DEVELOPING TOY DESIGN CRITERIA FOR VISUALLY IMPAIRED CHILDREN: A NEW PLAY SET DESIGN

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ABSTRACT

DEVELOPING TOY DESIGN CRITERIA FOR VISUALLY IMPAIRED CHILDREN: A NEW PLAY SET DESIGN

Being visually impaired is a problem all on its own. The challenge is rendered even more compelling in the conditions of the modern world, where we live under visual hegemony and all our perceptions and means of communication are based on visuality. Visually impaired people have to compensate with their other senses to overcome this disadvantage. To be able to live self-sufficiently, their daily life must be based principally on their tactile and auditory senses.

Throughout the history, there have been two vital elements that naturally support child development: ‘play’ and ‘toy’. Many scientific studies on children development have underlined the essential role of toys and play tools, as the objects of the activity of play. However, the play tools and toys designed for visually impaired children are inadequate. In fact, parents and teachers attempt to design handmade play tools to meet this need. The study has been constructed upon a literature review on visual impairment and visually impaired children; followed by an observation study carried out in the nursery and first grade classes in a primary school for visually impaired children.

Based on literature review and observation study, the study has stated toy design criteria for visually impaired children to improve their skills. Underlining the design criteria, the study is finalized with a play set design to support them in their daily lives.

Key words: Visual Impairment, Visually Impaired Children, Play, Play Tools, Toy, Toy Design.

ÖZET

GÖRME ENGELLİ ÇOCUKLAR İÇİN OYUNCAK TASARIMI ÖLÇÜTLERİNİN GELİŞTİRİLMESİ: YENİ BİR OYUN SETİ TASARIMI

Görme engelli olmak kendi başına bir sorun olmasına rağmen, görselliğin hegemonyası altında yaşadığımız modern dünyada, algı ve iletişimin görsel kanallar üzerinden çeşitlenmesi bu sorunu büyütmektedir. Görme engellilerin çevre ile iletişim kurabilmeleri diğer duyularının daha etkin kullanımına bağlıdır. Temel duyu olarak dokunma ve işitme duyuları kendi kendine yeterli bağımsız bir birey olmaları adına, günlük yaşamlarında egemen olmalıdır.

Oyun ve oyuncak yüzyıllardır çocukların gelişimini doğal olarak destekleyen çok değerli iki araçtır. Çocuk gelişimi üzerine yapılmış olan bilimsel pek çok araştırma oyun etkinliğinin nesnesi olarak oyuncağın ve oyun araçlarının önemli rolünü vurgulamıştır. Oysaki görme engelli çocuklar için tasarlanmış olan oyun araçları ve oyuncaklar yeterli değildir. Hatta ebeveynler ve öğretmenler bu ihtiyacı gidermek için el yapımı oyun araçları yapmaya çalışmaktadır Bu çalışma, görme engeliler ve görme engelli çocuklar üzerine literatür çalışması ve takibinde görme engelliler ilköğretim okulunun anaokul ve birinci sınıflarında gerçekleştirilmiş olan gözlem çalışması ile yapılandırılmıştır.

Elde edilen verilere dayanarak bu çalışma, görme engelli çocukların çeşitli beceri gelişimlerini destekleyecek oyuncaklar için tasarım ölçütleri ortaya koymaya çalışmıştır. Çalışma, bu ölçütler kullanılarak, görme engelli çocukları günlük yaşamlarında destekleyecek bir oyun seti tasarımı önerisi ile sonuçlandırılmıştır.

Anahtar kelimeler: Görme Engeli, Görme Engelli Çocuklar, Oyun, Oyun Araçları, Oyuncak, Oyuncak Tasarımı

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INTRODUCTION

1.1. Problem Definition

Childhood is a critical period of life. The character of an individual is shaped in these ages and the subconscious records countless events and memories. The development of cognitive skills is also completed in childhood.

The activity of play is an extremely essential issue in child development. Every child plays, regardless of nationality, location, belief, economic situation, physical condition or time and era. Play is a tool that supports children with their intrinsic development. There is a plethora of studies which underline the significance of play in children development. Devoted pedagogue Maria Montessori (1870-1952) is known for her famous saying: “Play is the work of the child”. Today, this approach is embraced by many educators and psychologists. According to this view, children should play in order to learn, to develop themselves, and to equip themselves for the world both physically and psychologically.

Children practice daily life through the activity of play, like an apprentice of life. They imitate actions and mimics of the people around them, perform many roles and pretend to be adults. The ability to imitate is at its peak in childhood. Children’s behavior, even their manner of walking, resembles those of their parents or the people who raise them.

Visually impaired children too, attain life skills and practice them in childhood. It is important to note that attaining these skills is even more important for them, not to be dependent on other people throughout their adulthood. However, disabled children are disadvantaged throughout this important developmental phase.

Disabled children need more specified means of play in order to have sufficient access to such practice. It is critical to understand the role of play in their development, and to pay the necessary importance to toys as the main tools of their play activity. In other words, all children need play activity but handicapped children need play activity with tools and toys which are specified according to their physical and mental

condition. For instance, a blind child needs toys which let him/her act by perceiving the environment through other senses than sight, whereas a deaf child depends mainly on the sense of sight.

In daily life visually impaired children have some difficulties about reaching places, going around; exploring, finding and perceiving objects. They need to do more practice about every kind of daily actions, routines and works for a self-sufficient life. They have to use their other senses more efficient and need to do practice for the sake of this purpose. Visually impaired children need some special tools/toys and practices/plays in order to support their self-sufficiency. The study claims that along with play activity and play tools we can support their daily lives.

To put it differently, in the context of self-sufficiency, for visually impaired children, specified toys are essential. The need of tools that are supposed to integrate with other senses to balance the impaired sense is overcome by the toys in the context of this study. The claim of this thesis is the possibility of supporting visually impaired children by special toys and play tools.

Visual impairment is the main focus of research in this study. In today's world, the perception of the physical environment is overwhelmingly based on visuality. In a visually-centered world, even the simplest everyday actions are extremely challenging for visually impaired people. For instance, public transportation is part of the everyday routine for most people, whereas it is a hassle for a blind. It is impossible to learn the route number of a bus without the help of a sighted peer. This is just a small example from daily life, which demonstrates the difficulties that blind people face in our visual oriented world.

The hegemony of visuality is also evident in the discipline of industrial design. The most tools dominantly used in industrial design stand out to be the visual ones, such as colors, graphic arrangements, shapes, patterns and typography. This is just as true in the case of toy design. When we look at the toys offered to the consumer market, it is impossible to miss that toy design is almost completely based on visuality, with the intention to attract attention. This feature of toys is even a problem for the sake of play activity of healthy children. For this reason, the study stated this reality as a problem and emphasized that it is an obligation to design customized toys for blind and visually impaired children.

There are very limited options in the market when it comes to toys specifically designed for visually impaired children. The majority of the available examples have

not been designed by professional designers, but by people who work with disabled children or are concerned with the subject of disability.

Every career field should be socially responsible about their own profession. With this intention, one of the responsibilities of designers about the subject is to design proper toys for visually impaired children. When designing for visually impaired children, their needs also should be a concern for toy designers, beside their abilities.

The study aims to clarify the issues that must be taken into consideration when designing toys for visually impaired children. It employs an observation study to understand the relationship between the concept of "learning" and "practicing", as well as the one between "the activity of play" and "the role of toys and play tools". Finally, through a design project, it is intended to exemplify how to design toys and play tools specifically for visually impaired children, ensuring that not only will support them, but also they will have fun.

1.2. Objectives

The major objective of this study is to determine the design criteria concerning toys for visually impaired children. Certainly it is assumed that the toys designed by using the concluded design criteria will support daily life skills of the visually impaired children. In order to determine the design criteria, it has been planned to conduct an observation study in a school for visually impaired children. The next step is to propose a toy design based on these criteria and build a model of this product.

There are theoretical and practical objectives of this thesis. The theoretical domain of this study involves objectives in four levels: Comprehension, analysis, synthesis and evaluation.

In the level of comprehension, the study defines the terms "blindness" and "visual impairment" as medical and educational concepts; classifies the consequences of being visually impaired; identifies the effects of this type of impairment on child development; emphasizes the importance of attaining some skills for the independence of the visually impaired; and restates the role of play in the development of these children.

In the level of analysis, the study surveys visually impaired children in their school time; examines their needs through observation; and analyzes the findings of the observation study.

In the level of synthesis, the study formulates the design criteria for a new toy design which can meet the needs of visually impaired children.

The practical domain of the study involves designing a new toy for visually impaired children, making use of the findings that are to emerge from the literature research and the observation study.

1.3. Methodology

The general purpose of this thesis is to formulate design criteria for a new toy which will support the learning process of the needed skills of visually impaired children. The study started with a literature review of texts about visual impairment, visually impaired children, child development, play, toy, and the relationship between all these notions. It is necessary to note here that, though there is a notable literature on toy design, it is hard to find resources on the subject of toy design for visually impaired children.

The next phase in the study was a nonparticipant observation. The survey has been conducted in İzmir Aşık Veysel Primary School for Visually Impaired Children, with children who have visual impairment but no other type of disability. The children have been observed in their course and play time. It was a nonparticipant observation in that the observer did not interact with the participants of the survey. The observer only took photos and notes without disturbing the children and teachers. The purpose of this observation study was not to measure or compare the abilities of visually impaired children, but to understand the effects of their visual impairment on their lives and to determine their special needs.

Both the literature review and the observation study were useful in determining the design criteria for toys to be designed for them. These design criteria are later used in a toy design project for visually impaired children. The design project was structured on the needs, features and abilities of these children. Moreover it is aimed have the feature of improving some skills of children which they will need in their daily lives.

1.4. Research Questions

During the study the main focus will be on understanding visually impaired children and their lives, their needs, features, abilities and the skills they need to achieve. Research questions of this thesis are listed as follows:

- What are the special needs of visually impaired children?
- What are the base problems to sustain visually impaired children's daily lives?
- What are the roles of play notion and toys in children development?
- How different should be toys for visually impaired children from ordinary toys?
- What should be the features of toys which are designed for visually impaired children?
- As designers, can we design a toy/ toy set that help to practice their daily lives, to improve their skills concerning to the difficulties in their daily lives?

1.5. Background

There are many researches individually on both visually impaired children, the activity of play, and toys. However, there are not enough studies dealing with all three subjects. The studies on visually impaired children mainly deal with the social, behavioral, emotional and perceptual aspects.[1] There are some studies researches about play among visually impaired children. The majority of the studies are about a single type of the play like symbolic, cognitive or musical play[2], and most of the observations in these studies are conducted with only a few children.[3]

Evyapan's PhD thesis is one of the most relevant and extensive studies.[4] This study is mainly about design methods, but the user group of the study is visually impaired children and the defined design product is a toy. This study is very important

[1] Brambring 2005, Celeste2007, Crocker and Orr 1996, Mallineni 2006, Olson 1983, Ophir-Cohen and others 2005, Roe 2008, Sleeuwenhoek 1995.

[2] Bishop and Hobson and Lee 2005, Celeste 2006, Hughes and Dote-Kwan and Dolendo 1998, Kern and Wolery 2002, McElligott and van Leeuwen 2004.

[3] Campbell 2007, Celeste 2006, Celeste and Grum 2010, Crocker and Orr 1996, Skellenger and Hill 1994.

[4] Evyapan, Naz A.G.Z., PhD. Thesis, 2002.

in the respect that it has been realized by an industrial designer, on the subjects of visually impaired children and toys designed for them.

Another notable study is Kılıçoğlu's thesis submitted for his master's degree at Selçuk University. This study observes the play activities of visually impaired children at nursery and first grade classes, from the perspective of an educator.[5]

Another study is Cem Kara's doctoral thesis about visually impaired children, submitted to Mimar Sinan Fine Arts University.[6] This study underlines the lack of children's books for visually impaired children in Turkey. The author designs a book for the user group and determines the problems of production and perception based on this sample.

There are many other theses about play activity among disabled children; however, not all of them deal with visually impaired children, but children with other impairments and disabilities.

Freelance designer Rachel Gottlieb has a study titled "Touch and Space: Active Learning for Visually Impaired Children", whose text is available on her personal website. As an industrial designer, she designed some activity mats and observed four children play with the mats she designed. These observations supplied her with important findings to develop her designs.

There are a number of researches about toys designed for visually impaired children, which aim to clarify the relationship between "toy" and "visually impaired children". The literature on toy design is very limited.

This study aims to combine all these subjects with the perspective of an industrial designer. Many studies exist on each individual subject, however this will be the first study whose purpose is to take all these aspects into account and thus reach a design criteria concerning toy design for visually impaired children.

1.6. Scope and Limitations

This thesis will be focused on visually impaired children aged five to eight years, who are in nursery class or first and second grade students in primary education.

[5] Kılıçoğlu, Mahir., M.S. Thesis, 2006.

[6] Kara, Cem., M.S. Thesis, 2011.

Children with multiple disabilities have been excluded from the observation range, since the large mental gap between the children would be an unwanted condition.

The objects of this study are toys. For a spontaneous and instinctive learning, toys should be in all acts and practices of children as the tools of the activity of play. The role of toys in all these acts and practices are very important. The importance of play activity and toys is more than what it seems. The play activity is an important tool to practice life. While exercising life with the play activity, children learn spontaneous and instinctively. In other words, learning in the childhood is integrated with the activity of play. To clarify that, the practice of life through the repetition of daily life patterns, improve the ability of remembering, knowing and learning. It is very hard to distinguish these three notions that integrated with practicing and also play activity. With these on mind, we will evaluate toys as inevitable tools for improvement of children.

1.7. Structure of the Thesis

Chapter 2 presents the definitions for the notion “visual impairment”, to construct a base for the study. The second part of the chapter provides an introduction to the notion of being blind. This part has five subheadings: specific conditions, skills to learn, some techniques and tools, public perception, and being visually impaired in Turkey. Thirdly; features, needs and abilities of the visually impaired children are clarified. The concepts of play, toy as the tool of play and child development are discussed in relation to visually impaired children. Some examples of toy design are given in the last part of this chapter.

Chapter 3 based on the observation study carried out in İzmir Aşık Veysel Primary School for Visually Impaired Children. Important data and findings concerning the study will be given in this chapter. In the last section of the chapter, the findings are evaluated.

In Chapter 4, design criteria for a new toy design for visually impaired children are formulated. The toy which is designed based on the design criteria is introduced.

Chapter 5 comprises the conclusion of the study, which is made upon an evaluation of the literature review, the observation study and the toy design. Suggestions for further research are also shared at the end of this section.

CHAPTER 2

VISUAL IMPAIRMENT, CHILDREN AND PLAY

In this chapter of the study first the definitions of visual impairment and blindness are given as basis information about the topic. With the information the term visually impaired is used for represent both educationally blind and having low vision.

After giving definitions, being visually impaired is/will be analyzed for the sake of gathering information about user of this study. The data is decided as essential for illumination of features of the user features. This subject covers specific levels of vision, skills to learn, some techniques and tools and being visually impaired in Turkey. There are many types of illness about vision. These diseases can cause impairments in different ratios. However the different percentage and quality of remained vision did not directly show the effect of impairment in daily life. There are varieties of positive and negative effects which create ease or difficulty in visually impaired people's lives beside the ratio of impairment. Many of these people can overcome the difficulties of the impairment by practice. Hence the ratio of impairment is directly proportional to the need of practice but it did not define abilities or disabilities. No matter how much massive the impairment, it is not a barrier for using any object with the help of practice and repetition.

There is always a method to use even for the objects which seems impossible to use for blind people. The methods and tools that visually impaired people used are also examined for understanding their basic techniques and habits. These techniques, skills and routines will be beacon to develop the design criteria. The efficient usages of other senses will clarify the living conditions which hounding skills are usually used. Again tools that are used by these people are analyzed. These tools and usage method of them are foreseen as the matters involve clues for the design criteria.

Some of the tools used by visually impaired people are digital ones. Some of these tools are very useful however to be under need of digital equipment in every second cause an addiction. For example blind people do not want to use navigators because there are many places that do not have their digital data on navigator, and it is impossible to update data of a navigator for every small detail of the changes of the

streets. Blind people even do not count their steps. They claim that they need to learn how to find their way in every circumstance. If they count their steps, they may forget the quantity and standstill in the middle of their way so even trusting to the numbers do not seem correct for a self-sufficient blind people. In other words, it is the worst thing to bind their sufficiency about their basic perceptions and basic skills to some digital equipment. Interaction with environment needs to be continuous/ constant.

To support the claim of the study, visually impaired children will be analyzed by the development ranges of children's skills. This study is also assumed to make some vital contributions to developing the design criteria. Children's perception of objects is examined. At the end of the study there will be a toy as an object to percept for these children therefore it is important to study on the perception of children.

Another skill that children should learn is self-help skills which need to improve manual dexterity. The importance of repetition and exercises will be underlined and the key point will appear as usage of hands and fingers to close the gap of impairment in vision. Cognitive issues also will be underlined as a constantly used skill in lifetime. Visually impaired children need to use their memory more than sighted people. For instance, they need to remember where the objects are in school and at home. Also the mind maps which is used for image and percept objects, need strong cognitive skills.

Another important issue is communication and development of linguistic skills. These skills need to be improved in daily life by practice and also by listening and reading books. Their communication based on linguistic and by practice they may understand the small differences in voice and use these skills instead of understanding body language and mimics. They also need to improve their vocabulary in order to articulate their selves through words, statement and discourse.

These skills and routines of daily life, all meet in an activity of children, this study would like to emphasize, it is playing. Playing is as a regular activity in children's lives, has essential value on their development. Children need to play for improving all their skills. These children may have difficulties to learn some of these skills with their different abilities or disabilities. That is why these children need some suitable play tools and toys which make the process easier, faster and richer.

Further, the study will explain the playing activity and several toys for these children. It is assumed that research on existing suitable toys will underline the important skills that children have to learn and develop. Also these toys will give clues for the design criteria. The importance of play, play types and playing with the toys

which are suitable for visually impaired children will be clarified for the sake of design criteria and self sufficiency of these children.

2.1. Visual Impairment and Blindness

There are many types and causes of visual impairment.[7] Visual impairment and blindness usually defined as two categories. The first one is medical definition which is used by government agencies for insurance, payments and health issues. Second definition, educational definition, has a more functional point of view that it highlights the vision, performance and the effects of impairment in life.

2.1.1. Medical Definition

International Statistical Classification of Diseases (ICD) as programmes of The World Health Organization (WHO) defines blindness "less than 3/60 (0.05) or corresponding visual field loss in the better eye with best possible correction"[8] but this definition has a new revision that the authorities decided to process the definition recommended by the Resolution of the International Council of Ophthalmology in 2002 and the Recommendations of the WHO Consultation on "Development of Standards for Characterization of Vision Loss and Visual Functioning" on September 2003. They realized that current definition do not differentiate the people who has or has not the perception of light. Moreover by using the term with best possible correction the definition overlooks a large proportion of persons with visual impairment. So the term "best corrected" changed by "presenting". On the other hand some changes also made in low vision definition which was "[...] visual acuity of less than 6/18 (0.3) but equal to or better than 3/60 (0.05) in the better eye with the best possible correction."[9] This definition changed because it did not have the distinction between low vision and blindness. The authorities will use the term of low vision in the next revision while the

[7] For further information, Webster, Alec and Joao Roe. *Children with Visual Impairment :Social Interaction, Language, and Learning in Mainstream School* London: Routledge, 1997, 21-63.

[8] Beth Omansky**,** "Blindness and Visual Impairment," in *Encyclopedia of Disability*, ed. Gary L. Albrecht, (Sage Publications, Inc, 2006), 186.

[9] Ibid., 186.

bounds between the terms are clarified.[10] The categories of visual acuity are clarified with the table below on the web site of ICD.

Table 1. The Categories of Visual Acuity, ICD, 2012.
(Source: http://www.who.int/blindness/en/)

Category	**Presenting distance visual acuity**	
	Worse than:	**Equal to or better than:**
0 Mild or no visual impairment		6/18 3/10 (0.3) 20/70
1 Moderate visual impairment	6/18 3/10 (0.3) 20/70	6/60 1/10 (0.1) 20/200
2 Severe visual impairment	6/60 1/10 (0.1) 20/200	3/60 1/20 (0.05) 20/400
3 Blindness	3/60 1/20 (0.05) 20/400	1/60* 1/50 (0.02) 5/300 (20/1200)
4 Blindness	1/60* 1/50 (0.02) 5/300 (20/1200)	light perception
5 Blindness	No light perception	
9	Undetermined or unspecified	
	* or counts fingers (CF) at 1 metre.	

Another definition which was proposed in 1934 by the American Medical Association (AMA) is now accepted by American Foundation for the Blind (AFB) and almost all U.S. government agencies.[11]

[10] World Health Organization Web Site, retrieved August 4, 2013, www.who.int/blindness/en

A legally blind person is a person "who has visual acuity of 20/200 or less in the better eye even with correction, or whose field of vision is so restricted that it subtends an angle of 20° or less in the better eye after correction."[12] According to almost all U.S. government agencies, partial sight is defined as "20/70 visual acuity in the best corrected eye or 20 degrees or less in the visual field."[13]

The legal definitions in Turkey also fit the ones given above. Practically, if a visually impaired person cannot see (with the best correction) from 60 cm which a healthy eye can see from 6.1 meters, then he/she is legally "blind" in Turkey. Besides, a person who has "low vision" is the one who can see the same sight from 2.1 to 0.6 meters.[14]

2.1.2. Educational Definition

Most "blind" people use their remaining vision to watch around, and many of them may even read texts in regular font size. The medical definition does not explain how much of their sense of vision these people can use.

The educational definitions of visual impairments underline the usage ratio of one's vision. Few people who are blind according to the legal definition practically cannot see anything. Most of the legally "blind" people can make use of their remaining vision. The educational classification deals with the question of how much a blind person can use his/her remained vision, and what he/she can and cannot do using it.

The importance of vision in education is evident for the ability to read and write. If a child cannot see a written text, he/she is a visually impaired child in educational terms. He/she needs to learn the Braille alphabet and needs to use tactile and auditory materials. There are also children with partial sight who can make use of texts printed in larger font size, or digital magnification tools.[15]

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[11] Poonam Jain, "Invalid Vision," in *Special Education* (Delhi, IND: Pragun Publications, 2006), 263.

[12] Ibid., 263.

[13] Beth Omansky**,** "Blindness and Visual Impairment."

[14] Mehmet Özyürek, "Görme Engelliler", in *Özel Eğitim*, ed. Süleyman Eripek, (Türkiye: Anadolu Üniversitesi Yayınları, 1998), 129-130.

[15] Jain, "Invalid Vision."

In Turkey, the educational definition of “blindness” is defined as being affected by severe loss of visual acuity and being in the need of reading in Braille and using audio books for education. As for “partial visual impairment”, the educational definition is having low vision that allows one to read texts in regular font size with the help of a magnifier, read texts in larger font sizes.

According to the regulations of the Turkish Ministry of Education concerning the “Institutions of Special Education”, there is a general definition for impairment: “An impaired person is one whose developmental and individual characteristics and educational qualifications differentiate significantly from their peers by various reasons, in terms of vision, hearing, language and speech, spastic, mental, orthopedic or individuals with mental disabilities.”[16]

The domain of this study is the children who are educationally blind. However the because of the word blind used for congenitally blind people in daily life the phrase visually impaired will be used in the study.

2.2. Being Visually Impaired

In order to determine toy design criteria for visually impaired children, it is essential to examine the daily lives of visually impaired people. Information about the adversities in their lives, the techniques they used, the skills they need to improve and their conditions are vital for the aim of the study. This is why this section of the study covers specific levels of vision, skills to learn, some techniques and tools and being visually impaired in Turkey. Firstly the impact of specific vision levels will be clarified. Secondly using other senses, orientation and mobility, independent living, and social interaction skills are explained. Thirdly using Braille, abacus and some other tools are explained and exemplified. Some of these tools will be example of solving some of the difficulties in their life and be an example of their interaction by products. Lastly The condition in Turkey tried to be explain briefly.

[16] Türkiye Milli Eğitim Bakanlığı Özel Eğitim Kurumları Genel Müdürlüğü, "Özel Eğitim Hizmetleri Yönetmeliği”, retrieved August 4, 2013. www.orgm.meb.gov.tr

2.2.1. Specific Levels of Vision

As it is underlined in the first part of the chapter, there are many illnesses that may lead to visual impairments. Blindness may be irreversible, or the remaining vision may be improved with certain corrective equipments. Some educationally blind people can see shadows and some have a perception of light, while others can see everything but in a distorted or blurry way. Some can see the colors, and some cannot. The usage of one's remaining sense of sight, and the problems encountered differ according to the remaining level of vision. However specific vision levels are not the only determiner of the troubles of life.

Although an individual's specific visual condition is very decisive on the difficulties he/she encounters, external factors "[...] such as the accessibility of their environment, the degree of support they have, and their financial resources"[17] are also very important. The individual's temperament is also influenced by such factors. Character is shaped during childhood, and the negative impacts left on the personality might haunt an individual throughout his/her life. The availability of social and economical support, tolerance and kindness in the education given in family and school in early childhood might have a big impact on a visually impaired person's life as an adult.

2.2.2. Skills to Learn

Use of Senses other than Vision

Visually impaired people depend mainly on their senses other than vision, according to the ratio of their remaining vision. They use their hands like eyes in order to identify objects, things and living things. They use every sound around them as a clue to understand what is going on and what are the things nearby. They may find their ways by the help of smells coming from shops and stores, and they are more sensitive to the air circulation around them while moving around. They learn how to use "acoustic shadows" to move with confidence. This acoustic shadow is generally created by an external sound source and an object as a blockage. It can be felt in the place behind the

[17] Beth Omansky**,** "Blindness and Visual Impairment," 187.

sound source and object like a shadow. In the place a person may feel the present of the object by hearing the sound less. Perceiving air circulations with body, finding the ways by smelling, following the sounds, seeing with hands; all these skills are developed by practice after the loss of vision, by force of circumstances and vital necessities. These skills need to be practiced to improve.

Orientation and Mobility

Mobility is one of the main difficulties in visually impaired people's lives. If the impairment comes from birth or childhood, they usually learn how to move safely. Moving around in a familiar environment is not a big trouble for most visually impaired people. They use their sense of hearing and the air circulation to perceive the obstacles around. Moreover they use also their sense of smell for finding way in streets. Blind people may use a sight guide, a white cane, a guide dog or digital equipments like GPRS navigators. They do not count their steps; instead they've learned guessing and remembering the distance they pass through.

However, getting around in an unknown, unfamiliar or crowded place is a challenge for blind people. They primarily use their sense of hearing in the streets. The more crowded the street is, the voices mix and moving around gets harder for them. They have to take into account voices of the people come from behind and front, the noise of passing cars and the sound of the wind; and to detect the obstacles around, they have to sense voice shadows at the same time.

The visually dominated environment of our culture makes it even harder to get around in a place. All signs like outdoor signs, cautionary signs, shop signs, traffic signs and also traffic lights are visual. Blind people cannot use these signs, and the physical presence of these signs constitutes an extra barrier for the visually impaired. When we think that even sighted people bump into these signs at least once in a lifetime, the difficulty can be better understood. The signs of transportation vehicles are also visual. It is almost impossible for a blind person to use public transportation without an accompaniment.

Orientation in this context means the ability of knowing where you are, which direction leads you to where you want to go, and how to go there. For the sake of a successful orientation, visually impaired people, especially if absolute blindness is in

question, should know their surroundings well. For this reason many blind people can move around in their own home like a sighted person.

Independent Living Skills

To lead an independent life, visually impaired people also have to work to earn money, should go around, do their own chores, do shopping and reduce the risks caused by the absence of their sense of sight in any location during their adulthood.

There are many blind people who can do all these daily routines. The hardest one seems to work in a proper job. Some professions are said to be more suitable for them such as being a teacher, lawyer, computer worker, phone operator, officer, military service staff, writer, musician or an artist. Although these jobs seem more suitable for blind people, there is not of course any determiner for choosing the right profession for blind people. Like everyone, they may do many jobs according to their characters and their abilities, their choices and likes.

A blind person also has to do his/her household duties. It is not that as hard as it seems if the person has a good sense of orientation about his/her house. Blind and visually impaired people are generally very tidy. They have to be organized well, to remember where the things are or where they put the things recently. This is also important for a safe mobility in house. There are some equipments and tactics they use for some of the chores. For example to match a couple of socks may be difficult but if you bond them each other with a knot then it will be very easy to put away after washing. Another example may be using boxes for each pair of shoes. Digital equipments are very useful for some domestic duties. For example a digital reader may be used for reading and choosing mode of white goods.

For instance, to do shopping using internet with software which reads all the text on the website aloud, may offer a better alternative to physically going to the supermarket. Using money while shopping can also be a problem for blind people. The banknotes are nearly the same in size, some of them are in similar colors and they have not any clue for visually impaired person. They may use some techniques such as using memory or folding the banknotes in different ways like in the Figure 1. However there is not any chance for blind people to trust the cashier or tradesman.

Figure 1. A Technique for Differentiation of dollar Banknotes.
(Source: www.pinterest.com/pin/527062581100864 76/)

In addition there are some stickers that enable one to write something in Braille alphabet that blind people may stick them on things which cannot be recognized by their smell or food and hygiene products which must bear an expiry date.

Kitchen is a risky space at home for visually impaired people, due to the presence of fire and cutting tools with blade surfaces. Blind people should be especially aware such risks at home. Fire, electricity, sharp objects like knifes and balconies in upper floors may pose risks for them.

Social Interaction Skills

Many people cannot tell a visually impaired person from sighted ones unless he/she is absolutely blind. There is not an obvious social difference between visually impaired and sighted people. However, as mentioned before, our daily life is mainly based on visual elements. We watch television or films, we read printed books, we talk about fashion and football. In short, everything has a visual aspect inevitably.

Thanks to the digital technology, blind people have the chance to use the internet and access the information they need with some special software. But even today, the majority of the books are not offered in digital or auditory format. Consequently in social groups there may be differences of interests and sense of humor among blind people and sighted people. However, it is not impossible to eliminate these differences. There are many activities that blind people can engage in and have fun. With some modifications they can play bowling and golf, and they can show great talent in arts and crafts. Music, acting, writing, ceramics, sculpting, jewelry design, weaving,

needle work and crochet are some examples to the hobbies which can be taken up by blind people.

2.2.3. Some Techniques and Tools

Using Braille

Educationally blind people who cannot read texts in larger font sizes use Braille alphabet. In Braille Alphabet, the letters and numbers are shown by a combination of six dots (Figure 2). Each combination of dots refers to a letter, and the combination of letters gives the word. With a space between words, sentences are formed as usual.

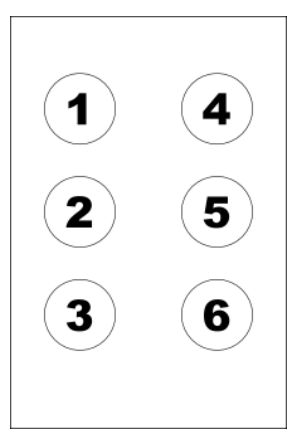

Figure 2. Braille Alphabet Cell with the Order of Dots.
(Source: www.tr.wikipedia.org/wiki/Braille_alfabesi)

In Figure 3, the Turkish alphabet is shown in Braille. There are some symbols indicating the usage of a capital letter, and a number or punctuations in Braille. Moreover there are some abbreviations for words. Since writing in Braille occupy too much space, there are some specific ways to shorten words, like the usage of the shortened form *etc.* instead of *et cetera*. Visually impaired people who learn to read in Braille also begin to use these shortenings in time. For example in Turkish Braille, "*a*" is the shortened form of "*aynı*" (meaning "same" in English). However, there are many shortened forms in Braille, and it is not easy to remember them all f you do not memorize them properly.

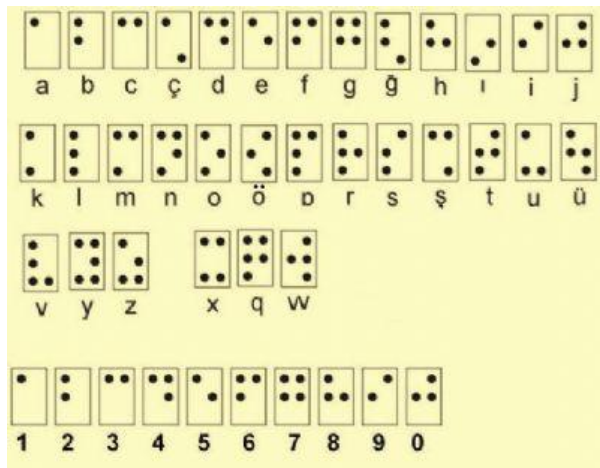

Figure 3. Turkish Braille Alphabet and numbers.
(Source: www.beyram.gov.tr/hab/grup.asp?biz=361&bizler=4&foto)

There are some Braille equipments for the use of visually impaired people. The Braille slate and stylus are equipments that enable a person to "write" on a piece of paper in Braille. Slate functions like a template and the stylus is the special pen that produces raised dots of Braille letters on paper (Figure 4).

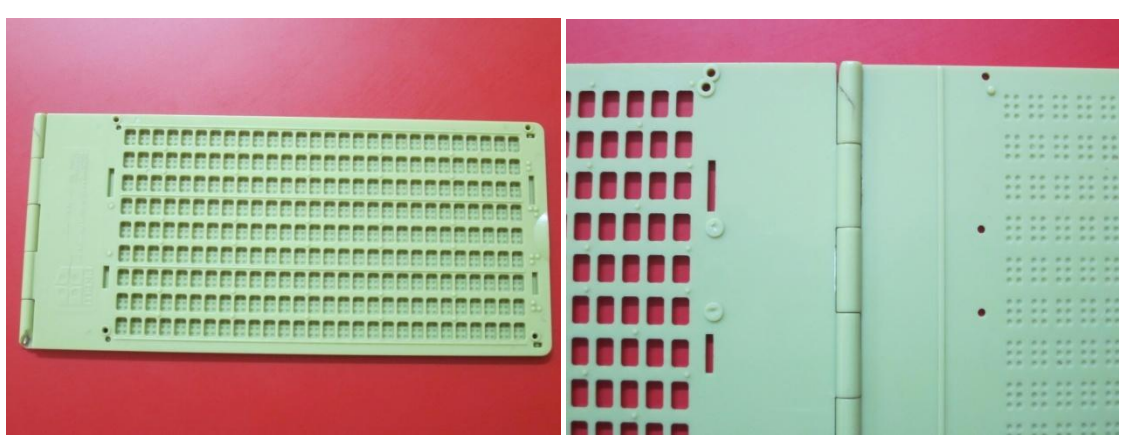

Figure 4. Braille Slates and Stylus.

Braille typewriters are also available (Figure 5). They are good for faster writing, and since the paper used in these typewriters is more durable, the writings last longer. However not everyone can purchase a typewriter, and carrying such big and heavy equipment is not easy. Therefore, writing with slates and stylus is an indispensible option.

Figure 5. Braille Typewriter.
(Source: www.acb.org/tennessee/perkins_brailler.html)

Using Abacus

For mathematical operations, blind people use abacus, which are a little bit more complicated compared to the ones that are generally used in primary schools (Figure 6). With the help of these abacuses, it is possible to do addition, subtraction, multiplication and division in as many as four digit numbers.

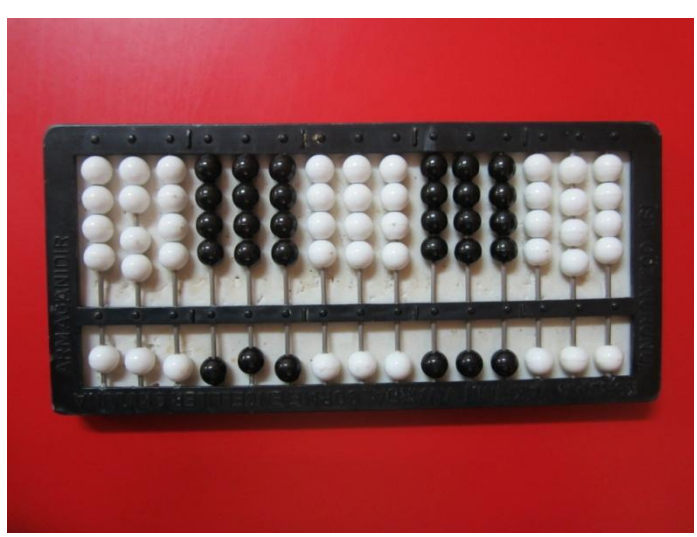

Figure 6. Abacus Used in Mathematic Classes of Blind Children.

Other Special Tools and Devices

Besides Braille equipments, there are many utensils for visually impaired people which supply us with clues to understand visually impaired people's lives.

Canes are used for mobility (Figure 7). There are many different canes, some are foldable, and some are telescoping. A variety of materials are used to make white canes lighter and stronger. As well as white canes, there are also many walking sticks in the market for people with low vision. For a confident mobility in winter there are also some snow and ice shoe-grips for visually impaired people.

Figure 7. a) A Folding White Cane, b) Snow and Ice Shoe Grip.
(Source: www.engelsizdunyam.org/t19127/ and www.rnib.org.uk/shop/)

There are many products offered on the internet, which facilitate the daily life of blind people. Digitals equipments are very useful as long as the visually impaired individual can operate them. There are digital talking watches, clocks, calculators, and money and color identifiers (Figure 8). Besides, mp3 players and digital voice recorders are very useful devices for visually impaired people.

Figure 8. Talking Digital Equipments a) A Talking Watch b) A Talking Calculator. (Source: www.engelliler-icin-icatlar.blogspot.com/2012/03/gorme-engelliler-icin-kol-saati.html and www.engellilermarketi.com/asp/group/71/Gunluk-Yasam-Urunleri)

There is one very specialized product named Touch Memo (Figure 9) for blind people, which is a talking label identifier. This device is used together with stickers. Small stickers with numbers are attached to each object that needs to be identified, for example a jar of jam. When the label is introduced the first time to the device, the device demands the user to identify the object, and the voice is recorded into the device. In this example, the user can make a note such as "mom's strawberry jam made in June 2012" for the jar of jam. Later, this note recorded on the device's memory can be used in order to identify the object in question.

Figure 9. Touch Memo, Digital Sticker.
(Source: www.ncbi.ie/shop/labelling/labeller-touch-memo-(dl75))

There are some stickers on which one can write in Braille Alphabet; however this is not a very good solution for remembering things which cannot be fit on a sticker. Some labelers (Figure 10) which show letters in regular alphabet let all literate people leave notes in Braille. They provide written communication between blind people and sighted family members who do not know how to write in Braille.

Figure 10. A Labeler Shows also Letters in Latin Alphabet.
(Source: http://www.amazon.com/MAGNIFYING-AIDS-Braille-Labeler/dp/B001L7OF4I)

Some other functional products are shown in Figure 11. The first one is for pairing socks. The second one is an indicator that is used to indicate the level of a liquid while filling in a glass. Some such indicators signal with a beep sound and some use vibration as an alert.

Figure 11. a) A Product for Pairing Socks, b) Indicator for The Level of a Liquid. (Source: www.secure.nfb.org/ecommerce/asp/default.asp and www.engellilermarketi.com/asp/product/18446/Sivi-Olcer)

There are some more products for visually blind people like measuring devices, meters, rulers and medical utensils such as thermometers, talking blood pressure and glucose meters (Figure 12). Additionally, there are pens which let one write on regular paper in Braille, by leaving three dimensional spots.

Figure 12. Ruler for Blind People.
(Source: www.shop.aph.org)

With widespread use of digital technology, many software programs have been developed for blind people as well. With some applications it is possible to use your phone as a color identifier and your tablet computer as a Braille typewriter (Figure 13). There are also many applications in phones and some mp3 players which help visually impaired people in some difficult situations.

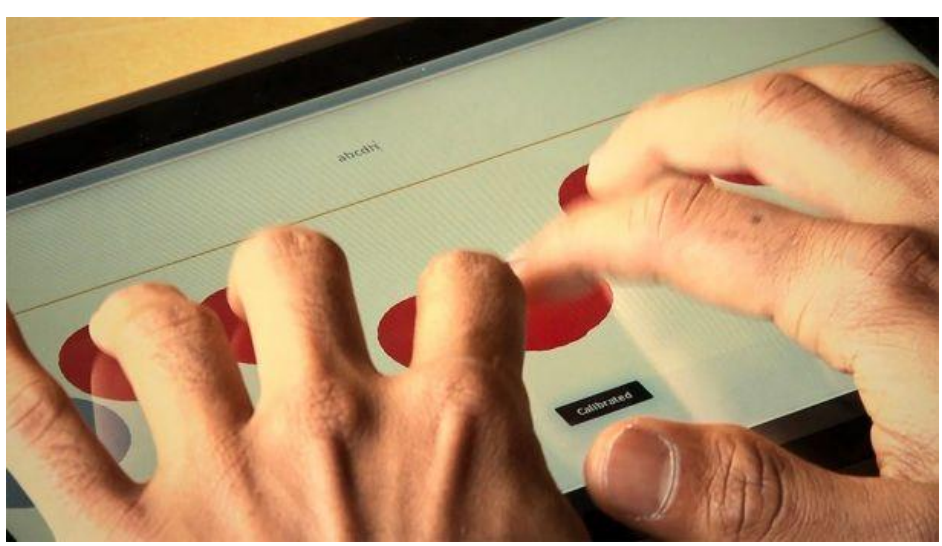

Figure 13. Braille Typewriter Application for Digital Tablets.
(Source: http://news.cnet.com/8301-17938_105-20118728-1/tablet-app-brings-new-touch-to-braille/)

Lamps and magnifiers for low vision are essential tools that enable more efficient usage of the remaining sight (Figure 14).

Figure 14. a) A Digital Portable Magnifier, b) A Video Reading Magnifier. (Source: http://www.thebraillerdepot.com/Low_Vision/Eye_Q.html and http://www.maculardegeneration-reader.com/eazyreader)

2.2.4. Being Visually Impaired in Turkey

In Turkey there are many associations concerned with disabilities, and specifically with visual impairment. These associations have many good and efficient activities.[18] They organize many projects, they support disabled people, offer courses to develop the skills of disabled people and educate parents while they bring up their visually impaired children. Moreover they defend rights of disabled people legally. They prepare and realize projects for the sake of visually impaired people in Turkey.

Unfortunately, in 21st century's Turkey some there are still some laws which fail to defend the rights of disabled people. Hopefully these associations work for these laws to be changed, putting pressure on governments and authorities.

Most Turkish cities lack the necessary facilities for visually impaired people. There are some thoughtful acts and works of municipalities about equipping the streets but because of the inadequate information given to the workers and the public, many tragicomic situations emerge in streets. In some cities, special tactile pavements have been placed in the main streets for blind people, in some point they have been rendered useless and misleading due to failures in application.

[18] The list of Turkish associations concerned with visually impaired people www.6nokta.org.tr/vakif_dernekler.html

Figure 15. Some Faulty Implementations of Tactile Paving Stones in Turkey. (Source: http://www.kanalben.com/haber/7399/bu-kaldirim-engellilere-engel-oluyor.html and http://www.cumhuriyet.com.tr/?hn=343280)

There are many wrong implementations of tactile paving in Turkey (Figure 15). These works have been initiated with good intentions and these misuses should not interrupt further projects. Nevertheless more municipalities should work to make the streets and public spaces accessible for disabled people.

In turkey there are sixteen schools in fourteen cities for visually impaired children. Most of these schools have their primary and secondary schools. Moreover most of these schools have dormitories for the children who came from close cities. Unfortunately the distribution of the libraries for visually impaired people is not like the schools. There are six libraries and five of them are in İstanbul and one of them is in İzmir.[19]

In Turkey to teach Braille alphabet properly children go to these schools. In these schools there are specially educated teachers who educate the children with the same syllabus which is used in sighted education. The difference is the used alphabet and education tools. The children, who educated with the same curriculum, can go to any high schools and universities which they deserved in the entrance exams. With this system there are many visually impaired people who can live self-sufficiently in Turkey.

In addition to their impairment, blind people also have to deal with undesirable attitudes of the public. Not everybody knows how to behave to visually impaired people. People have many different approaches to blindness and blind people, some of them being very far from humanistic, and some of these approaches comprise an

[19]Web site of the 6 Nokta Körler Derneği. www.6nokta.org.tr/okullar.html, www.6nokta.org.tr/kutuphaneler.html

upsetting feeling of pity. Compassion is not a bad thing, but the first thing everyone should learn is being respectful to other individuals. Blind people are not individuals who are dependent on others and a burden for governments. On the contrary, they are determined people who deal with many problems and difficulties of life in good temper. It is necessary to teach children in early ages the proper manners that must be displayed to visually impaired people.

Most of the social problems faced by visually impaired people arise from the unawareness of the public. Formal education in schools should include subjects that teach citizens how to live with impaired people and how to behave towards them. Hopefully one day, Turkish society will be freed of discrimination and all citizens will learn to live together with impaired people.

2.3. Visually Impaired Children and Basic Notions

In contrast to adults, children learn many things from scratch. The actions and experiences of visually impaired children differ from those of visually impaired adults. Childhood is the era of practicing and knowing the world; and compared to healthy children, a blind child has to acquire many additional skills.

Childhood is a period when many things are learned much more easily. However, visually impaired children need to learn many things by the help of guidance, since they cannot observe how people do things. They cannot copy or imitate other people's behaviors or actions. To instruct an action to a blind children there are three things to do. First of all the action should be described in details. Secondly, if possible, the child should be helped to practice it with his/her hands; because this is the way blind people "see" things and understand movements. Finally, the child should be encouraged to try the action himself/herself; however he/she should be kept under surveillance if there is a possibility of any kind of danger. Furthermore, when teaching something to a visually impaired child, it is important to divide the action in small segments and teach incrementally.

Below, the learning mechanism of blind children is studied in four subheadings: Perception of tangible data, self help skills, communication, socialization and play.

2.3.1. Perception of Tangible Objects

Mostly, people perceive the world with their sense of vision. However children with visual impairment should learn how to detect the world. Perception of tangible objects is not easy for visually impaired children. Firstly, lack of visual data obstructs seeking and reaching objects. These children should learn and encouraged about seeking and grabbing objects. Perception of tangible but huge and gigantic objects like trees, rivers and mountains is another problem of this subject. Children should have the detailed explanation of these huge beings. Also some three dimensional models of these may help children to perceive them.

Children with visual impairment use their tactile sense instead of their vision. Their levels of vision also affect the usage level of tactile sense. Instead of realizing the world with their eyes these children uses their hands.[20] They examine and identify the objects by grabbling. By the way they get the impression of the objects and build some notions with these impressions. These are on mind, the usage of hands are very essential for the visually impaired children. The gross and fine motor skills of children should be developed for the sake of children's perception.

Usage of vary materials can be used as tools of development for tactile senses. The more material children reach and touch, the more their senses improve. For the sake of their perception skills children should touch different types of fabrics. Vary of fabrics could be on their clothes or on their plush toys. Also some small materials like beads, chickpea, bean, lentil, rice and small types of pastas may be used for full some small bags which will improve children's fine motor skills.[21]

In the guide for parents' of visually impaired children, Özyürek advises parents to let their children walk barefooted on different materials and surfaces like granite, wood, floorboards, ceramic tiles, marble, carpet, rug inside and grass, earth, sand, pebbles, asphalted surfaces outdoor. According to Özyürek soles also send as much

[20] Ayşegül Ataman, "Kör Çocuğun Gelişiminde Oyunun Önemi," *Anadolu Üniversitesi Eğitim Fakültesi Dergisi*, (1984): 342.

[21] "Görme Engelli Çocuğu Olan Ailelerin Yapması Gerekenler," retrieved August 3, 2013 from http://engelliler.gen.tr.

stimulus as palms so walking on different surfaces also improve the perception skills of children.[22]

For perception of some of big objects children with visual impairment should use their visual memory for mental visualization. For many of the objects it is impossible to get what it is by touching a part of it. For instance, you could not get the idea of table by grabbing one of its legs. It is a must to touch every part of the table and combine these information on mind to comprehend the shape of it. This kind of perception is called haptic perception[23]. To form this image on mind, blind people use a mind maps. Mind map is the visualization in mind and the name of the perception is haptic perception. In the light of these information children should learn to use haptic perception, exercise on it and try to compose as many mind maps as possible to develop this sense.

Also perceiving tangible objects is a very essential for experience of spaces. Interaction with environment and experience it by touching is a must for visually impaired children. For mobility and good orientation skills cooperation of usage of other senses, perception of tangible data, mental maps and cognitive development is necessary. For perception of spaces and composition of mind maps children with visual impairments may start to exercise in a room of their houses. They may learn all the objects in the room, grab them and learn the sizes, volumes and shapes of them beside their usage. Also the places of the object are important for developing of mind map of the room. Children need to improve all their skills by exercising.

2.3.2. Self Help Skills

Self help skills are essential knowledge, dexterities and daily life tools which need to be learned by visually impaired children. It is possible to classify these skills into four as grooming and hygiene, eating, dressing, and household skills (cleaning, laundry, helping in household tasks, staying away from danger). These skills are multistage. Stages and difficulty levels change according to their ages. Additionally, the stages of difficulties are upgraded by the last achievement of the children. Children try to learn these skills sequentially. Lack of visual sense also has negative impact on

[22] Mehmet Özyürek, *Görme Yetersizliği Olan Çocuğu Bağımsızlığa Hazırlamak İçin Ana Baba Rehberi*. (Ankara, Başbakanlık Aile Araştırma Kurumu, 1995), 51.

[23] Mehmet Özyürek, "Görme Engelliler", 146-147.

learning self help skills. Without ability of imitation, these children have to be taught about the skills. They should practice more because they try to do it without using sense of vision. To develop these skills children also need the direct experience of world itself. They should learn these skills by try them in the life.

Grooming and hygiene skills are generally actions about toileting, cleaning hands, brushing teeth, washing oneself in bath time and blowing nose. The table bellow exemplifies some of the skills and analyzes them by the acts needed.

Table 2. Grooming and Hygiene Skills.

Grooming and Hygiene	Toileting	Washing	Grooming	Nose-blowing
Examples of Skills	*Uses toilet *Uses toilet paper *Uses bidet	*Washing hands *Using soap *Drying Hands *Washing face *Drying Face *Wash and rinse hair and body *Drying after bath	*Brushing teeth *Combing hair *Brushing hair *Drying hair *Trimming fingernails *Trimming toenails	*Using tissue to blow nose *Wiping nose without being told
Acts	*Knowing the place of WC in school and home *Knowing orientation of bathroom *Manual dexterity	*Knowing the place of WC in school and home *Knowing orientation of bathroom *Manual dexterity	*Physical movements *Manual dexterity	*Manual dexterity *Awareness of body

In the eating section there are acts about eating, drinking, preparing food. In detail these skills may be listed. Getting drink from dispenser, pouring water/milk, drinking from cup, eating with spoon, eating with fork, spreading with knife, cutting with knife, setting table, cleaning table, getting own snack, preparing breakfast, making toast or sandwiches. Visually impaired children should learn these skills by one by according to the easiness. For these skills, children should know the place of kitchen and the orientation of kitchen. They should have the required manual dexterity for ever each of skills. They should hold small things which needed developed fine motor skills. Lastly being aware of danger is important issue in the kitchens.

Dressing is also essential skill, children should learn. These skills are not only good for being independent but also excellent in order to evaluate the child's physical and cognitive skills. Dressing covers the skills like putting on/off the dresses and shoes, differentiating clothing front from back, zipping a zipper, buttoning and unbuttoning

buttons, buckling belts, tying shoes, put on the shoes on the right feet, put dirty clothes in hamper, select clothes that fit and match each other, select clothes appropriate to weather or context. For these self help skills, visually impaired children should develop their motor skills both gross and fine. There are some actions based on special manual dexterities like buttoning and buckling. Dressing skills also cover some cognitive issues and awareness of concepts of life. Also for achievement of these acts, children need to develop many fundamental issues.

Finally, the last self help skill heading is household skills. The heading is generally covers cleaning, laundry, helping in household tasks and stay away from danger at home. To enumerate the skills are, putting toys away, making own bed, separating clean from dirty clothes, loading washing machine, hanging up clothes neatly, folds clothes neatly, put away clothes, taking out trash, clear table after eating, dusting, vacuuming, cleaning sink and toilet, washing dishes, loading dishwasher, using door handles, turn on/off the lights, the radio, TV and other digital equipments like cell phones. These skills are the ones which are necessary and needed ones for modern livings in homes. Maybe in country towns children may not need these skills but need others like to milk a cow safely and properly.

The last skill under the household heading is being aware of dangers both indoor and outdoor. Being aware of sharp corners, slippery surfaces, wet places, high places, stairs, height awareness ,hot things like oven or stoves, fire, electricity, sharp and cutting objects, poisoning and toxic materials, knowing about what to do in unfavorable occasions like earthquake are the vital awareness for children's education. Every child should be warned and practiced about home accidents and their potential negative solutions. However this is especially important for visually impaired children. Visually impaired children should be taught about essential acts and the places of risky part of the house. Surely for the safety issues, cognition and awareness are the most important notions that children should use for their well being and security.

There are also many dangerous outdoor occasions. The traffic is pretty dangerous one by itself. Adding the irregular pavements the streets are very risky for visually impaired children. These children should be taught about all the risks they may face with in outdoor.

2.3.3. Cognitive Development

Visually impaired children need to learn all objects and notions with a higher effort. Cognitive development is very important for all children however with the special group of children it gains much more value. Without the sense of vision it is harder to learn and memorize many things like objects, materials, conditions and notions. The cognitive development used in every second in life and visually impaired people need to use this skill because they need to use their memory more than sighted people.

For instance, all children need to learn the adjectives like small and big, thin and thick, soft and hard, short and tall, light and heavy. These are very basic qualifications however a visually impaired child needs to feel these by his/her hands to learn this kind of notions. With the information gained with hands children need to create a mind map. This is their method to percept things instead of the sight. They also use their visual memory. In this case they do not remember what they see with their visual memory; instead they put created mind map.

Sighted people do not need to remember the place of all things at home. They see the place of chairs, glasses, remote controls however the visually impaired people need to be tidy and have full knowledge of orientation. This is why they need much more cognitive development and memory. They need to remember many things with their related mind map. It is important to have memory of sounds and voices. This is a needed talent for both orientation and mobility, and communication. The sound clues in the streets help to find way and the recognition of people's voice will help in communication.

2.3.4. Communication

The lack of one sense imposes obligation of effective usage of other senses. Our communication based on our auditory sense though if there is not any remained vision the power of communication gains much more value. Visually impaired children should learn how to communicate well. Besides they need to be trained about different tones of speaking. In this point parents ability to use their voices is very important. People naturally use their voices according to the circumstances like an angry of excitable tone.

Still, parents of visually impaired children should use their voices consciously. This is very important especially in dangerous situations. These children may not perceive all dangers in their environment and protect them usage of voice gain value. Moreover in communication we also use our body language frequently. For a better communication skill visually impaired children may use the tone of voices instead of body language. This way they may understand even the character of the speaker. In particular people are in blinds' worlds only with their voices for a time. So children should learn to analyze voices of people around them.

Skill of memorizing voices also gains value in the lives of blind people. Peoples voices are the most characteristic and comprehensible clue for identifying others. That is why visually impaired children begin to use this sense effectively from the baby hood. In fact as listening, speaking is also very vital for communication. That is why to develop communication stills children with visual impairment need to tell themselves clearly. For this propose parents and teachers should let them speak and encouraged them to tell something in detailed way. Moreover for learning as many words as they can children should be read many books. This will also develop their expression of themselves.

One way to develop their communication is the playing activity. Actually every dialogue in childhood contains play activity. Children play in which they develop their communication skills, that they talk, define, explain or make stories up. This is also important for improving friendships and for their sociality.

2.3.5. Important Remarks of Basic Notions

Development of personality is an endless process of our lives. This process begins from infancy by the cases and conditions recorded to subconscious. In childhood children also begin to build up their personality by being social. All effects of genes, subconscious and attitudes learned through the notion of imitation. Imitation emerges as determined for tool for social behaviors and manners. Visually impaired children cannot imitate the gesture and mimics/facial expressions of others but can use the imitation of communication skills and patterns. These children may imitate the dialogs of adults by using auditory sense more effectively.

Generally children's social skills evaluate by the friendship. Getting along well with peers, sharing toys, playing and working with others are some of the evaluation criteria. Most of the children act as the elders treated to them. For growing up sociable children with visually impairment, to behave patient and tolerant is essential for elders. Because of the impairment in the sense of vision, communication and behavior patterns gain much value for the socialization of these children.

Playing is an activity that covers all the day of the children. For example, children learn along with playing, eat for playing, socialize in playing, etc. In every acts and steps of children there is a piece of play. Teaching to children also should involve the playing activity. There are more things to learn for visually impaired children so they need more time for playing also for the sake of their education. These children, especially educationally blind ones, may need guiding about how to playing with some toys or play tools. Parents should support their children about this issue. Moreover parents and babysitters of these children should teach variety of plays to exemplify types of plays.

While playing children need to do some acts, develop some manual dexterities and skills. Some of them are pushing, pulling, turning some part of toys, grasping and holding large toys, objects and small things like crayons, doing puzzles, playing board games, throwing, catching and hitting balls, using scissors and glue, scribbles and colors with several coloring pencils and painting dyes. These abilities should be tried and practice in the proper age periods by these children.

2.4. Visually Impaired Children and Playing

In this part of the study the relation between play and children development will be underlined, than play types and toys as a tools of playing activity will be examined. After these information given the relation between visually impaired children and toys will be cleared. Lastly several toys suitable for these children and some toys designed for the children are exemplified.

2.4.1. Play and Development of Childhood

"It should be noted that children at play are not playing about; their games should be seen as their most serious-minded activity."[24] Michel de Montaigne

"Play is a child's response to life almost where life begins, play begins. Play is the way the child learns what no one can teach him."[25] Lawrence K. Frank

"Play is the work of the child."[26] Maria Montessori

There are many sayings about child's play written by researchers and philosophers. Many of them underline the importance of child's play. However description of play activity of children is more challenging.

Garvey states descriptive characteristics of play as:

(1) Play is pleasurable, enjoyable. Even when not actually accompanied by signs of mirth, it is still positively valued by the player.

(2) Play has no extrinsic goals. Its motivations are intrinsic and serve no other objectives. In fact, it is more an enjoyment of means than an effort devoted to some particular end. In utilitarian terms, it is inherently unproductive.

(3) Play is spontaneous and voluntary. It is not obligatory but is freely chosen by the player.

(4) Play involves some active engagement on the part of the player

(5) Play has certain systematic relations to what is not play.[27]

By these characteristics, Garvey states the meaning of playing without emphasizing any of the advantage of play.

In the Educational Terms Dictionary of The Turkish Language Association defines play as any pleasurable activity that has not any relationship with a prospective purpose or a sense of satisfaction, and inherently has its objective.[28]

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[24] Michel de Montaigne, Book 1 Chapter 23.

[25] Rhonda L. Clements and Leah Fiorentino, *The Child's Right to Play: A Global Approach*. (Greenwood Publishing Group, 2004), 125.

[26] David Elkind, "Play" *Corsini Encyclopedia of Psychology*, (1988).

[27] Garvey, Catherine. *Play*. (Harvard University Press, 1990), 4-5.

[28] Educational Terms Dictionary, The Turkish Language Association, "play" (*oyun* in Turkish).

Republic of Turkey Ministry of National Education defines the word play as for a particular purpose or not, performed by rules or not, however in any case the child takes part willingly and have a liking, the basis of physical, cognitive, language, emotional and social development of the child and which is a real part of life, and the most effective learning process.[29]

Playing as being in the center of the life of children is very essential for their life. Children create their own world which fits them by playing.[30] There is not any right or wrong in play activity. This activity comes instinctively. Actually children play in every second of their lives. Most of the times even their dialogs contain play activity. With their play they repeat many actions and skills. They do not do this on purpose however their play is an exercise of life. Children do not get bored from a play. They always have energy to play. Playing with/in the same play do not disturb them and they do not give up with repetitions. Benjamin also underlines the importance of repetitions in play. According to him rehearsing in play activity is in the soul of play and there is nothing gives that much happiness to children. He also claims that habits come to lives with plays.[31]

The other action children always do involuntarily is learning. Children are very open to learn something if it is not a teaching process. They observe people and internalize their behaviors or stills. For instance many children unconsciously shape their character by the affect of the people's characters around them. This learning process is also covered by play activity. For healthy learning children should play.

There are many headings of children's development. Some of the skills may be enumerated as gross motor, fine motor, visual, auditory, coordination, physical, cause & effect, tactile, explore, musical, creative, imagination, emotion, social, concentration, language & communication, mathematical, problem solving and logical skills. These skills may be added up in five kind of development. Physical, cognitive, language, social, emotional development categories are the ones which clarifies total development of a child.

These development categories are also the ones which play activity can improve. For physical, cognitive, language, social, emotional development children need to play.

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[29] Türkiye Cumhuriyeti Milli Eğitim Bakanlığı. *Çocuk Gelişimi ve Eğitimi Oyun Etkinliği-1.* (Ankara 2009), 4.

[30] Walter Benjamin. *Çocuklar, Gençlik ve Eğitim Üzerine*. (Ankara: Dost Kitapevi Yayınları, 2001), 62.

[31] Ibid., 73-74.

Play is physically active process. Children move, run, bounce, grab, make exercises and sport by plays. They develop their body and mind with these actions. Children learn many of the information in plays. For example notions like numbers, colors and shapes learned by small plays in babyhood. Plays, riddles, songs and books are generally the tools used to develop linguistic skills of children. Playing with others is the best way of socialization for a child. They learn friendship and communication by this way. Lastly, the effect of playing on the emotions and happiness of the children is greater than assumed.

Play as the skills below also promotes problem solving, critical thinking, curiosity, creativity, persistence, love of learning and brings also academic success in long term.

Children always enjoy playing and this enjoyment penetrates into their lives. Gleave and Cole-Hamilton evince the relation between the play, happiness and well-being of children. They shared a quotation from Folley that "It is widely understood that play is a crucial to children's healthy development and quality of life."[3233]

2.4.1.1. Play Types

There are many categorizations about play types done by many philosophers and academicians. They have many different classification aspects of play activity. Some of them use features and aim of play types, some of them overrate the number of players and some of them use developmental issues.

The Republic of Turkey Ministry of National Education state the play categories in one of lecture notes (Play Activities-I) states the categorization of play according to their characters, play area and objects used.

Play types according to their characters:

- Functional play
- Imaginative/ Pretend/ Fantasy play

[32] P Foley, "Introduction" in *Promoting Children's Wellbeing: Policy and Practice*, (Bristol: Policy Press 2008), 6,queted in Josie Gleave and Issy Cole-Hamilton, "A Literature Review on the Effects of a Lack of Play on Children's Lives." (2012):5.

[33] For further information about benefits of play the literature review done by Josie Gleave and Issy Cole-Hamilton in 2012 is an appropriate one.

- Group play

Play types according to play area:

- Outdoor play
- Indoor play

Play types according to the objects used:

- Playing in/on objects
- Playing with objects
- Playing without objects.[34]

Rettig uses six types of play types which are like a combination of play catagorizations of Parten's, Piaget's and Smilansky's. He defines types of the plays as:

Solitary play : When a child plays alone, shows little awareness of another child in the play area, and does not interact with the child.

Parallel play : When a child plays near but not with another child and plays either with similar or different play-things.

Functional-manipulative play: When a child manipulates a plaything or uses it in the way it is intended to be used (for example, pretending to drink from a toy cup).

Symbolic play : When two children are pretending that an object is another object (such as making believe that a stick is a gun).

Dramatic play : When a child is engaged in a pretend role-play activity (for instance, pretending to be a mother or Batman).

Cooperative play : When children are engaged in play that is organized and there is give and take among the children.[35]

TRUCE (Teachers Resisting Unhealthy Children's Entertainment) Organization defines five types of play for choosing toys. They underlined to provide opportunities from toys are important and with the awareness parents should choose toys for their

[34] Türkiye Cumhuriyeti Milli Eğitim Bakanlığı. *Çocuk Gelişimi ve Eğitimi Oyun Etkinliği-1*. 19-27.

[35] Michael Rettig, "The Play of Young Children with Visual Impairments: Characteristics and Interventions." *Journal of Visual Impairment & Blindness* 88, no. 5 (1994), 420.

children. Their play types are dramatic play, manipulative play, game playing, creative arts and physical play.[36]

2.4.1.2. Playing with Toys

In their play activity children use some tools and objects from the very beginning of human history. Children who need to explore the world begin with the objects as tools of the life. Before industrial revolution children or parents of them create some toys for playing. Making your own toys provide the usage of local and several materials. Besides, a handmade toy done with the surrounding materials provides the feature of simplicity to toys. About this subject Benjamin also commented in his book "On Children, Youth and Education". Firstly he gives examples of materials that used in toys like pebbles, wood, pine cone, chaff, bones and plants additionally metals, glasses, paper and alabaster.[37] After this detection he underline the degeneration of toys by getting bigger, losing their values like simplicity, littleness and playfulness[38]. Moreover according to his inference the more objects of play activity are impressive in usual sense the more they are far from being tools of the play activity.[39]

In today's world the toy shops full of attractive toys. Most of these toys have their own story that the power of these stories not let children to imagine any other story on it. There are also some people realize the bad affect of these kinds of toys on children's imagination.[40] One of the examples is the TRUCE the organization of educators whom establish their aim to counteract the harmful impact of media and marketing on children.[41] In the last annual toy selection guide they published features of high play valued toys. According to the guide high play valued toys should be able to use in many ways, children in many age levels may play with it, it should be available for playing with other toys, it should develop skills or new interests of children, it

[36] TRUCE Organization, *Toys, Play & Young Children Action Guide*, 16. ed., (MA, USA, 2012).
[37] Walter Benjamin, *Çocuklar , Gençlik ve Eğitim Üzerine*. 66.

[38] Ibid.

[39] Ibid., 67.

[40]Nilüfer Talu, "Symbolic Creativity, Play Activity and Everyday Life: The Critique of (Designed) Play Things." Submitted to *Creativity Research Journal*, 2012.

[41] Web site of TRUCE Organization, http://www.truceteachers.org/, 2013.

should be suitable to play alone and also with others, it should be both attract attention of girls and boys.[42]

The toys as a play tools has a vital effect on children. Neatly choice of toys may influence children's physical, cognitive and social development, education and improvement of skills positively. Scognamillo also confirms that a toy based on an over specification, do kill, harm or monotone the imagination of children no matter how much it's functionality.[43]

Even the powerful affect of toys in play activity toys do not determine the play activity.[44] Children's imaginations are the one control and direct the play activity. That's why a toy should not damage the imagination of children and should not take the leading role of play activity.

2.4.2. Visually Impaired Children and Playing with Toys

"During play activities, children have opportunities to learn through exploration and imitation."[45] However this process is harder for visually impaired children. Children need to guide about toys, play tools and also plays. They needed to have shown play types. These children need to be encouraged also exploring the features of toys. This difficulty is also underlined in the article conducted by Lewis et. al. as "[...] lack of vision making it harder for the children to detect the individual and collective properties of the toys they are presented with [...]"[46]

In the loss or impairment of one sense the other senses used more effectively. This view generally determines the toys of visually impaired children. Many of the toys which shown as suitable for them includes sound. However these toys are generally good for attracting attention of babies and toddlers. After an age children learn to use

[42] TRUCE Organization, *Toys, Play & Young Children Action Guide*.

[43] Giovanni Scognamillo, "Beyoğlu Oyuncakçıları". *Toplumsal Tarihte Çocuk*. (İstanbul: Tarih Vakfı Yayınları, 1994), 140.

[44] Walter Benjamin, *Çocuklar, Gençlik ve Eğitim Üzerine*, 67.

[45] AC Skellenger, LP Rosenblum and BK. Jager "Behaviors of Preschoolers with Visual Impairments in Indoor Play Settings", *Journal of Visual Impairment and Blindness*, 91:6 (1997).

[46] V. Lewis, S. Norgate, G. Collis, and R Reynolds. "The Consequences of Visual Impairment for Children's Symbolic and Functional Play." *British Journal of Developmental Psychology* 18, no. 3 (2000), 461.

their sense of hearing for the distant stimulus. As a result the toys with voices may isolate children from the outer world. However there are some useful usages of sounds in toys. The beeping foam balls or balls with bells and audio books are some of these exceptions.

The other widespread toy kind for visually impaired children is the one comprises some tactile stuff. Sense of touch is the other very important sense for visually important children. Consequently to develop their skill of using the tactile sense the toys with some textured material is helpful. For the development of the sense the variety of materials touched and examined by the children also formative. In many guides for parents and teachers of visually impaired children it is advised to use selection of materials in plays and play tools such as wood, paper, range of cloths, plastic and metal.

2.4.2.1. Several Toys and Play Tools for Blind Children

Toys and play tools generally do not designed and produced for the needs of impaired children. Still there are many toys and play tools which are suitable for visually impaired children. In general the very traditional and creative toys and play tools are also valuable for the development of also these children.

According to my researches and observations there are some tangible toys that are suitable for visually impaired children. However as might be estimated these toys are limited to appeal to auditory and tactile sense, and to improve the basic motor skills, as gross and fine motor skills. If it is reclaimed by senses already many toys designed by ignoring the senses taste and smell. If it is evaluated again existing toys are restricted to touching, hearing and basic motor skills. Nevertheless there are very limited toys which will included into mind mapping and memory notions and which will develop cognitive and linguistic skills of these children. In the examples toys are examined and exampled according to their attached sense and improvement motor, cognitive and social skills under the subheadings of regular toys suitable for visually impaired children, designed toys for visually impaired children and toys and educational play tools about Braille. Some of the examples may suitable for both senses and some of the skills. These will be given in a table at the end of this section.

Regular Toys Suitable for Visually Impaired Children

Tactile sense:

Feeling different textured materials is very important in babyhood. The toys in Figure 16 specially designed for the sake of sense development of children's. They are brightly colored and include some sound effects. One of them is also suitable to play as a ball and the other two are in the shape of three dimensional models of animals' octopus and snake. All these features are suitable for the development of cognitive skills and senses of visually impaired children. There are many other well designed toys like these examples, for the purpose of improving texture awareness.

Figure 16. Toys Designed by Several Textured Materials. a)Loveys Chime Ball by Kids Preferred. b)Musical Inchworm by Lamaze. c)Octotunes Musical Toy by Lamaze. (Source: www.kidspreferred.com and www.lamazetoys.co.uk)

The toys in Figure 17 are the samples of the textured of one material by leveling up and down using several patterns. With the help of these toys visually impaired children develop sensitivity of their fingers.

Figure 17. Textured Toys. a)Squidgie Ball by Aerobie b)Super Yummy by Discovery Toys c)Tangle Toy by Tangle Creations. (Source: www.aerobie.com, www.discoverytoys.com and www.shop.aph.org)

Besides playing will be always fun for children. The third toy tangle is a toy for elders actually. It is playing for disporting you without an intention or it may also helps in stressful times. As well the tangle toy is a good disporting for visually impaired children that it will not let children to do their tics while they are alone.

Building blocks are very successful toys which let children use their imagination and develop their creativity. There are many building block toys which are in different materials, shapes and colors produced by many different brands. The toy in Figure 18 is the version of a wooden set of blocks which have magnets within blocks. With the usage of magnets the toy Jungle Magnetic Blocks let to create some more combinations of constructions. As all building toys these toy is also an example of toy set which is suitable for visually impaired children.

Figure 18. Jungle Magnetic Blocks by Tegu.
(Source: www.yoyo.com)

These two play tools (Figure 19) are made to develop art and craft skills of children. Another shared feature of these toys are form some shapes in 2D but they may be felt by their thickness. With the feature they are suitable also for the visually

impaired children. Being available of using bright colors, different textures and creation of many alternative shapes are the other advantages of these play tools. With Wikki Stix children may demonstrate basic shapes, small maps or guides, drawings. Additionally by playing with String Along Lacing Kit has some pattern cards. With the help of these pattern cards children may copy patterns and initially learn how to do patterns and try to do new patterns after awhile.

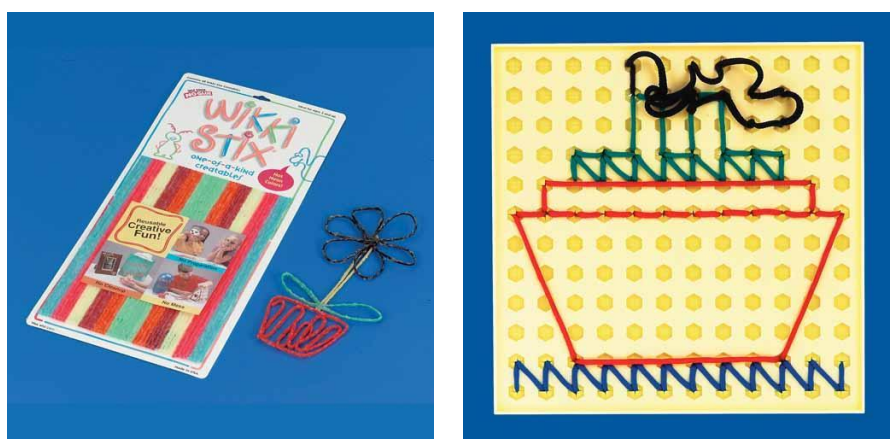

Figure 19. a)Wikki Stix Hot Neon Colors by Wikki Stix b) String-Along Lacing Kit by The Educational Insights. (Source: www.rnib.org.uk)

These rubbing plates in Figure 20 are for placing under the paper and coloring over them. Then the patterns on the plates will be copied on paper. On the other hand these kinds of rubbing plates are very suitable for children with visual impairments. These plates may also be useful to teach patterns, shapes, animals to the children. It may be also a good exercise of using Braille alphabet for fingers.

Figure 20. Teach Me Shapes by Roylco.
(Source: www.amazon.com)

Auditory sense:

Playing musical instruments and toy models of them always will be fun for many children. Playing with musical instruments also develops visually impaired children's sense of rhythm and skill of defining sounds and echoes.

Figure 21. a) Big Drum by Plan Toys b) Oval Xylophone by Plan Toys.
(Source: www.smarttoys.gr and www.shop.therhythmtree.com.au)

Bop it (Figure 22) is a toy of Hasbro which speeds up the reflex of children. When it is turned on the toy give commands of bop it, twist it, pull it, spin it, flick it and shake it" randomly. Bop it is the command of hitting the middle of the toy, on the black part of the toy. And other commands are applied on in order of yellow, blue, orange and green part of the toy. The last command refers shaking the all toy. There is a continuous rhythmic background music which's tempo increases by the levels. While playing children try to do their best and try to do the commands as quickly as possible. This toy improves speed, agility and co-ordination of children. By learning how to play and the place of colorful knobs all visually impaired children can also play with the toy. And the toy will both develop their fine motor skills and memory.

Figure 22. Bop It XT by Hasbro.
(Source: www.hasbro.com)

Motor Skills:

Moving around is one of the hardest things in the childhood. The push along toys like the Walk N Roll in Figure 23, are helpful for visually impaired children and have difficulties in mobility. Moreover these toys usually make sounds which will also attract attention of the children. It might be used for walking safely in an unknown environment as a white cane.

Figure 23. Walk-N-Roll by Plan Toys
(Source: www.thegreennursery.com and www.littlewoolmaus.com)

Making sufficient physical movement is very important for the visually impaired children. They are not aware of their surroundings in every location. That is why they generally do less exercises and movement which actually help growth of their muscles. As a result the toys like tricycles with push handles and trampolines, like in the Figure 24, will help these children to do enough physical activity.

Figure 24. a)3 in 1 Trike by The Little Tikes b)Trampoline by Springfree.
(Source: www.ableplay.org)

Cognitive skills:

The Danish craftsman Kay Bojesen (1886-1958) designed the toy elephant in 1903 and the toy monkey is designed in 1951 which is considered as a design classic now (Figure 25). These toys are suitable for visually impaired children because they are three dimensional models of the animals which children could not touch and feel the whole of the animal. Toys like these helps children to draw a cognitive map of animals and their features. The toys have animated parts which show the body parts of the animals. Also this characteristic of the toy is increases the value of the toy for these children. With the point the toys both give the fun and the learning at the same time.

Figure 25. a)The Toy Elephant. b)The Toy Monkey.
(Source: www.polyvore.com and www.husandhem.co.uk)

Also as many wooden toys, the natural texture of the toy is a value for the children's tactile sense development which should be taken in consideration.

Sliding puzzle is a puzzle type which is normally not suitable for visually impaired children. A puzzle firm produces three dimensional versions of these puzzles. Two of them is given on Figure 26. With their form these puzzles are also suitable for these children. These puzzles will develop cognitive skills and fine motor skills of these children. They will help children to create mind maps of given figure like the animals in example.

Figure 26. a)3D Slide Puzzle:Penguin by Sequential Puzzle b)3D Slide Puzzle:Tropical Fish by Sequential Puzzle. (Source: www.seriouspuzzles.com)

Examples of Toys Designed and Produced for Visually Impaired Children

There are toys and play tools specially designed and produced for visually impaired children. In this part these toys are sampled with small explanations. These toys are also categorized by their affect on senses and skills. They are elaborately chosen as examples of the whole.

Tactile sense:

There are many toys for supporting children's tactile improvement. For several illnesses these toys work well. Generally these toys are playing by matching the same pairs (Figure 27). In most of the toys different materials is used for different textures. However a few of them do not use colors in these play sets. Color matching prevents the usage of tactile in sight children. These tactile toys are of benefit to visually impaired children.

Figure 27. a)Touch and Match Texture Board b) Ruff's House Teaching Tactile Set by Learning Resources c)Tactile Turn'n Match by TFH Special Needs Toys. (Source: www.rnib.org.uk and www.specialneedstoys.com/uk)

The toy set on Figure 28 is an example of toys which use the same material with the variety of patterns to create different tactile. However the difference of the toy set is let children also feel by their feet. Together with, designer thought about sight children and added a blindfold to the set and do not let children use the colors as a clue. This is a well designed toy for the sake of visually impaired children's sense and cognitive skills.

Figure 28. Tactile Discs by Gonge.
(Source: www.ableplay.org and www.e-quip4education.co.uk)

These strips set (Figure 29) is provide visually impaired children a new style of drawing a picture. By placing the variety of shapes with textures on the black base, drawing and feeling what is done after the process is possible.

Figure 29. Picture Maker Textured Strips by American Printing House for the Blind.
(Source: www.aph.org/advisory/2008adv02.html)

Auditory sense:

An example to toys which are specially designed for visually impaired children which improve their auditory sense is the Sound Box set produced by Guidecraft (Figure 30). There are six different sound making things within the twelve same wooden boxes in the set. Children try to match the same sounds while playing. This set also may be played like a memory game with a pair and help to improvement of cognitive skills also. Usage of auditory sense and development of the usage of the sense is essential for these children thus this design is also a valuable one for the sake of these children's growth.

Figure 30. Sound Box by Guidecraft.
(Source: www.rnib.org.uk)

Cognitive skills:

Most of the memory cards are in two dimensions. Generally designers use graphical elements to diversify various cards. The play set in Figure 30 is a three dimensional version of the memory games which designed for visually impaired children. These children need to develop their memory so the toy is a very useful one. The play set suitable for paired play so this toy is also appropriate to improve communication skills and social relationships.

Figure 31. Memory Caps by Guidecraft.
(Source: www.rnib.org.uk)

The firm Edushape attach different patterns to the colors and produced a building block set in the Figure 32a. For visually impaired children and especially for the children who cannot see the colors this toy is perfect. These children may use their sense of touch instead of their sight. And the major benefit of the building block set is obviously to provide cognitive development.

Figure 32. a) Textured Building Blocks by Edushape b) Animals Black & White Puzzle by Bigjigs Toys. (Source: www.rnib.org.uk and www.c2.yoyo.com)

There are many simple puzzles for toddlers. This puzzle on the Figure 32 is an example of the puzzles which teaches basic shapes. However it uses animals and some patterns very well. Even though this puzzle is not appropriate for the blind children it fits the usage of some of the partially visually impaired children. Generally even the toys for blind children are not in white and black. By using only these colors the

designers higher the level of contrast and underline the patterns and shape as suitable to the purpose of the toy.

Many games are reproduced for the sake of blind people. Dominos and tic-tac-toe games on the Figure 33 are just two examples of them. In domino the firm Guidecraft uses textures instead of Braille numbers. With the redesigned version this domino set is appropriate for children who do not know Braille alphabet yet. However the dominos with the dots also is an exercise of feeling the dots of Braille.

Figure 33. a)Texture Dominoes by Guidecraft b)Tactile Tic-Tac-Toe Game by MaxiAids. (Source: www.guidecraft.com and www.shopping.com)

Other game which is redesigned for blind people is chess. In the brail chess sets (Figure 34) there are holes in the middle of the squares and the pins under the chessmen fit in these holes. This provides stability of chessmen and by the feature visually impaired people may touch to chessmen and chessboard freely. There are also pins on the top of black chessmen's for separating the two teams of chessmen. Also the chessboard has some level differences for the sake of understanding its squares. By the way playing chess is available for blind people. Chess is a very valuable game for the development of cognitive skills and memory of also blind and visually impaired children.

Figure 34. Braille Chess Sets.
(Source: www.chess.business-news-blog.eu/2013/28777/ and
www.checkmatesusa.com)

Motor Skills:

For the physical development of muscles playing with balls is a valuable play type. According to the size of the balls they generally develop fine and gross motor skills of children. Moreover playing with balls together with elders and peers will improve their sociability. For visually impaired children there are many types of balls (Figure 35). They generally contain bell and by the help of its sound children may chase, catch, kick and throw it easily.

Figure 35. a) Giant Jingling Bell Ball b)Foam Bell Ball c)Goal ball d)Reizen Audible Football. (Source: www.rnib.org.uk)

Toys and Educational Play Tools about Braille

Tactile Sense and Cognitive Skills:

Moreover there are some toys and play tools aiming to train children about Braille alphabet. They generally purpose make children practices of feeling the dots by finger tips and to track a row, improving fine motor skills and tactile sense, teaching the Braille alphabet so develop the cognitive skills. These toys are special with their major improvement on children's development, both tactile sense and cognitive skills. This is because they are educational tools of Braille alphabet which is based on the tactile sense and fine motor skills.

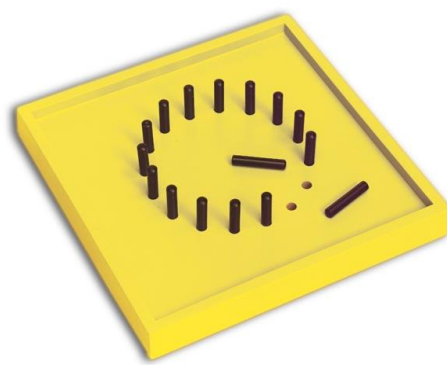

Figure 36. Peg-A-Circle Set by American Printing House for the Blind.
(Source: www.shop.aph.org)

The Peg a circle set on the Figure 36 This toy set helps improving of fine motor skills and target to teach the notions like next, sequence, clockwise, and counterclockwise. With the toy set children may feel pegs from top view just like dots of Braille. They learn how to array the pegs and follow the order of them.

Figure 37. Braillin Doll by Once.
(Source: http://kcmc-new.umf.maine.edu/includes/kcmc/itemPg.php?cat=296&item=3044)

The Braillin Doll (Figure 37) is a charming way of teaching Braille alphabet to visually impaired children. The dots on the body of doll may be push in and come out by a second puss. By using doll children get used to six dots and in the learning process of the numbers and letters the doll may be used as a tool.

Figure 38. a)Braille Slide Puzzle by Maxi Aids b) Braille System by Tack-Tiles. (Source: www.rnib.org.uk/shop/Pages/Category.aspx?Category=puzzles and www.images.businessweek.com/ss/09/12/1209_25_world_changing_products/24.htm)

The sliding puzzles on the Figure 38a especially designed for the educationally blind children. There are letters from “a” to “o” on the puzzle. The aim is the make them in order following each other from left to right. Another Braille toy set is produced

by the company Tack-Tiles. This toy set has parts like building blocks. On the top of the parts there are letters, numbers and other Braille punctuations. On front of the blocks there are equivalents of letters in Latin alphabet for parents. With these block these children may write anything they want and make practice while learning letters.

There is one more sliding puzzle in Braille alphabet produced by Eni Puzzles (Figure 39). This is a cylindrical one, has the numbers from one to eight in different colors. The aim could be array the numbers in every row or compose a pattern from these.

Figure 39. Braille Set Pastel and Bold by Eni Puzzle
(Source: www.twistypuzzles.com)

The Touch and Tell book on Figure 40 is the unique example of using dots for composing a picture or shape. This is book not only provides children to feel and learn the notions but also it makes them get used to the dots of Braille. Educationally blind children who have these kinds of books before primary school probably learn Braille faster and comfortably. With this method children may learn how things demonstrated in two dimensions. Moreover there are many things children need to learn like animals, fruits, vehicles, flowers, trees, clothes etc. Some of the notions are impossible to hold the whole and grasp. These drawings with dots may be a very well education tool for these children.

Figure 40. Touch and Tell by American Printing House for the Blind.
(Source: www.shop.aph.org)

There are many toys created by parents for some developmental purposes. Also there are some designs designed but not produced yet like on the Figure 41.

Figure 41. Reach & Match Designed by Mandy Shuk-Man Lau.
(Source: www.core77designawards.com/2012/recipients/reach-match-2/)

Mandy Shuk-Man Lau won the design award of Core77 in strategy and research category as a student with her product Reach &Match in 2012. She did researches in Vision Australia which serves for blindness and low vision. She designed a toy set which is two sided. One side is about tactile senses and the other side of the set is aiming to improve Braille alphabet skills. This toy set is a very useful one for development of skills in tactile and Braille for educationally blind children.

Evaluation:

For evaluation of these examples a table is drawn with the toys respectively and with senses and the development skills (Table 3). As it is told in second chapter for physical, cognitive, language, social, emotional development children need to play. In this table the categorization is adapted and changed. For the physical development the notion motor skills is used, as fine and gross motor skills. In addition the development of social and linguistic is put together under the heading of social development. Another item to explain the emotional development is not used in the table because if a toy is suitable and enjoyable for a child then it naturally has improvement in his/her emotional development. However the proper interaction between a toy and a child is related with the interest of the child. Moreover it may be thought that the proper toys for children should always influence positively the emotional development of the children. So this development categorization is excluded from the table.

These skills are marked for toys in the table also by regarding the playing activity of the toys. In other words not only the features of toys but also the play types of toys are also considered. Especially the social skills are marked by this consideration.

In the table audio and tactile senses are take place under the heading of senses. The vision, taste and smell senses are excluded because the vision is used as the amount of remained vision of the children and the taste and smell senses are generally did not used in toy designs. However beside the usage of the dominant senses, in this study they are vision and auditory, the usage of smell and taste may be used for some toys and play tools or some plays may be designed for development of these senses in childhood.

In the table, toys are divided with coloring the rows with tones of gray according to their headings which are indicated to regular toys, specially designed toys and Braille toys and play tools.

To interpret, in the table the strong relationship between the fine motor skills and tactile sense is obviously seen. And also it is clear that most of the chosen toys have the value of developing these sense and skill. Usage of this value is determined as a very essential tool in designing toys for visually impaired children. This will be a useful argument in the last chapter of the study.

As it may be seen in the table, there is not many examples of toys which is designed for developing gross motor skills of visually impaired children. Nevertheless

this is a very important issue that they need to practice and improve. This finding also will be regarded while determining the toy design criteria.

When the table is checked again it is obvious that there is not any memory toy or play tool in the ordinary toys. However this is also a vital need for visually impaired children. They need to do some more practices to strength their memory and the best way of it is practicing in plays.

Furthermore linguistic is another skill that does not mentioned adequately in the features of the toys. These children need to encourage about communicate with people. The more they play with the toys they will use word and sentences the more their communication skills improve.

As it is assumed in the first part of this chapter these toys give us some clues for determining the design criteria such as using variety of materials and textures, importance of boarders and tracing lines, importance of perception of fingers, instance simplicity of some of the toys, and need of developing cognitive skills and memory. Also the toy examples will give the hint that there are not enough toys which develop children's gross motor, memory and linguistic skills.

To discuss overall this toy research, there are many toys which are designed and produced for children in the market. Many of them do not appropriate for the usage of visually impaired children. In fact toy designers may consider the children with several impairments when designing a new toy. These will enrich their toys design quality and many other children may play with the toy by some more stimulus. Simply, using high contrast and bright colors, and some more variety of textures in designs is enough for make the toys more suitable for visually impaired children. In addition several textured materials in the toys are essential for the development of tactile senses of every child.

Table 3. Exampled Toys and the Purposed Skills and Senses.

Exampled Toys (respectively)	Motor Skills		Cognitive Skills			Social Skills		Senses	
	Fine	Gross	Mind Map	Educatory	Memory	Linguistic	Socializing	Audio	Tactile
Loveys Chime Ball	x	x						x	x
Musical Inchworm / Octotunes Musical Toy	x			x				x	x
Squidgie Ball/ Super Yummy/ Tangle Toy	x								x
Jungle Magnetic Block	x		x			x	x		
Wikki Stix	x			x		x	x		x
String-Along Lacing Kit	x		x	x		x	x		x
Teaching Me Shapes	x		x	x			x		x
Big Drum / Oval Xylophone	x	x						x	
Bop It XT	x	x		x		x		x	
Walk-N-Roll		x						x	
3 in one Trike		x							
Trampoline		x							
The Toy Elephant / Monkey	x		x	x					x
3D Slide Puzzles	x		x	x					x
Touch and Match	x			x	x		x		x
Rullf's House	x								x
Tactile Turn'n Match	x								x
Tactile Disks	x		x		x		x		x
Picture Maker	x		x	x		x			
Sound Box	x				x		x	x	
Memory Caps	x				x		x		x
Textured Building Blocks	x		x				x		
Animals Black &White Puzzle	x			x					
Textured Domino	x			x			x		x
Tactile Tic-Tac-Toe	x		x				x		
Braille Chess Sets	x		x		x		x		
Giant Jingling Bell Ball		x					x	x	
Foam Bell Ball	x	x					x	x	x
Goal Ball	x	x	x			x	x	x	
Audible Football	x	x	x			x	x	x	
Peg-a-Circle Set	x		x						
Brailin Doll	x			x	x		x		
Braille Slide Puzzle	x			x					x
Braille System	x			x		x	x		
Braille Eni Puzzle	x			x					
Touch and Tell	x						x		x
Reach & Match	x		x	x			x		x

CHAPTER 3

OBSERVATION STUDY

In the context of this study to define design criteria concerning a toy for visually impaired children, an observation study has been planned to collect data. The best place to observe visually impaired children together is surely their school, which they attend on a daily basis to receive special education. To understand this special user group, the observer should learn about the features, needs and abilities in their natural circumstances with the help of spontaneous happenings. Hence, uncontrolled and unstructured observation study is the best method for understanding visually impaired children. Kothari states that unstructured observation method is more suitable for exploratory studies.[47] The observation was planned to be of non-participant type, since it is impossible to act like a member of the observed group, considering its specific condition. However there were some difficulties in realizing the non-participant observation, because there was not any space to hide and observe the children. Therefore the observer tried to do her best and examine children without any interference.

3.1. Observation Area

The observation study was carried out İzmir Aşık Veysel Primary School for Visually Impaired Children (İzmir *Aşık Veysel Görme Engelliler İlkokulu*) in Bornova. The school is unique in İzmir as a school for visually impaired children. There are nursery classes, primary and secondary classes in the school which have 125 students totally. There are also a dormitory for boarding students in school which is not the concern of this study. The study was conducted on a three days a week basis for a five week period between December 24th, 2012 and January 23th, 2013 with 25 children. The observation was carried out in the nursery and first grade classes with the children

[47] C. R. Kothari, *Research Methodology: Methods and Techniques*, (New Delhi: New Age International, 2004), 96.

in ages 5 to 8. The observation study was done during class hours, breaks and also the lunch times.

The observation study is about visual impairment of children, and children with a second cognitive impairment were not included in the observed group.

Table 4. Schedule of Observation Study in İzmir Aşık Veysel Primary School for Visually Impaired Children.

Hours/Dates	24-26.12.2012	31.12.2012-2-3.01.2013	7-8.01.2013	9.01.2013	14-16.01.2013	21-23.01.2013
9:00-11:30	Nursery classes	Nursery classes	First Class 1-A	Second Class 2-A	Nursery classes	First Classes
Lunch break	Dining Hall	Dining Hall	Dining Hall	Dining Hall	Dining Hall	Dining Hall
12:30-3:00	Nursery classes	Nursery classes	First Class 1-B	First Classes	First Classes	First Classes

The observer tried to detect the differences in visually impaired children's daily lives, compared to the daily life of healthy children. The aim of the observation is not to measure what and how much these children achieve but to frame and focus on their needs in daily life under the effects of their impairment. The aim of this observation is to clarify the problems of the children's everyday lives. What are the actions which they have difficulties to do? What are the things to learn? What are the things to percept? They have already deficiency of one of their senses but what are the other problems they should get off because of their blindness or impairment.

To understand daily lives of children is very essential for the design criteria of the toy because playing activity is a basic need of children and toy is the object of this activity.

3.2. Crucial Data and Findings

In this section, the observation data will be presented in eight chapters. Each chapter indicates one of the problems which the children are observed to face.

3.2.1. Relation between Difficulties and Family Care

During the observations, three problems appeared concerning the family and early childhood education. First of all, the uniqueness of children should be underlined. Every child in the world is unique but how does this situation turn into a problem?

In many education systems there are some criteria that people use to divide students into some groups. An entrance exam which determines the cognitive level of children or age of children basically may create these groups. Beside the psychological condition of children, in fact this is good for both educators and quality of children's education. However when we examine the education of visually disabled children it is not even possible to separate them according to their remained vision. For instance there are children who have some remained vision and some blind students in the same class (Figure 42. Two of the Children Showing Their Drawings).One of the reason that children study in same class is there are not many visually impaired students in one region. In the school there are also many boarding students who are from other cities. Even with this dormitory potential of the school there are not enough children. Educators separated students according to their ages as commonly applied. Still, these children's IQ levels, characters, the education given in family and the disability levels are not same.

Figure 42. Two of the Children Showing Their Drawings.

In classes teachers should give lessons by one by. Moreover teachers should remember all children's knowledge level. For instance, in one of the first grade classes in Aşık Veysel Primary School while one of the student tried to learn how to write sentences like *"Ela Lale el ele."* (Ela and Lale are hand in hand) another student tried to learn how to read and write one of the letter properly by using the Braille alphabet (Figure 43).

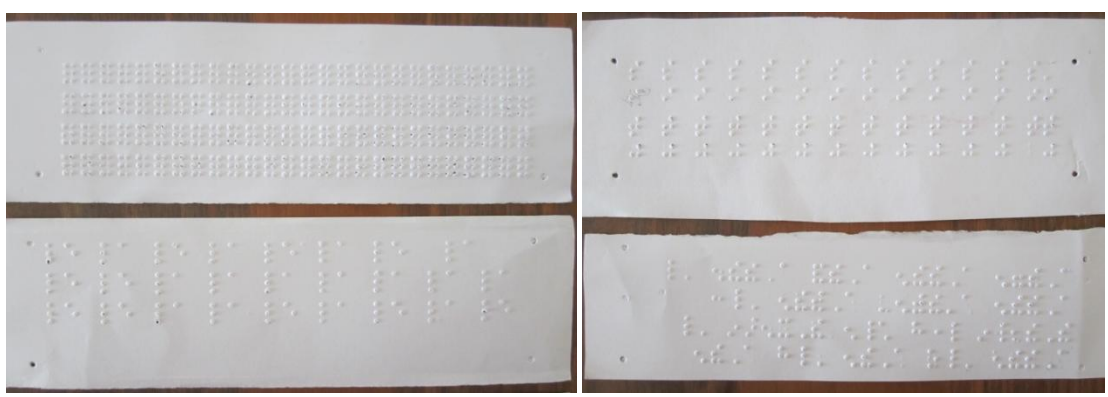

Figure 43. Four Different Writing Levels of Four Children in the Same Day.

An important educational gap between the students concerns not their level of sight, but their level of learned life skills. This is closely related to the families' awareness about blindness. When a family, usually mothers in Turkey, behave in a protective manner to the visually impaired children, they do all the things for their children and for protect his/her they do not let the child have any opportunity to do some acts. Then these children could walk later or could not walk confidently in their childhood, they could not go to toilet by themselves or could not eat their lunch without help. This is actually the worst parent manner for the sake of these special children. Parents should teach them to do things; they should support and encourage them to learning daily life activities. For example mothers should show their children to put on their shoes even they do not want to do. Because, as many others, these activities are learned by repetition. The more children practice, the more they learn.

As a result, there is a big difference between abilities of these children according to the growing methods of their parents. In the school, it is observed that a blind girl (Figure 44) with a good education can walk confidently in the garden of the school and can use stairs as any healthy children but there is a boy in the same age who could not walk in a relax mode even if he can see more than his classmate.

Figure 44. A Blind Girl Walks in the Garden of the School.

Moreover to be filled with compassion is essential for development of these children. Unfortunately some of families could not be in this conscious; no matter the health of children, every child need peace and compassion in home. As in every school and every class there are some children who could not feel this love and behave in a rude, shy or nervous and offensive manner. Thirdly, children's physical, mental and psychological development regress when the lack of enough interest and tenderness are combined with the impairment. Parents of visually impaired children should be more patient and lovely for growing a confident, independent and self-contained person. These children need to endeavor more than a healthy child to be a self contained person. Therefore they need more attention, interest, and effort. According to the dissimilar manner of the family, a gap occurs between the behavior patterns of children. Moreover in the observation it is quite clear which child has given how much attention, interest, and effort by their families. This is also a very problematic position for teachers. To understand and act according to this situation is probably one of the hardest matters of being a primary school teacher.

Keywords and detections for design criteria:

- The vision level should not be a criterion.
- The toy should be suitable for their average IQ capacity in these ages.

- The toy should be played with parents to let them pay attention and spend time with their kids.
- The toy should give feeling of success and self-belief to support children's self confidence.
- Learning every day activities, repetition, practice, spatial issues, and cognitive development.

3.2.2. Orientation and Mobility

Moving around is obviously one of the critical problems of many visually impaired people. However, it is very nice to see children in the garden of the school, playing with their friends, no matter how much they see. In Aşık Veysel Visually Impaired Primary School, children are taught to hold their hands in pairs. These pairs comprise of one blind and one partially visually impaired children (Figure 45).

Figure 45. Children Walk in Peers in the Garden of the School.

The partially visually impaired children who sees more that his/her pair, walks in school breaks by controlling also his/her pair's path. By this way all children can go around and fell the sun in good weathers, make some physical activity and have fun.

Besides, it is very interesting to see some of the totally blind children going around alone, playing with friends without a guiding friend.

Figure 46. Children Playing Together in the Class.

Even some of the blind children walk more confidently than some of the children who have perception of light or have some remained vision. This unusual observation is not a strange situation after being informed about visually impaired people. There are many blind elder people who can live self-sufficiently.[48] They take busses, go to work, do their job, do shopping and care about their houses without any help as some of the teachers in the school. Consequently every blind child can live and survive by themselves with the right manner, education and support.

Besides the good examples unfortunately there are many children have some difficulties in mobility. Teachers and the parents of the children work to teach them how to feel safe while they are moving by some techniques. One technique that observed in the school is both for learning the space and how to walk indoors. Teachers of nursery class direct one of their students to find the wall and touch the wall with the back side of her left hand (diverse of palm side). Then they want her to walk by the way the wall goes with a continuous touch to wall. When there is a cupboard near to the wall they support her to pass it and reach the other side and touch the wall again. By this method the girl draw a circle in room. She learns both how to walk along to a wall and how to

[48] Web Site of Altı Nokta Körler Vakfı http://www.6nokta.org.tr/

learn a new space. Moreover by the help of this useful exercise the girl learn the places of things in the classroom like the places of desks, cupboards, bookshelves. This is a essential training for visually impaired children, if they know places of the objects in a space that they use mostly, like their home or classroom, than the space get safer with the help of map which they have on their mind.

Figure 47. Children Use Walls as a Tool of Mobility.

Another technique that teachers use in the school is to make a queue with children. In this queue children's hands are on the shoulders of the child which stands in the front of her/him. Generally in this method the first child in the queue is partially sighted. By using this method, children walk in an order. Besides, for teachers it is easier to control them in the queue. Furthermore to be in a queue with friends is a fun for children. It is like a small play for children even they walk a very short route. This queue technique which looks like a train also is an example of following a route and tracking for children.

Figure 48. Children in Queue Like a Train.

In addition the notions of direction and orientation are very vital for the movement of children. Children with visually impairment need to know positional vocabulary like their sides (right and left), up and down and the notions as on the top of, under, inside, beside, over, front, on, in...etc.[49] For a safe and confident walking of children, they also need to be sure about all these orientation notions.

Another feature that visually impaired children have to gain for a comfortable moving is understanding and using voices. Teachers are conscious of there is not a special and isolated world for visually impaired people. Thus they even do not design schools especially for them. Children need to do practice of world and solution actually is not design safe places for them. For now the solution is teach them how they could survive and live in the world. The solution is to let them try again and again and do practice many times about any work. Consequently visually impaired children need to learn using and understanding voices. Actually this education should be started in family from the early ages of children. Children with visual impairment can use the reflection of sounds to realize the dimension of a space or the distance between them and wall and this is something developed by the practice.

In the school, teachers cannot help all the children by one by and take them from one place to another. Of course usually they walk with their friends hand in hand but also they try to walk alone. If they always use a companion, they always need a person, that's why they need to do walking practices alone. Especially in the nursery class,

[49] Mehmet Özyürek, *Görme Yetersizliği Olan Çocuğu Bağımsızlığa Hazırlamak İçin Ana Baba Rehberi*, 96-98.

teachers do not help children to walk to dining hall. They want them to practice going to hall by themselves, sometimes they call them from the entrance of dining hall and let them learn and practice using the voices while walking.

Additionally it is a very interesting observation that a child refuse to jump on one leg in a game which teachers of first class arrange in the garden. Many of the children love to bounce and play the game ambitiously however one of them thought that he could not bounce and do not attend the play activity. This means he did not bounce on his feet in his eight years live and even the thought of bouncing makes him feel unconfident.

Keywords and detections for design criteria:

- The toy may develop children's spatial knowledge or perception.
- The children need to practice the world as it is.
- The children need to use sounds by the practice of real spaces.
- Positional vocabulary is essential like the words up, down, on, in, top, under, inside, beside, over, front, left and right.
- Path, tracking, route, space, queue, following a route and memorizing space.

3.2.3. Learning Braille

Braille is started to educate from nursery class by some simple exercises like feeling the dots and learning the place of the dots in one letter. In beginning classes the tools for writing Braille are the Braille slates (tablets) and the Braille stylus (pens). There are some special typewriters for writing Braille and teachers in visually impaired children's schools teach how to use these typewriters in upper classes.

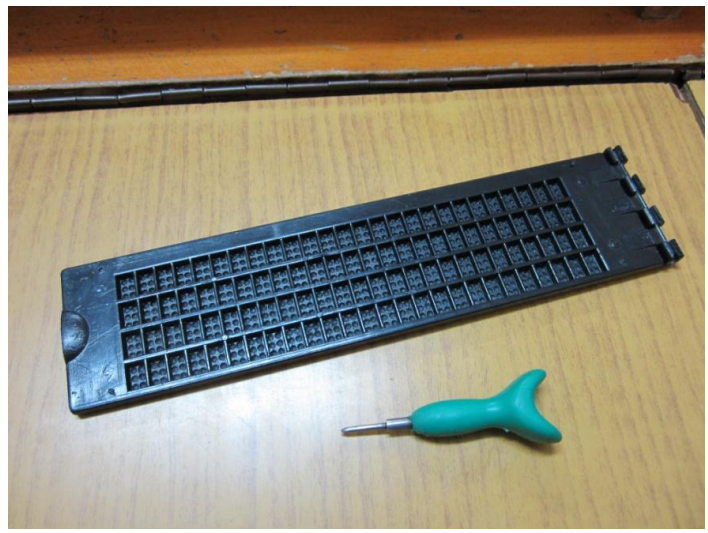

Figure 49. Braille Tablets and Pen.

Firstly to use these tablets a thicker paper is needed. When the paper is put in a tablet the tablet is needed to bend from the middle and tablet locks the paper. There are small rectangular holes on the front side of the tablet and there are six small dots on the back side of it which meet the rectangular letter spaces. When a child makes dots with its pen the six points help them to write properly and easily.

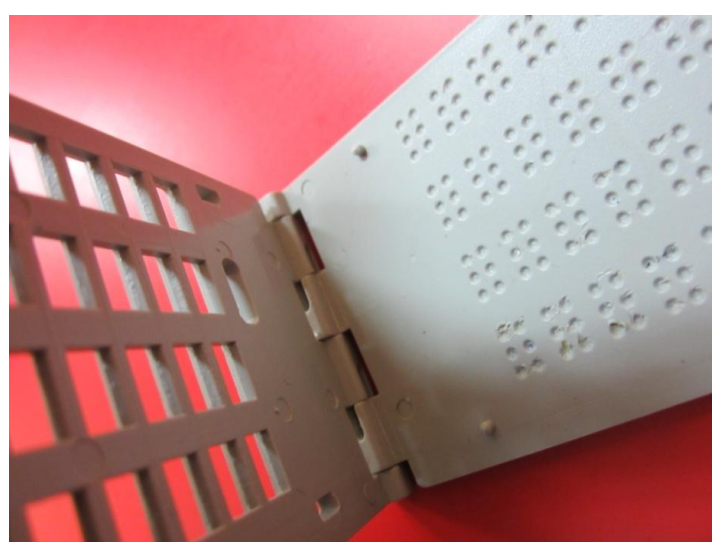

Figure 50. Braille Tablet.

The complicated thing in this process is the need of writing from right to left and need to write the symmetry of letters vertically. When the paper is taken out of the tablet it should be read from left to write from the serrated side of paper which is the

back side of the paper. This seems very confusing while doing observation but the teachers claims that children do not have difficulties about it and they comprehend the differences between writing and reading in a few days. However the need of learning symmetry in these early ages is a very interesting detection.

Figure 51. A Child Writing in Braille Alphabet with the Tablet and Pen.

To read the writing in Braille alphabet children take the paper out of the tablets, turn the paper they dotted and read the letters from the opposite face by the order. While reading the writings, children should use both of their hands. For instance, a right handed child should touch to the beginning of the row with her/his left hand and read the writing with her/his right hand. When she/he comes to the end of the row she/he follows the row by her/his left hand takes the row bellow and finds the starting point of the next row. Then she/he continues to read with her/his right hand.

The tool abacus is not a Braille tool however it takes place of the Braille tools in math classes as the main tool of the course. Children also use their Braille tools in math classes however using abacus simplify students' works in mathematics. The usage of abacus is shown on the Figure 52. In the first photograph the bead in first row shows number one and second photo indicates the number two. The beads on the right side of the abacus means five and the beads in the second row is for tens digit.

Figure 52. Beads Indicates Respectively to Numbers 1, 2, 5 and 10 in Abacus.

With the information the abacus beads on the Figure 53 indicates the number 173. In Math classes children learn how to use abacus and learn both math operations and how to use abacus for calculate the solution of the operations. Generally in the Math operations they used both side of the abacus and reach to the answers.

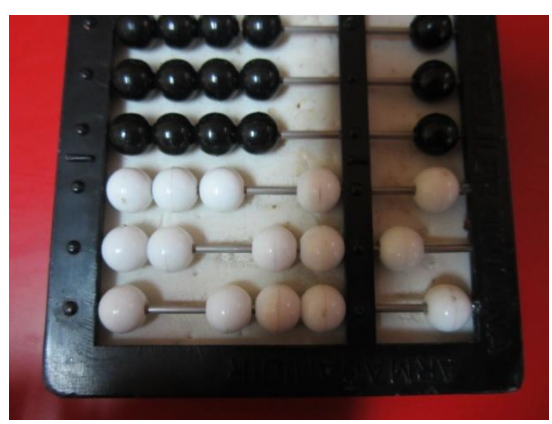

Figure 53. Indicating the Number 173 in Abacus.

Keywords and detections for design criteria:

- Texture, bulge, indentation, dots, symmetry, side, row, to follow the row and memorization, focusing.

3.2.4. Individual Training

The other problematical point in teaching Braille is the necessity to teach the first steps of writing and reading, individually. The dissimilar levels of children's knowledge causes also the need of teaching separately but the main reason of this obligation is the need of showing how to write and read one by one in the very beginning of the process. The way of teaching something to a visually impaired child is

a little bit more difficult than teaching a healthy child. For instance teaching how to write a letter in Braille alphabet with the help of tablet, firstly teacher needs to explain what they want to do in details and do ones, in this example he/she writes the letter. Teacher should let the child to touch his/her hand while he/she is writing. Next teacher writes one more time with the child, like cutting a cake together, further let the child to try writing. Hence the process is needed to study with children by one by while teaching the first steps of writing and reading Braille. Meanwhile children start to learn quicker however the levels of children separated more and more with the time according to their ability. Under these circumstances teachers need to do their courses by studying with children individually.

For teaching effectively teachers of first classes need to study with children by one by. Sometimes voices of children get louder in the class when teachers begin to work with a child. The difficulty here is making the other students stand still quietly. These students are very young and they want to play. They start to talk to each other, stand up and walk in the class, if they have a tic they start to do it, like wobbling or pressing on eyes. Teachers have troubles to study with one of the students and amuse the rest of the class at the same time. A toy or a toy set which children play in the class quietly and individually may be the savior of teachers.

Figure 54. Teacher of First Class Studying with one of the Student.

Keywords and detections for design criteria:

- Individually, classroom playing, quite.

3.2.5. The Techniques for Craft Works

In the school one of the classes is very different from the general school courses syllabus. This is the art lesson. The art courses for visually impaired students are modified to a modeling class (Figure 55). Children play with clay and learn how to made models and objects from the clay. In superior classes they learn how to make and use molds.

Figure 55. First Class Students in Modelling Class.

There is not any painting or drawing class in the primary school but some activities done in nursery class with oily pastel painting. Teachers want children used their remained vision so they encourage them to make some drawings if they have a vision.

Figure 56. Another Method Used in Modelling Class.

There are some methods used in art education of visually impaired children. In the observation one method is seen in nursery class that teacher draw a rabbit and a carrot on a big size of paper and glued a rope on the borders of this drawing (Figure 57). Children touch and feel the ropes and fill inside of these ropes by pasting two kind of material, cotton and an orange craft paper. This was a very educative activity that it let children to feel the rope, to percept what is the drawn figures, to feel three different materials and to play with their friends together in a group work. Moreover the figures are not small enough to realize in two hands so children have to feel the parts of them and attach the parts in mind. This is also called haptic perception for blind people and it is another thing that children should practice for daily life.

Figure 57. Rope Technique for Modelling Class.

Keywords and detections for design criteria:

- Model, percept figures, clay, different materials, perception of borders, learning figures and shapes.

3.2.6. Need of Guidance

Blind and partially visually impaired children need much more attention and effort of their parents. To teach objects, notions, actions; parents should patiently define, practice and show them to the children. Firstly they should give details about what they want to teach. And give examples or do it themselves while children is listening and watching. Besides teaching the children also need leading in their daily

life. For example, in lunch time teachers always tell what the meal in the plates is and where the meals are (Figure 58).

Moreover children also need guidance while they learn anything because of absence of observation. They need detailed information and definitions and repetition of the instructions till they learn the notion or object.

Figure 58. The Children Having Their Lunch.

Keywords and detections for design criteria:

- Mental pictures of objects, defining, leading, guidance, help, detailed information and memorization, learning the places of objects.

3.2.7. Habit Spasm /Tics

Some children observed in the school while they are rubbing their eyes, making a cluster of movements like pendulating or waggling and wobbling. Teachers do not want children do the tics, they usually warn them to not to do especially if they rub or press on their eyes because these tics are also bad for health of their eyes. However children do not make tics on purpose and unfortunately avoiding tics is a very hard process. These motions come from the childhood. Özyürek defines the tics of blind

children as a turn into oneself own body. He explains in babyhood many blind babies stay alone in their bed for long hours, they could not get any external stimulus and start to play with his/her own body. The information given in his book which guides parents of visually impaired children is very interesting that blind children in Africa do not have any tic because their mothers always carry them in their back. The deduction of this information states a baby who is close to mother and who can touch and feel his/her mother anytime do not need to do any chronic motion so do not have blindness tics. [50]

Figure 59. Children Robbing Eyes as an Example of Tic.

Tics of blind people may influence their social life adversely so from the very beginning before these habits emerge, doctors or consultants should underline the importance of physical contact between parents and blind baby. Blindness tics also reduce children's desire and willingness to explore.[51]

Another habit that children used to do is repeating the words of people around them. The teachers of the nursery class try to avert this habit of one child professionally. According the information they gave it is just easy to do and this habit prevents the development of linguistic and social interaction skills of children. Maybe this is an outcome of the imitation habit of all children. Every child learns by imitations they watch and observe their parents and elders around them and duplicate them and this is a

[50] Mehmet Özyürek, *Görme Yetersizliği Olan Çocuğu Bağımsızlığa Hazırlamak İçin Ana Baba Rehberi*. 71-78.

[51] Ibid., 75-76.

useful tool of children do instinctively. However blind children do not have the visual information to imitate and they may use the words for this instinctive copying habit.

Keywords and detections for design criteria:

- Socializing, linguistic, imitation.

3.2.8. Playing and Imitation

Not the all visually impaired children but the blind ones cannot use imitation in their life. To imitate someone is an essential learning tool, beginning by watching and internalization not only for children but also for all human beings. We are learning many things by observation during life.

Furthermore playing without imitation is a little bit hard. Blind children need to be guided in the beginning of playing for every new toy or game. If there is not anyone to tell them the variety of activities in playing with objects than they use the objects, tools and toys just one simple way. Children do not know possible choices of playing with objects. However if someone teach them to play with objects as if they are something else then they can use this type of playing for other ones automatically. For instance, children from first grade class played with the rainwater in a stone container as if it was a soup. They stirred the water with the benches and put some leaves as the vegetables and salt. There was one blind boy with them he also joined the game by the help of a girl who told him about their play and gave him a stick for stirring (Figure 60).

Figure 60. Children Playing in the Garden of the School.

Moreover they could not copy any visual answer of their peers. In the observation period, children play a game with their teacher in nursery class. The game is putting hands to the right position according to the teacher's directions. There are three positions for hands in the game which teacher set and inform to children, up on and under. When teacher says up, hands go to up in the air and when teacher says on or under than the hands are go directly on or under the table. This game is certainly to teach these spatial relationship words however it grounds observation of imitation. One of the children who can see partly can copy the motions of others while others cannot because of their inadequate remained vision. Moreover even the first child could not do the motion at first, he learned after awhile by the imitation.

Keywords and detections for design criteria:

- Imitation, playing together.

3.3. Evaluation of Findings for Design Criteria

The observation study reveals that, visually impaired children have to work harder than sighted children o learn fundamental things such as physical movements/ actions, manual dexterities, cognitive issues and memory.

Visual impairments, especially when it is close to the blindness, reduce the perception of space and surroundings. Visually impaired children have difficulties to move independently and confidently. They should try hard and practice much more than sighted children to get used to do many physical movements.

Visually impaired children should also learn some of the abilities and skills for daily life activities like tying shoes, using scissors, pouring water in glasses, etc. These manual dexterities are gained by practice but for sighted children it is easier to gain the ability. They can see how people do the things, use the equipments, they can see the place of objects and the position of their hands according to the objects. Even to develop coordination of hands is easier for sighted ones. On account of this even the practice of the skills are simple of these children. For this issue also, visually impaired children should work hard and practice more to learn these manual dexterities.

Some of the visually impaired children have not remained vision enough to see what people do. For this reason every action should be explained and taught to them. Lack of the sense brings the lack of imitation and these means parents of these children

should spend more time with their children and spend more effort compared to the parents of healthy children. By the level of visual impairment level the definition which children need, changes. Children should instruct about what the objects are, from which material/s they are made of, for which purpose it is used, how it is used, where the place of them, by whom these objects used generally, how it may be used more safely, etc. These answers are the ones which come in mind at first, there are much more answers for objects that parents should explain the children patiently. Moreover objects are the easiest ones. There are many more things to tell about non perceptible, abstract things, notions, senses and actions. They are knotty to explain and harder to understand for these children. For instance Jan Bailey wrote in her article which she told about her childhood, growing up as a blind child, she have some difficulties to understand why she cannot touch the sky.[52] With these in mind visually impaired children and their parents should make an effort to develop the cognitive skills of the children. Moreover they need to spend much more time for the sufficient knowledge.

Finally the last issue which visually impaired children should do much more than sighted children is memorizing. Visually impaired children should have an excellent memory. They should remember all the notions, objects, their properties, usages and places, sound of machines, smells of shops, voice of people and even general appearance of people. Memory of a blind person provides to him/her orientation, mobility, communication and socialization. The memory is important for all people however there are more things to remember for people with visual impairments. For this reason there are many things to learn and memorize for visually impaired children.

There is a group of key words as a result of to the observation study. These words are imitation, playing together, physical contact, socializing, linguistic, mental pictures of objects, defining, leading, guidance, help, detailed information, model, percept figures, clay, different materials, memorization, individually, classroom playing, quite, dots, symmetry, side, row, to follow the row, path, tracking, route, space, queue, following a route, texture, bulge, indentation, spatial knowledge, practice the world, using sounds by the practice of real spaces, positional vocabulary and memorizing space. These keywords are categorized in four segments. These segments and key words are shown in the Table 5.

[52] Jan Bailey, "Growing Up Blind," *The Braille Monitor*. 32:8, (1989).

Table 5. Segments and Key Words of Findings.

Segments of Findings	Learning and Perception	Orientation	Socialization & Guidance	Linguistic
Key words	*imitation *mental pictures *mental maps *percept figures *models *clay *memorizing *different materials *texture *bulge *indentation *practice *dots *symmetry	*practice spaces *follow routes *follow rows *positional vocabulary *using sounds by the practice of real spaces *side *row *path *route tracking *space *queue	*playing together *physical contact *socializing *individually *classroom playing *being quite	*defining *positional vocabulary *detailed information

CHAPTER 4

DESIGN CRITERIA AND A NEW TOY DESIGN

4.1. Design Criteria

In this chapter the toy design criteria will be determined by the help of literature review and observation study. The general toy features and special features of visually impaired children will be examined. The special features will be list in a table according to their related improvement.

According to the Gielen there are three important concepts which make toy quality higher when they are used in design process: aimlessness, empathy and play value.[53] However there is a big popularity on games which has an aim, in fact the real play do not covers any win or loss. These are the plays which is good for children's development of skills and creativity. Also it is important to design toys by thinking children's needs, wishes, preferences and skills. And he also states that play value is clarified the enjoyment of children while they are playing.[54] The most important clue here is to design a toy which children love to play.

According to TRUCE Organization toys have play value when they...

- can be used in many ways.
- allow children to be in charge of play.
- appeal to children at more than one age or level of development.
- are not linked to video games, computers, TV or movies.
- can be used with other toys for new and more complex play.
- will stand the test of time and continue to be part of play as children develop new interests and skills.
- promote respectful, non-stereotyped, non-violent interactions among children.

[53] Gielen, M. A. "Essential Concepts in Toy Design Education: Aimlessness, Empathy and Play Value." 4.

[54] Ibid., 4.

- help children develop skills important for further learning and a sense of mastery.
- can be used by children to play alone as well as with others.
- can be enjoyed by both girls and boys:[55]

Some of these features will be also in the toy design criteria as features of ordinary toys which are valid for play tools and toys have a play value.

For the toys of visually impaired children Jain claims that presenting attractive toys for identification is important for these children. He also mention teachers should help these children by asking them tracing drawn pictures and figures, giving them three dimensional objects, using flash cards for developing memory, teaching tracing and wiring ropes.[56] In addition to the attractive toys suggestion of the writer, it is time to underline the importance of the using contrast colors in toys of visually impaired children.

Sevinç is stated that children with visual impairments need to have some toys which has sounds, smells, special textures and shapes according to meet their need of stimulus.[57] Findings of the observation study reveal clearly the importance of improvement of the tactile sense. Sense of touch is the common point of the learning, perception and orientation segments defined in last part of the third section. Because of this reason the in the toys and play tools of visually impaired children touching should come into prominence.

Evyapan determined some criteria for a toy which will encourage a visually impaired children interaction with surrounding environment."Among the objectives of the toy will be:

- to encourage physical independence for the child with no sight, providing in the meantime basic knowledge on objects and space, and developing cognitive skills,
- to provide opportunities for the child to use imaginative and creative skills in the play,

[55] TRUCE Organization, *Toys, Play & Young Children Action Guide*.

[56] Jain, "Invalid Vision."

[57] Sevinç, Müzeyyen. *Erken Çocukluk Gelişiminde Ve Eğitiminde Oyun*. (İstanbul: Morpa Kültür Yayınları, 2004), 237.

- to provide a means of social interaction between the child and adults and the children and peers (blind or sighted)."[58]

Also she claims that "the toy for visually impaired children should:

- demand simple tasks the completion of which gives the child a sense of accomplishment;
- be flexible as to the way in which it is played with;
- be added with more complex functions as the child gains experience;
- make the child exercise a skill without feeling pressurized."[59]

This study as Evyapan's also underlines the importance to the feature,developing skills, of the visually impaired children toys. This study claims that toys can support the developments of daily life practices of visually impaired children when it is design according to their features and needs. For this reason three table are drawn for determining some of the toy design criteria according to developmental needs of some skills, senses and abilities.

Table 6. Senses and Some Applications for Design Criteria.

Senses				
Visual	Auditory	Tactual	Gustatory	Olfactory
	Using sounds for orientation	Exercise with fingers	Without seeing tasting foods	The smell of different materials
	Listening audio books	Improve texture awareness		Memorizing the smell of people and spaces
	Playing an instrument	Different materials		
	Differentiating voice and tones of people	Haptic perception of 3D objects		
		Awareness of shapes		
		Tracing borders and lines		

[58] Naz A. G. Z. Evyapan, PhD Thesis,2002, 110.

[59] Ibid.,170.

Table 7. Developmental Domains and Needed Skills for Design Criteria.

Developmental Domains		
Physical	Cognitive	Social
Gross Motor	Mind Mapping	Linguistic
Fine Motor	Remembering/Memorizing	Communication
Perception	Finding position	Friendship

In the Table 8 the key statement of observation study and determined daily life activities and tools used. The toys for visually impaired children should make children practice their skills according to the result of observation study.

Table 8. Daily Life Skills from Observation Study for Design Criteria.

Key Statement of Observation	Skills Needed for an Self-Sufficient Daily Life	Basic Need for the Skill
"The more children practice the more children learn."	Mobility	Encourage to explore Practicing/ Repetition
	Orientation	
	Using Braille	Perception with fingertips

According to these statements and findings the toy design criteria tried to determine. The design criteria will be given under two subtitles: Criteria which are valid for all toys, Criteria which are valid for toys of visually impaired children.

Criteria Which are Valid for All Toys

- Not to restrain imagination of children rather improve their imaginary world and creativity.
- Parts are simple as possible.
- Parts are durable as possible.
- Simple, enjoyable and fun to play.
- Appropriate to play alone and play with others.
- Improve sociability of children.
- Appropriate to play with other toys.
- Appropriate to play in alternative plays.
- Appropriate to play by both girls and boys.
- Should be design and produce according to the safety regulations.

Criteria Which are Valid for Toys of Visually Impaired Children

- **Daily Life Skills**

- Improve mobility and orientation skills of the children.
- Exercising for fingertips.
- Integrated perception of the objects that children know well from their daily life.
- Contain models of objects of real world for practicing daily life skills.
- Encourage children for repetition of daily life skills.
- Support them to be self confident individuals.

- **Senses**

- Improve the sense of touch and perception skills.
- Designed by using variety of materials, textures, shapes, borders and lines.
- Designed by using attractive colors.
- Designed by using colors which make a high contrast.
- Designed by using variety of sounds.
- Designed by using some materials which have different smells.

- **Development Stages**

- Exercising for fingers.
- Do not contain any abstract feature.
- Encourage children to explore.
- Encourage children to use their imagination and creativity.
- Encourage them to create mental maps by using and improving haptic perception.
- Encourage them use and develop their memory.
- Improve language skills.
- Provide interaction for these children between their adults and peers.

This study underlines the importance of mobility problem of children. Mobility and orientation skills are the ones which affected all the life of visually impaired person. To be good at in these skills brings self confidence and self sufficiency for a life time.

4.2. A New Play Set Design: *Oda Kur* / Install a Room

After determining the design criteria, an example product is designed by using not all but the many of these criteria. The criteria improve mobility and orientation skills of the children, encourage them to create mental maps by using and improving haptic perception, and encourage children to explore are underlined because there is not any accessed toy in market with these concerns. Moreover the concern of improvement of the fine motor skills is decided to use as a tool in this design. There are many toys that regard this skill and tactile sense that is why this sense and skill is not the purpose but the tool of this play set.

In this study the importance of practice is underlined. As parallel to the claim of the study it is thought that a play set which children built indoor environments may help them to practice mobility and make it fun for children. It is decided to design a toy set which let children to build variety of spaces they have been in or they imagine because as it is observed children need to do practice about orientation and mobility. It is assumed that children will learn spaces and built them with the toy set, and by the way they will practice mobility and this will be a part of a play activity. They may use their hands and fingers to walk in the play set, create mind maps and at the end be more confident in the spaces they learn with this toy set.

The toy set involves some small and scaled models of furniture's and some basic spatial elements. Some of the models will let children to arrange the size of the furniture. Moreover the set let children to determine the ratio and sizes of space/ created rooms.

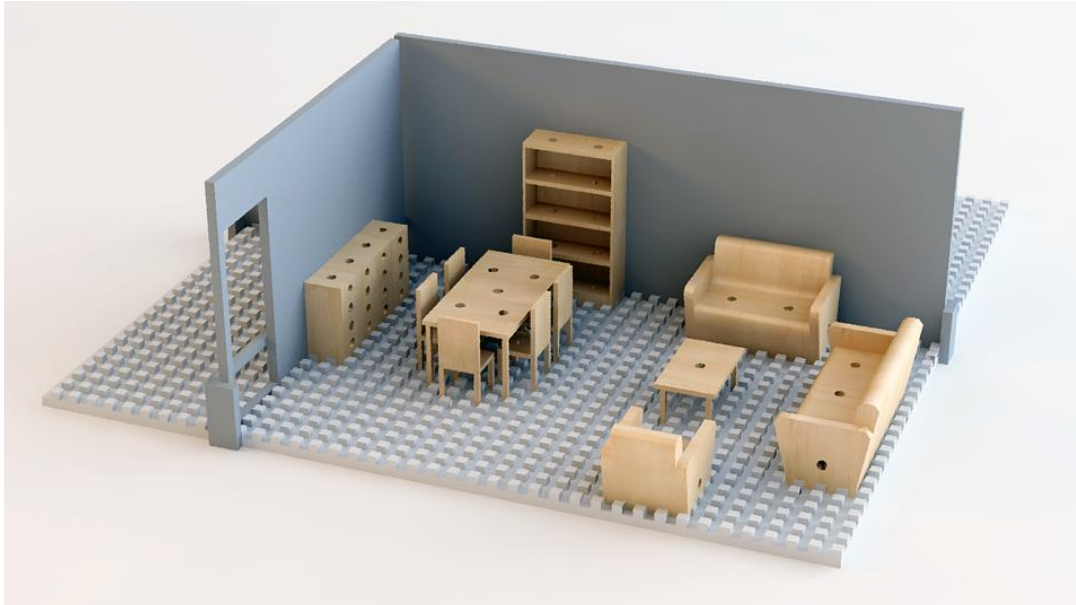

Figure 61. Toy Set *Oda Kur/* Install a Room Designed.

4.2.1. The Play Set

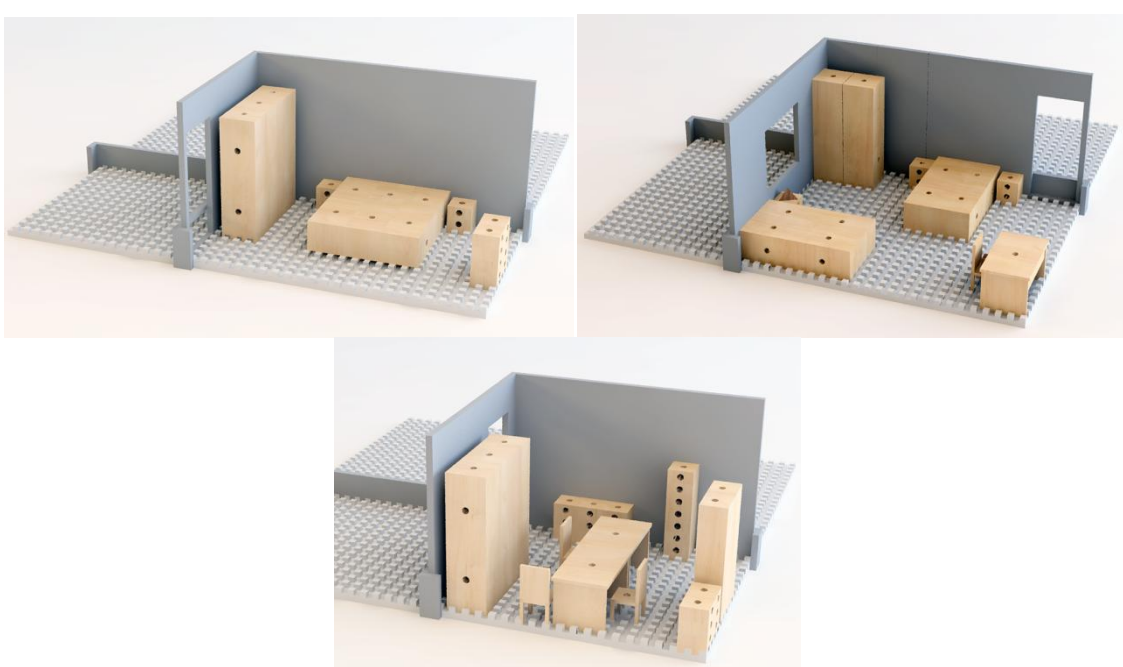

Figure 62. Toy Set *Oda Kur/* Install a Room, Bedroom and Office.

Oda Kur/ Install a Room is a toy set that children can build a model of room which they know or which they imagine. This toy set includes a basement for floor,

panels for walls, models of furniture, location pins, workspace cloth, two blindfolds and the bag of set. Firstly, elements of the toy set are explained.

Spatial Elements:

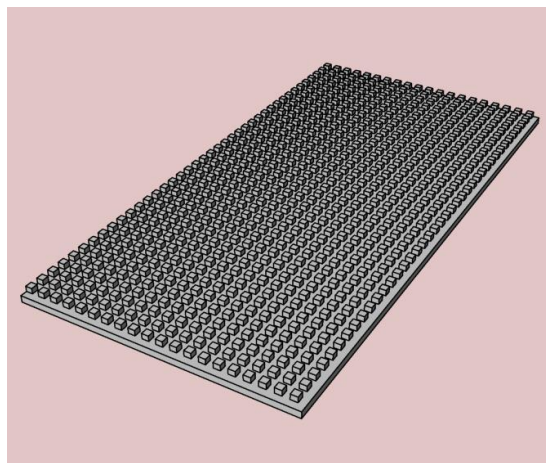

Figure 63. Base Component of the Toy Set *Oda Kur/* Install a Room.

Base component is designed as in the Figure 63 for the sake of stability of other components. The stability of the other components as furniture models is very important for visually impaired children. As it is told in section two, these children used their hand as their eyes so they need to examine and find the part by touching them. If there would not be any fitting surface then children may smash the furniture elements unintentionally.

To fit the elements in the base canals are used. With the canal rows children may practice following rows and paths. These canals correspond to the following lines in Braille alphabet which is an essential tool for visually impaired children. They may have the alignment perception by the help of these lines. Also this will make it easier to place the furniture in their places. There are suitable bulges and indentations at the bottom of the furniture components for the best fit to basement. Also with the help of this canal rows the wall panels, as the second spatial element of the toy set, can be attached and stand still on the base component. Moreover these rows will help children to measure and understand the proportions between the real space and toy set.

There will be two base components for a better placement in the bag of toy set. These base components will be produced from plastics and produced by injection molding.

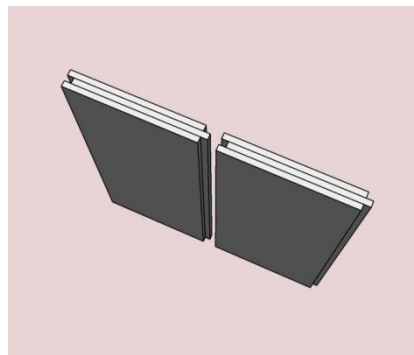

Figure 64. Wall Panels and Attaching System of Panels.

Second spatial sort of elements are wall panels (Figure 64). These panels will be placed to the indentations of base component. The size of the space wanted to be created build by these panels. By using the panels to side of the space created and the other two wall of the space defined with the end of base to let children play comfortably.

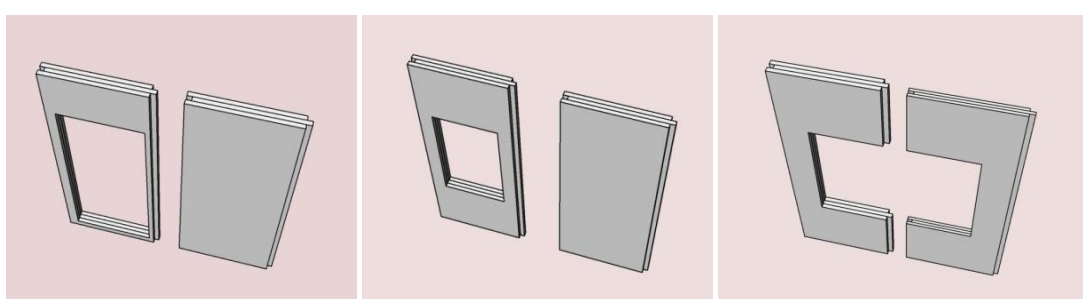

Figure 65. Walls with the Gaps for Doors and Windows.

There are four kinds of wall panels of toy set. First one is the plane one for walls and second one has a gap which indicates the door opening. Third and fourth ones have holes which indicate windows (Figure 65).

Furniture Models:

The models of furniture are determined by considering modern city houses of Turkey. Appropriate volumes which can indicate furniture of houses are decided. Some of the volumes are designed to let children decided about the size of the furniture so some of the furniture elements are modular. Furniture will be explained in two headings as modular and other furniture.

Modular Furniture Models:

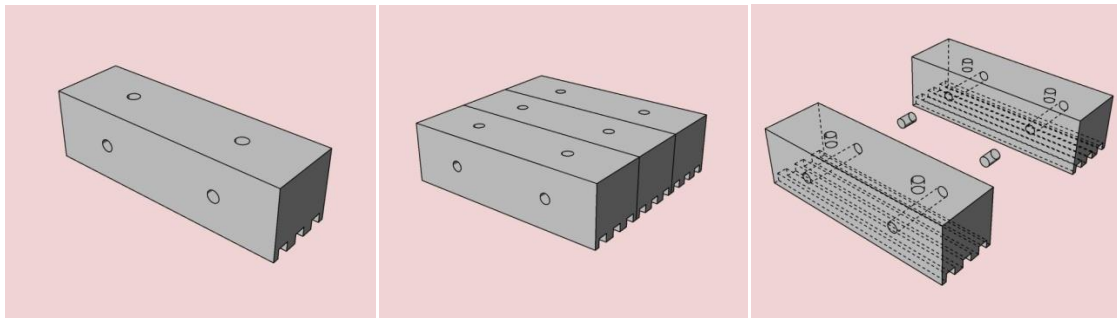

Figure 66. Horizontal Furniture Components.

One of the components is the horizontal one (Figure 66). The components bring together with the small wooden pins. By the way beds for one or two are built. The channels at the bottom of the elements make the model stable on the basement.

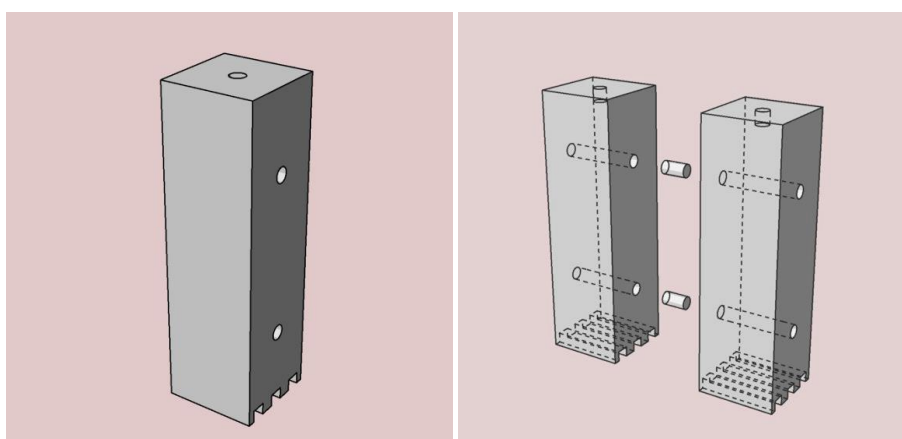

Figure 67. Vertical Furniture Components.

Second modular furniture of the toy set is wardrobe (Figure 67). Wardrobe comprise of some vertical elements. According to the width of needed furniture the vertical elements are combined.

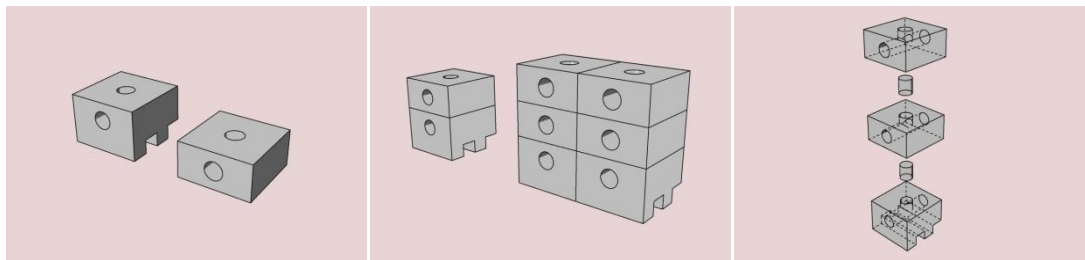

Figure 68. Furniture Components, Drawers, Bad Stands.

There are some small components in the toy set to build furniture like drawers and bad stands (Figure 68). There are two kinds of these components. One of them has some channels on the bottom to fix on the base component/floor of the model. Second kind can be attached on the other with small pins. The width and length of the furniture determined by using willed number of elements.

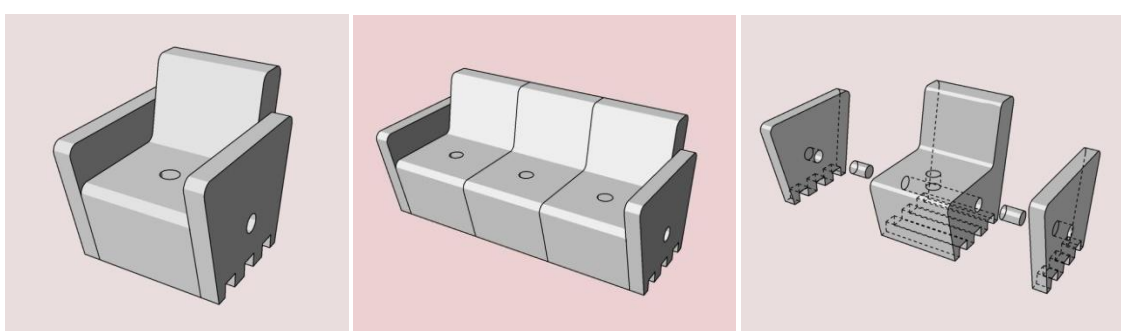

Figure 69. Furniture Components, Armchaires, Sofas.

The last modular furniture of the toy set is armchairs and sofas (Figure 69). To construct these furniture there are two types of elements except attaching pins. These are the sitting unit and the armband unit.

Other Furniture Models:

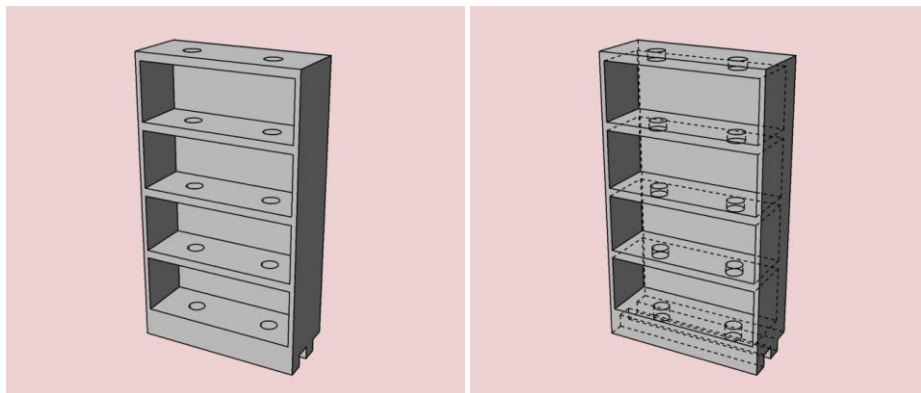

Figure 70. Furniture Components, Bookcase.

In the toy set there are two bookcases (Figure 70). This furniture has some holes on the surfaces. These holes are for locating pins which may be refer the places of some objects in some kind of plays.

Figure 71. Furniture Components, Tables.

There are three types of table in toy set. A desk, a round table and a dining table is the defined sort of tables (Figure 71). These tables are also suitable for the base component and they also have some holes on the top surfaces for the location pins.

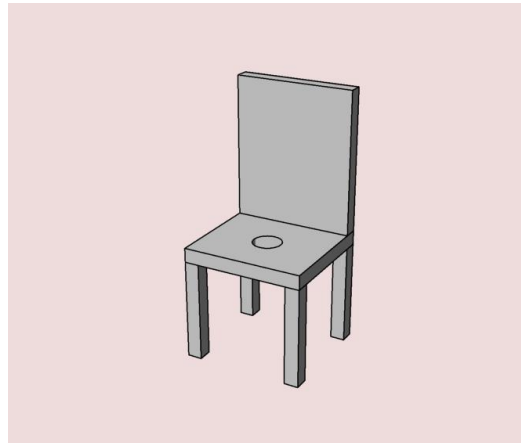

Figure 72. Furniture Components, Chairs.

Chairs are another furniture models in the toy set (Figure 72). The chair models also appropriate for the base. There are eight chairs in one toy set.

Figure 73. Furniture Components, Coffee Table.

A coffee table added to selection of furniture of the toy set *Oda Kur* /Install a Room (Figure 73). This element has also one hole for locating pins.

Attaching Pins:

These are the small pieces that help to combine elements to construct some of the furniture models.

Locating Pins:

Locating pins are the pins fits to the top surfaces of elements in the *Oda Kur* / Install a Room toy set (Figure 74). These pins will be produced from different materials like wood, glass, cloth and metal. This will develop children's material perception. Also playing with these pins will improve fine motor skills of the children.

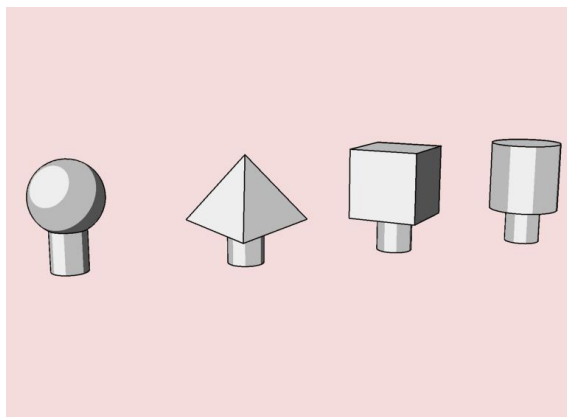

Figure 74. Pins of Toy Set *Oda Kur/* Install a Room.

Fabric Components and Bag of Oda Kur:

In the toy set *Oda Kur* / Install a Room there are one workspace cloth and two blindfolds (Figure 75). The color of workspace cloth is chosen aiming to get the contrast with the furniture models. This little detail may ease the perception of some of visually impaired children who can use his/her remained vision.

The two blindfolds added to toy set because in some of the plays children may want to do not use their remained vision. Also these blindfolds are good for sighted parents and siblings. They may use it to understand their children/sibling and play with them with the same circumstances.

Figure 75. Fabric components, Workspace Cloth and Blindfold.

Package of this toy set is designed as a bag with handle (Figure 76). There are many pieces in toy set so it is a must to design the places of models in a package that they can use in playing process. Knowing the places of models and elements provides easiness. for this reason a zippered bag designed. When the bag is opened it becomes a stand for models. Models are placed in the gaps opened in a piece of styropor. This stand defines the places of models and also protects them from any impact in the package.

Figure 76. *Oda Kur* /Install a Room Toy Set Logo and Bag as Package.

All elements and number of pieces:

The elements and number of pieces is shown in the Figure 77. One set of *Oda Kur* / Install a Room included 32 modular furniture model elements, 13 models of furniture, 4 pins, 21 wall panels and one base element. The *Oda Kur* / Install a Room toy set is comprised of 70 components.

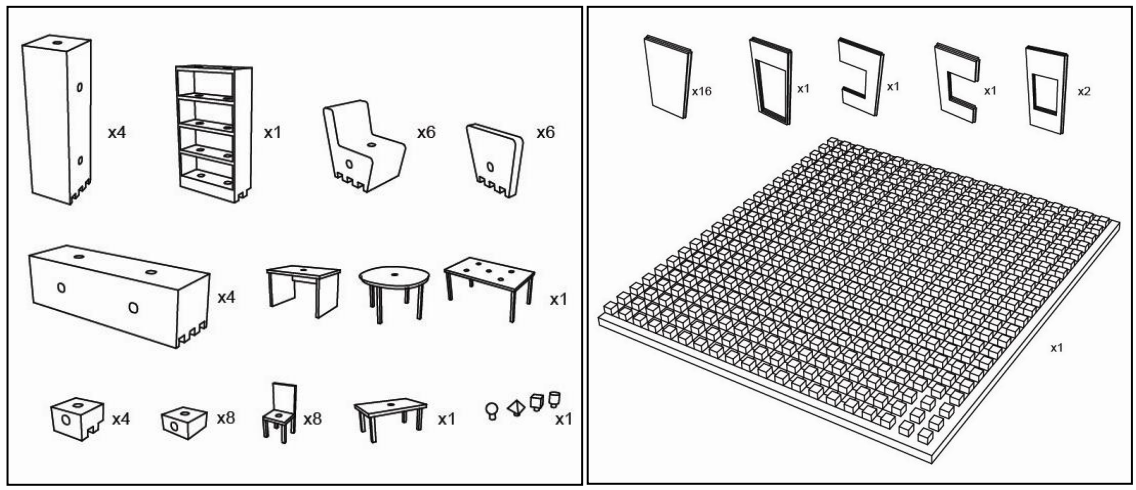

Figure 77. Elements of the Toy Set *Oda Kur/* Install a Room and Quantities of Elements in one Set.

Model of the Oda Kur /Install a Room Toy Set:

A model was produced at the end of the study. In the model of the toy set all the parts made by plywood and medium-density fiberboard (mdf) however to reduced the weight of the set and for differentiate spatial elements from the furniture components it is decided to produce the spatial elements from the plastics. Also after producing the model it is decided to reduced the base components dimensions from 80 cm to 60 cm.

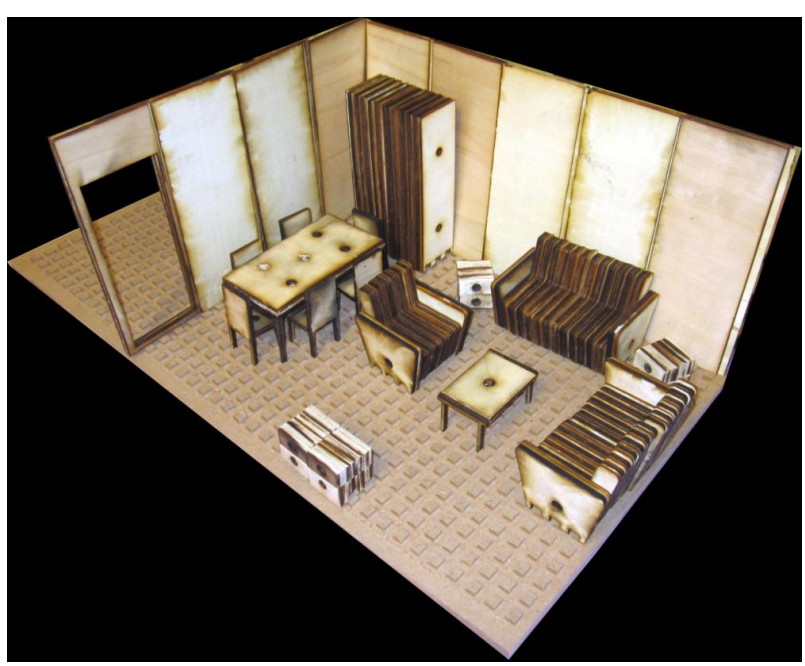

Figure 78. Model of the Toy Set *Oda Kur/* Install a Room.

Figure 79. Housing of Elements in the Bag of Play Set.

In the bag of the play set there are places for all parts (Figure 79). This is especially done for the sake of easier usage of the children. Visually impaired children may use the places and searching and finding places of the elements will be easier for them. This is also provides a practice of being tidy in their daily life. In the Figure 80 the usage of the bag is demonstrated.

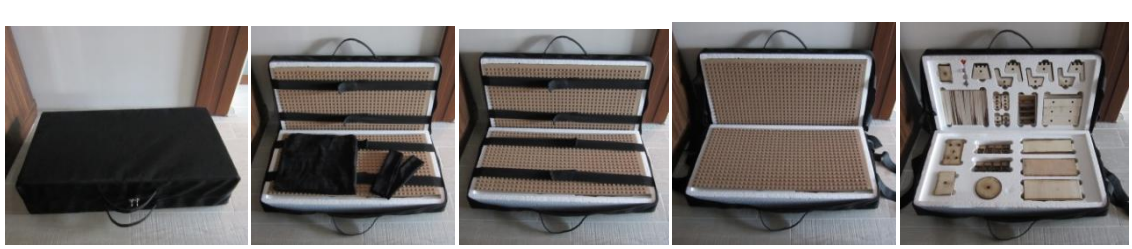

Figure 80. Opening of the Bag.

Potentials and limitations of Oda Kur /Install a Room Toy Set:

Oda Kur /Install a Room Toy Set can be played indoor, alone or with a companion, by using objects. The toy set is suitable for functional play, imaginative/pretend/fantasy play, functional - manipulative play, dramatic play and cooperative play.

This toy set is included furniture models and spatial elements which are generally scaled in 1/10 proportion. The base component of the set will be in 60 cm length and width. This dimension is decided to make it suitable to the arm dimensions of children. According to this dimension the maximum area of the room will be 36 m². It is thought that this area enough for indicating many types of rooms.

This toy set is for playing in indoor spaces and only has indoor equipments. Toy set's aim is to make children mobility practices in rooms of houses by playing activity. So that is why this toy only has indoor equipments and furniture. Truthfully this is a limitation of the toy set but a new toy set may also design with outdoor concept.

Children also need to play in a flat surface to place base elements in house or school. The base element can be thought as a limitation also. Some of the children maybe do not need to use this element because they have milder impairment. However this element has designed as a practice of tracing, positioning and following the lines and rows which are needed skills for children's perception, mobility and using Braille.

The statement of Schneekloth also support the idea of the play set.

> "Schneekloth (1989) suggested that the play environment should be miniaturized, so that children with low vision can learn about and understand their surroundings more readily; two important concepts in this regard are how walls are joined to ceilings and how rooms are joined together. This miniaturization allows children to explore their environment tactilely."[60]

It is assumed that beside the many other supports in improving many other skills this toy set will make practice of mobility and positing fun for visually impaired children. While children do more practice they will be more self confident on mobility and orientation. By the way they will begin to use their environment sufficiently. When

[60] L. H. Schneekloth, "Play Environments for Visually Impaired Children," in *Journal of Visual Impairment & Blindness*, 83(1989),196-201, queted in Michael Rettig, "The Play of Young Children with Visual Impairments: Characteristics and Interventions." *Journal of Visual Impairment & Blindness* 88, no. 5 (1994): 419.

they use their environment confidently it will be easier for them to learn and move in new spaces. Combining with the imagination of children, the toy set believed to achieve its purpose as a play tool.

4.2.2. How to Play

One of the features of good toy is providing many different play activities. Toys should not define the play activity sharply. Scognamillo also stated that toys based on over-specification damage the imagination of children.[61] Children should be physically and mentally free to use toys in various types of plays. As a designer the thing to do is suggesting some proper play activities.

It is possible to use the toy set *Oda Kur* /Install a Room in many types of play. In the toy set there are models of small furniture and models of two space elements floor and wall which are designed proportionately proper to small-scaled furniture models. By using sufficient parts it is possible to build rooms like bedroom, child room, dining room and saloon. Moreover it is possible to play only with the furniture model. In this part of the study some of the plays that children may play with the toy set are explained. These are only some of the possibilities for visually impaired children however children will find many other ways to play with the set.

A parent, a sibling or a friend of a child may show one of the furniture in the home and let the child touch or grab a part of the furniture without using her/his remained vision. After, child begins to explore the models in the toy set. The child tries to understand which part of which furniture that he/she touched or grabbed. This will develop the haptic perception skills of children. Moreover this play will force the children used some mind maps and improve their knowledge about some objects.

One of the other alternatives of play activity is playing with questions. One child may choose one of the part from the toy set and do not tell. The other child tries to find which the chosen part by questions. They may choose some of the parts and furniture models and may limit the play at first. This play will be also good for haptic perception. As well it will develop linguistic and social skills of children. In addition their cognitive skills will improve with the problem solving skills.

[61] G. Scognamillo, "Beyoğlu Oyuncakçıları," in *Türkiye'de Çocukluğun Tarihi* Ed. Bekir Onur. (İstanbul Tarih Vakfı Yurt Yayınları, 1993), 136-140.

These two play activity also may be played with the inactive hand of the child (left hand for a right handed child). By the way they may make it harder to find and it may be again a challenge to find the furniture or object in mind. This will also develop the cognitive skills of children and improve the physical perception skills of their inactive hands.

Some other options of plays are based on creation of space. A sighted person may guide the play and build a room that child knows well with the toy set. Then he/she ask the child to explore the model of the room and ask "what place/where is this place?" Then child tries to find it. Vice versa of this game will be another alternative of play.

In this play a child walk and explore a room with a guidance or alone. After this he/she tries to set the room with *Oda Kur* / Install a Room. This will courage child to explore the room and learn the space well. Learning a space is a need for children however with the help of *Oda Kur* / Install a Room it will be a play.

Children may also create some spaces do not exist. They may make it out. This will develop children imagination and usages of mind maps. Children may create a role play with the set and may generate their imaginative world.

Two children may also play with the *Oda Kur* /Install a Room in another way. A child makes out a space and houses some furniture models in it. After finishing he/she begins to describe the created room. The second child who has another set begins to build the room according to the definitions of his/her friend. After finishing they change their places and examine their friend's creation and find the differences if there is any.

Another option of play is using the pins in the created space. For placing pins there are holes in all the furniture models and pins also fit the floor surface. To define a place of object these pins may be used. There may be objects in the room and after creating the same room pins may indicate the places of the objects in real world. After finding the pin child may explore for the real object and finds out what it is and where it is exactly like "on the left side of the chair seat".

Again with the pins a familiar play may be played with a sighted companion. It is the play hot and cold. This play needs a companion. One of the children hides something he/she may show the hidden object before to make the play easier. After hiding other child comes to the find the hidden object. The first player helps him/her by saying colder or hotter. These words indicate the distance between the hidden object and finder. When the finder comes closer to the hidden object then other player may say hotter and for the much more nearness the words like burning and scorching may be

used. And just for the opposite situation the words like freezing and icy is suitable. With the vocal guidance second player finds the object and players change their roles. With the toy set *Oda Kur* /Install a Room children can use the pins instead of object and play hot and cold in the model room. Then they may find the object in the real room. This play develops listening and exploration skills of children and children get used to the idea of opposites.

These eight different play activities are only some instance of playing which can realized with the toy set *Oda Kur* / Install a Room. Many other varieties are hidden in the imagination of children.

CHAPTER 5

CONCLUSION

5.1. Conclusion of the Study

The aim of this study was to determine the toy design criteria for visually impaired children and design a toy according to the determined design criteria. For this purpose, literature review, an observation study and a design process were carried out.

In literature review firstly visual impairment and blindness were defined. Then being visually impaired was examined in four aspects: specific conditions, requisiteness, some techniques and tools and being visually impaired in Turkey. Lastly features of visually impaired children and their playing activity and some toys suitable for them were researched.

In this part of the study fundamental information about people with visual impairment was collected and presented in groups. Features, abilities and needs of children with visual impairment were specifically gathered under skills of perception, self help, cognitive, communication, socialization and playing. According to this study, children with visual impairments need to do much more practices than sighted children for the sake of their developments about physical movements/actions, manual dexterities, cognitive issues, and memory.

In the last part of the chapter the importance of play activity in children's physical, cognitive, language, social, emotional development was underlined. As being objects of play activity, some toys which visually impaired children can properly play with were researched and presented with their suitable features.

After literature research, a non participant observation is done in İzmir Aşık Veysel Visually Impaired Primary School, during fifteen school days, in the nursery and first classes. Findings of this observation study were evaluated by the determined keywords. When these keywords were grouped these four segments were stated as learning and perception, orientation, socialization and guidance, and linguistic. These segments show the fundamental needs of children. These segments also demonstrate the skills which a toy set for visually impaired children should develop.

By the key worlds, grouping and evaluation of findings design criteria of a selected toy set were determined.[62] The importance of perception, orientation and mobility skills was detected as a result of studies. Developing ability of creating mental maps was also as a basic feature of toy for visually impaired children. Moreover exploring was reached as the one of the most important activity of perception, orientation and mobility skills.

According to the design criteria, the toy set *Oda Kur* was designed. *Oda Kur* is a toy set that children can build a model of room which they know or which they imagine. This toy set includes a basement for floor, panels for walls, models of furniture, location pins, workspace cloth, two blindfolds and the bag of set. After describing the toy set eight samples of playing activities were explained. According to this study to impose one type of playing style blunt children's imagination and creativity. For this reason many styles of play activities are sampled and toy set was kept away from any playing rules. At the end of this thesis a wooden prototype of the toy set *Oda Kur* was produced.

The strongest outcome of this study is the design criteria produced through a balanced combination of literature and field study. *Oda Kur* is produced as an exemplary design applying the set of criteria suggested to support visually impaired children with a product that will have a high impact for a healthy development. If applied by more designers and designs; the set of criteria will bring a healthier development chance to visually impaired children via play objects.

To point out, in the observation study the vital effect of practice is underlined. It is observed that the effect of impairment can be overcome by the help of practice. Here the repetition of acts, movements and skills gain value. All these activities take place in the activity of play. Because children do not get bored repeating only in plays. For this reason playing is one of the strongest tools of learning. In other words, play activity integrates exercise of life and learning.

Unlike sighted children, visually impaired children have some difficulties in learning some of the skills which they will use in their daily lives. Also they need to learn some different skills like mobility, orientation and using Braille alphabet. For this needs and difficulties they need to do more practice for the sake of their healthy development. Also in the design criteria this statement is underlined. Moreover the toy set is designed according to encourage the practice of daily life. It is assumed that

[62] Design criteria enumerated in chapter 4.1.

children will play with the toy set in interaction with the space they are in or they know well. Some playing activities are exemplified in the fourth chapter for the sake of children's development in mobility and cognitive skills. Also while creating these playing activities the idea in mind is make children practice the daily life activities while they are playing happily.

As a final word it can be said that the most important issue is the well-being of children. It is both covers the emotional and other developmental stages. The very best feature of playing activity is making people happy without any age restrictions. In point of fact, the study done in the hopes of providing happy and healthy childhoods and self-sufficient lives for visually impaired children, which is above all other aims.

Along with many contributions to the existing knowledge on the topic; this study also showed that there are still many unexplored research and designs within the field of designing for visually impaired children. People who do not know anybody disabled or impaired may have different thoughts about impaired people or children. However they are also ones living within the community like anybody else. They have some special conditions but others do not need to relegate them. Observed children were like the many other children, very cute, joyful and sometimes naughty. Their special condition brings them some other needs. Life a little bit harder for them because of these needs however when they supported they have chance to have good and happy lives. In this point not only to design a toy but also to let them have the toys gain importance. A designed toy could not be helpful if it is not supplied and given to these children.

5.2. Suggestions for Further Studies

The study explained in this thesis may be followed by another observation of visually impaired children while they are playing with the toy set *Oda Kur*. With a long term observation study, the mobility, orientation and perception skills of children may be surveyed for measuring the success of the designed toy set.

In addition *Oda Kur* toy set is designed to build models of modern rooms in Turkey. Some further research may be done for subcultures or other cultures. After defining the basic elements of cultures some parts can be added or removed according to the cultural habits of using furniture.

This research may be a step for designing specified toys for disabled children in Turkey. A project may be created to produce such toys for blind children and by the support of foundations some donation may be gained to purchase the project.

The scope of this study was to design a toy according to the needs of visually impaired children However, these children need not only toys but also many other tools for practicing the life skills. For this reason it is possible for also other designers to use the determined design criteria and observation study, in the process of many other new products to be targeted at blind children.

The observation study was constructed giving the ability to observe children's school periods. Hence, a more detailed observation which involves the periods in houses can be done for understanding daily life of visually impaired children in order to support the design criteria.

The observation study was resulted by a new toy design however it is possible to make some suggestions about how to transform existing toys for the sake of visually impaired children. There are many toys that these children cannot use with the all features. By some modifications many toys may become suitable for visually impaired children.

Moreover children need some games to develop their cognitive skills. Designers need to do some adjustments to existing digital games aiming mental development. In addition some tangible play tools and games can be designed.

The research study of this thesis also underlines the importance of conscious guidance of parents, for the sake of visually impaired children. Another further research or design process may be done about a system which educate and support the parents of visually impaired children.

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