	Tripoli A	Zlitin C	-1.541	0.327	0.007
	Tripoli B	Zlitin C	-1.382	0.335	0.036
	Tripoli C	Zlitin C	-1.532	0.335	0.010
Availability of toilet adjacent to the classroom	Misrata B	Tripoli A	-1.030	0.249	0.035
	Misrata B	Zlitin A	-1.056	0.261	0.044
	Tripoli A	Misrata B	1.030	0.249	0.035



APPENDIX C

(ADDITIONAL PICTURES FOR LIBYAN KINDERGARTENS)

Tripoli A



Toilets (Picture taken by author)



Activity area (Picture taken by author)



Toilets (Picture taken by author)



Activity and resting area (Picture taken by author)



Activity area (Picture taken by author)

Tripoli B



Activity room (Picture taken by author)



Activity room (left) and kitchen (right) (Picture taken by author)

Tripoli C



Toilets (left) and playing room (right) (Picture taken by author)



Activity and playing room (Picture taken by author)

Misrata A



Classroom (Picture taken by author)

Misrata B



Playground (Picture taken by author)



Playground (Picture taken by author)



Playground (Picture taken by author)

Misrata C

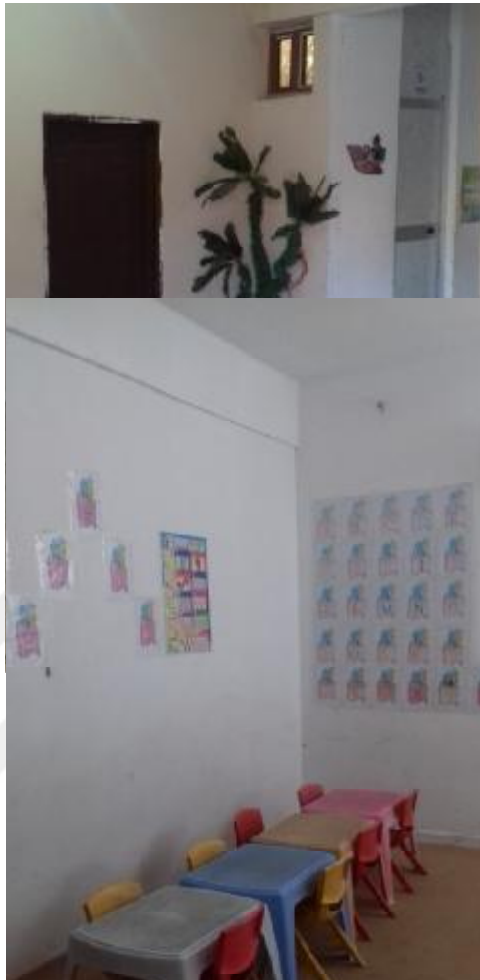


Activity room (Picture taken by author)



Classroom (Picture taken by author)

Zlitin A



Lobby and corridors (left) and Classroom (right) (Picture taken by author)



Classroom (Picture taken by author)

Zliti B



Kitchen (left) and Playground (right) (Picture taken by author)



Classroom (Picture taken by author)

Zlitiñ C



Toilets (Picture taken by author)



Classroom (Picture taken by author)



Student lockers (left) and staff rest area (right) (Picture taken by author)