# PRESCHOOL CHILDREN AS A USER GROUP:
# DESIGN CONSIDERATIONS FOR MUSICAL TOYS

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**DESIGN CONSIDERATIONS FOR MUSICAL TOYS**

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## ABSTRACT

PRESCHOOL CHILDREN AS A USER GROUP:
DESIGN CONSIDERATIONS FOR MUSICAL TOYS

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Early musical experiences are very important for social, cognitive and physical development of children, as well as their future musical competences. Preschools present this environment with various musical materials. However, suitability of these materials in terms of developmental needs of children and educational goals is questionable. The purpose of this study is to transfer knowledge from relevant literature to design considerations of musical toys for preschool children.

Literature review was conducted to determine various aspects to be considered while designing musical toys by compiling knowledge from developmental psychology and pedagogy literature; governments' educational policies and programs for early childhood in Turkey and in the world in general were reviewed in order to determine the expected outcomes of preschool education, and the research and development–studies done in the field of musical toy design were explored. Furthermore, ten semi-structured interviews were conducted with preschool educators in order to gather their experiences and opinions on the usage of musical materials. As a result, suggestions are provided for designers to be used in designing musical toys for preschool children concerning children's needs, teachers and learning context, and product attributes.



Keywords: preschool children, preschool education, musical development, musical toy design

# ÖZ

BİR KULLANICI GRUBU OLARAK ANAOKULU ÇOCUKLARI:
MÜZİK OYUNCAKLARIYLA İLGİLİ TASARIMA DAİR KAYGILAR

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Erken yaş müzik deneyimleri çocukların sosyal, bilişsel ve fiziksel gelişimleri kadar, gelecekteki müzik becerileri için de önemlidir. Anaokulları erken çocukluk döneminde çeşitli müzik materyalleriyle bu ortamı sağlamaktadır. Ancak, bu materyallerin çocuğun gelişimsel ihtiyaçları ve eğitim amaçlarına uygunluğu tartışılmaktadır. Bu çalışmanın amacı, ilgili literatürden elde edilen bilginin anaokulu çocuklarının kullanımına yönelik müzik oyuncakları için tasarım kaygılarına aktarılmasıdır.

Müzik oyuncağı tasarımında göz önünde bulundurulması gereken hususları belirlemek amacıyla yapılan literatür çalışmasında, gelişim psikolojisi ve eğitim bilimleri alanları; dünyada ve Türkiye'de okulöncesi eğitimden beklenen kazanımları tespit etmek üzere devlet eğitim politikaları ile programları; ve ayrıca, müzik oyuncağı tasarımı konusunda yapılan araştırma ve geliştirme çalışmaları incelenmiştir. Ek olarak, müzik oyuncakları kullanımı üzerine görüş ve deneyimleri ile ilgili veri toplamak amacıyla, on anaokulu eğitmeni ile yarı yapılandırılmış görüşmeler yapılmıştır. Sonuç olarak, tasarımcılar için anaokulu çocuklarının kullanımına yönelik müzik oyuncaklarının tasarlanmasında kullanılmak üzere çocukların ihtiyaçları, öğretmenler ve eğitim ortamı ile ürün özellikleri açısından öneriler sunulmaktadır.

Anahtar kelimeler: okulöncesi çocukları, anaokulu eğitimi, müzikal gelişim, müzik oyuncağı tasarımı

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To children who hear requiems before lullabies

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# CHAPTER 1

## INTRODUCTION

User-centered design approach has become prerequisite in design research and practice for the last decades. This approach requires designers to focus on the usability of designed products by the targeted user group. Understanding not only the needs, but also contextual factors is essential for a user-centered design perspective in order to be able to determine possible scenarios and enable particular interactions with the products and environments. Hence, an extensive comprehension of the characteristics and needs of the user group is necessary for designers.

Young children learn through their experiences; everything they do is an experiment to make sense of the world. During this period, it is crucial to provide them with developmentally appropriate materials. Preschool is such an environment full of opportunities to support the development of children by providing them various materials to experience with.

Play is a natural, characteristic behavior of preschool children, through which they explore their material and social environment in order to build their own knowledge and skills. Similarly, music plays an important role in child development, and also is an integral part of preschool activities. It promotes various material exploration and social interaction opportunities for children.

Despite the highly consistent body of knowledge and methods presented by child development theories, as well as educational approaches and programs; designers are lack of a comprehensive source to consult regarding the developmental and educational requirements while designing products for children. Instead, they need to check on psychology and pedagogy literature or take existing products as a

reference point. However, there is an increasing need in design practice concerning the factors to be taken into consideration from a designer's perspective.

## 1.1 Background of the Study

Jean Piaget (1896-1980) was a Swiss psychologist, whose theories on cognitive development of children have been very influential on developmental psychology. According to Papert (1999), "One might say that Piaget was the first to take children's thinking seriously". In the frame of his developmental stages, preschool period coincides with the second one, which is preoperational stage. This stage also represents a particular cognitive transformation: the development of symbolic thinking (Singer and Revenson, 1996). In this period, children learn that a thing may stand for something else, and associate things with symbols. Non-verbalizing activities, such as use of materials, provide the basis for children to use more abstract forms of symbolization for later, such as letters and numbers. It is also important to encourage the child to develop and use non-verbal symbolization as a way of communication. This alternative way of communication helps to convey feelings, thoughts and experiences, which are difficult to put into words. Emergence of symbolic thinking is the basic step to develop this kind of language (Cohen et al.., 2008).

Children's musical experiences contribute to their cognitive, social, and motor development. As Swanwick (1988) cites from The Gulbenkian Report, *The Arts in Schools*, arts in any form provide distinct categories of understanding, conceptual thinking, analytical thought, understanding of synthesis and wholeness. Apart from that, music has an expressive character rather than a descriptive one as is language. Children's early contact with music will help them appreciate and use this expressive tool more effectively.

Concentrating on rhythmic patterns and responding accordingly are dominant musical characteristics of preschool children (Martin, 1988; cited in Zachopoulou et al., 2003). In its educational program book and teachers' guidebook that suggests activities; official preschool program of Turkey supports the musical abilities of preschool children, which are about concentrating on the rhythm concept of music.

Music is a vital part of preschool education, and specific “music hours” are suggested to teachers along with the particular activity hours of a typical day in the preschool such as free play hours, arts hours, mother tongue hours, and so on. In those booklets, preschool teachers are encouraged to provide children different kinds of sound sources, and children are expected to experience and develop an understanding of various characteristics of sound and music. (Republic of Turkish Ministry of National Education, 2006)

Preschool period is identified with various kinds of *play*, which is beneficial for their cognitive, physical and social development. The exploratory nature of play is very important for preschool children, since play is a safe process to explore, try and learn real life experiences (Piaget, 1962). Play is considered as the most effective learning tool for preschoolers, and it is suggested to teachers to organize play-based activities (Republic of Turkey, Ministry of National Education, 2006). Musical play is one of the tools that can support the basis of symbolic thinking, while allowing the child to make contact with different kinds of materials.

According to Warrener (1985), it is possible to trace musical development in accordance with Piagetian stages, which could be an inspiration for material use in musical play. During child-initiated musical play, it is possible for children to explore various materials to experience various sounds, as well as experiencing gestural representation of the melodic or rhythmic patterns as instrumental exploration (Tarnowski, 1999).

Research on designing toys for children is a recent field of study, which gain speed within last decade. There is an effort to internalize knowledge borrowed from developmental psychology literature, and develop certain measuring tools (Kudrowitz and Wallace, 2010) and guidelines (Hinske et al., 2008) for designers. This effort presents the deficiency of importing knowledge from other fields, and the need for design researchers to produce a body of relevant knowledge within design field and from a designer’s point of view.

## 1.2 Aim of the Study

The aim of this study is to explore possible design contributions on musical toys for children in order to enrich their musical experiences considering their developmental needs and educational requirements. In addition to a review of the relevant literature, expert opinions of preschool educators are expected to guide this study.

Fields of developmental psychology and pedagogy, along with toy design for children are expected to provide the theoretical basis for the study, while real classroom experiences give insights about the usage context and current situation in Turkey.

## 1.3 Research Questions

In this study, the answers for the following questions have been seeked for:

*Main research question*: In which ways musical toy design for preschool children can enrich musical experience considering the developmental needs of children and educational requirements?

- What are the factors related to preschool children to be considered when designing musical toys?
- What kind of music materials are used and musical activities are conducted in preschool context?
- What sorts of outcomes are expected to be gained by preschool children from musical experiences?

## 1.4 Structure of the Thesis

In the first part of theliterature review chapter; child development areas and theories, as well as early childhood education methods and national programs will be reviewed. With a developmental approach, functions and types of play and toys, the relationship of preschool child in terms of its benefits, their musical characteristics, and music education methods for preschoolers are reviewed in the second part.

Lastly, it is attempted to present a comprehension of children as users and play as a usage context; the effort of design researchers to build tools from a developmental perspective for designers to benefit in designing toys; and contemporary research on musical toy design inspired from developmental approaches.

In the third chapter, field study and data analysis conducted with the participance of preschool educators concerning their opinions and experiences on usage of musical materials in preschools will be presented. Lastly, conclusions as suggestions for musical toy designers will be presented in the fourth section.

### 1.5 Uniqueness of the Study

This study focuses on the needs of preschool children as musical toy users based on their developmental trends and their reflections on learning environment. The multi-disciplinar nature of the study requires a comprehension of abilities and constraints of the users from a developmental perspective. Also, the review of educational requirements presents the needs in a specific usage context. This way, this study would enable designers to benefit from relevant literature in musical toy design process.

# CHAPTER 2

# LITERATURE REVIEW

Multidisciplinary nature of the subject of this study requires an extensive search of the relevant literature. A manifold review of the literature on music in preschool education, preschool music education, music cognition, child development and institutional approaches was conducted to construct the framework of the study. All-inclusive databases such as Education Resources Information Center (ERIC), JSTOR, EBSCOhost, ScienceDirect, and SpringerLink as well as field-specific journals such as Early Childhood Education Journal (ECEJ), Journal of Research on Music Education (JRME), Music Educators Journal (MEJ), and Psychology of Music were reviewed with the combinations of keywords: “preschool”, “early childhood”, “music”, “rhythm”, “toys”, “musical instruments”, “toy design”, “musical toy design”, “musical development”, “music education”, and “curriculum”. Also, considering the recent advances after 1980s in neuroscience of music as a result of brain imaging technologies, and its implications on the findings of music cognition and music education, publications from 1980 to today is the focus of this chapter. Emerging themes were then reviewed in detail.

Literature review resulted in following subjects: educational methods for early childhood in accordance with child development theories, the importance of play and toys for children, the relationship of children with music in terms of the benefits of/gained by musical experiences for other competences such as literacy or spatial/temporal reasoning with the recent findings of neuroscience, the characteristics of musical development of children, music education methods for children, handling children as users, as well as designing toys and musical toys for children. This sorting also gives a hint about the classification of relevant publications from which this study is fed. Structure of this chapter was constructed

upon the literature of child development, early childhood education, relationship of preschool children and music, and designing for children.

Products in question are designed for a particular user group. Hence, developmental trends of preschool age children are an important source of knowledge to base on.
To constitute the necessary understanding about these most important actors, theories of the pioneers of developmental psychology such as Lev Vygotsky, Erik Erikson, Jean Piaget and Howard Gardner are reviewed. The main intent of this field is to define age-related characteristics of children. This literature covers intellectual and emotional development of the child, while Gardner's theory includes artistic development as well.

In parallel with developmental approaches, a respectable amount of studies can be found in the literature on child learning and pedagogy. Relevant studies in this field are on the application of developmental theories and various approaches to early childhood education such as Montessori method of education, Reggio Emilia approach to early childhood education, Project Spectrum, The HighScope early childhood education approach and so on. Publications vary from government directives to informal/professional or non professional suggestions for preschool teachers. Also, early childhood educational programs at national or regional levels as well as institutional considerations are subject matters of this category.

Another category of studies cover the aspects of music for preschool children in terms of its benefits, as well as characteristics of musical development and music education methods for preschool children. There is a set of interdisciplinary studies concerning the effects of musical experiences of children on other competences such as literacy, spatial/temporal reasoning or mathematical concepts. This literature seems to be in parallel with the recent findings of cognitive neuroscience. Empirical studies regarding the effect of music education to children, children's musical activities such as listening to music or playing an instrument on the development of a specific competence such as motor capabilities or literacy skills constitute a considerable part of this literature. Musical development has also been a field of study, which focuses on the musical characteristics of children in accordance with the developmental theories. Publications on music education, on the other hand, cover a number of educational methods such as the methods of

Dalcroze Eurhythmics and Orff Schulwerk, which will be explored later. Although these methods mostly aim musical performance, some of them, Eurhythmics and Schulwerk in particular, concentrate on the relationship of bodily movement and components of music, especially rhythm. On that sense, these methods fit in preschool curricula which appreciate the necessity of music and movement for children, and could inspire relevant activities and materials.

There is a great deal of publications on child play and toys in the field of child development. Functions of play for development of children as well as material use during play dominate the literature, while little is found on musical toys and musical play of children. Most of the limited product-related publications include social and historical reflections of toys, product reviews in consumer magazines, or newly developed and as yet non-commercial projects. These projects mostly concentrate on the tangibility of the musical medium and translation of the input created by the child into a digital output. Another common point of these products/environments is that they are based on the findings of developmental psychology and pedagogy. It is possible to name musical materials in different ways according to their intended use and gains such as music toys or music instruments. In this study, the term “musical toys” is preferred.

User-centered design approach has reflections on designing products, environments and services for children. Children are a user group with their own needs, and the methods for the elicitation of these needs or including children into design process have been subject matters in design research. Also, designing toys and musical toys for children has been another issue concerning the scope of the study. Although being a new field of study, and not being as rich as relevant psychology and pedagogy literature, recent studies are examples of research through design approach and present examples of such designs and results of their research. Hence, examples of design projects constitute a source of knowledge for toy and musical toy design for children, instead of a structured literature.

Literature review study of this thesis is presented in a way to categorize the subjects in accordance with the overview above as well as touching the four main featuring aspects of the study; (1) child development and early childhood education, (2) children’s play and toys, (3) preschool children and music, and (4) designing for

children. In first section, age-related developmental characteristics of children in cognitive, social, physical and musical domains, as well as educational methods and national strategies are investigated. Second, functions of plays and toys for preschool children will be functions and types of plays and toys, and the importance of them for child development will be presented. Also, a comprehensive investigation on the relationship of preschool children and music in terms of biological foundations of music cognition, musical development and music education methods for children will be made. Lastly, an exploration of children as a user group and recent studies on designing toys and musical toys for children will be presented.

### 2.1 Child Development and Early Childhood Education

In order to be able to constitute a comprehensive framework for the study, it is essential to understand the specific characteristics of the user group as well as the usage context. The targeted user group is in a sensitive period with special needs that designers should consider, or even based upon, when designing any kind of products for them. Preschool children (3-6 years old) are passing through an intense and dynamic developmental period. This fact defines their cognitive, social and motor capabilities, and the skills to be nourished. Preschools are educational institutions which serve for this purpose. With the facilitation of the preschool teachers, children experience various activities. What makes these experiences different from the ones at home or other environments is that they are organized according to a structure for achieve certain goals. Children are expected to gain or develop several skills through these experiences, which are designed by various educational methods and governmental programs.

In this section, the areas and characteristics of child development will be explored as how they think and how they tend to act. After, an overview of popular child development theories will be presented to reinforce the understanding about developmental issues. Then, approaches to early childhood education will be investigated to figure out the educational implications of these development theories, how and through which means children are expected to develop certain skills, as well as to explore the inclusion of music to these programs. Lastly, some of the national educational programs for early childhood such as the programs of State of Illinois (USA), United Kingdom, Australia and Turkey will be presented in order to

have opinion about the expected benefits and outcomes of preschools education, especially musical ones.

### 2.1.1 Developmental Areas

Child development occurs in various inter-related areas of development. In this section, a brief summary of cognitive, social, and motor development will be presented. Considering the individual abilities due to developmental level, cognitive and motor development of children are directly related to the usage of musical instruments. Social development, on the other hand, is worth to mention since preschool environment is mostly the first social environment that children attend after their family circle. Hence, their behavioral tendencies in sharing a social environment are also important.

#### 2.1.1.1 Cognitive Development

Cognition is the “inner process and products of the mind that lead to ‘knowing’” (Berk, 2006, p. 219). Preschool children pass through an intense cognitive change in terms of understanding the world, interpreting events and relations. These changes occur through exploration of the environment to extend their knowledge about the world (Frost, et al., 2008).

Studies on cognitive development are influenced on three main sources: intellectual development theory of Jean Piaget; social development theory of Lev Vygotsky; and information-processing theories. Piaget believes that children build their own knowledge and understanding of their world in an unfolding way through individual explorations and interactions, while Vygotsky emphasizes the effects of culture on individual development of cognition through social interactions as an outside-in process. Information-processing theories, on the other hand, stress both the physical changes in the brain and the effect of the environment resulting in cognitive changes (Dyer, 2002).

Theories of Piaget and Vygotsky are discussed later in this section. However, Piaget’s ideas are still worth to briefly mention here, since they provide a detailed

frame of cognitive development of preschool children. First of all, Piaget divides child development into four main stages and preschool age children are in preoperational stage. This stage is characterized with an increasing complexity of *symbolism*. Children start to be able to represent objects and events mentally or with other objects and actions (Frost et al.. 2008, p. 130).

Information-processing theory handles mind with a computer analogy, a mechanism for manipulating symbols that information passes through. Outer information is encoded, recoded and decoded to take in and interpret, just like a computer (Berk, 2006, p. 272). Characteristics of preschool children according to information-processing theorists are given below.

Table 2.1 Cognitive Trends of Preschool Children
(Berk, 2006, p. 299)

| BASIC CAPACITIES | STRATEGIES | KNOWLEDGE | METACOGNITION |
|---|---|---|---|
| • Many processing skills are evident, including attention, recognition, recall, and reconstruction<br>• Overall capacity of the system increases | • Attention becomes more focused and sustained<br>• Beginnings of memory strategies are present, but they are seldom used spontaneously and have little impact on performance<br>• Variability and adaptive selection among strategies are evident | • Knowledge expands and becomes better organized<br>• Familiar events are remembered in scripts, which become more elaborate<br>• Autobiographical memory emerges, takes on narrative organization, and becomes more detailed | • Awareness of mental activities is present, but preschoolers view the mind as a passive container of information |

As the above table presents, preschool period is characterized with acceleration in cognitive development. Focusing on activities and attention increases, and children become able to develop a concept of sequence in events. They start to develop strategies of memory, although they are spontaneous rather than intentional.

Cognitive abilities of children determine the quality of their interactions with their material environment. Preschool children pass through a process of thinking

concretely to symbolically. Also, their social environment helps them develop certain cognitive skills. Designers should be aware of the fact that this is a process going through; hence they may seek for the ways to contribute to the cognitive development of children considering what they can do today and what they are capable of doing tomorrow.

#### 2.1.1.2 Social Development

Children begin to position themselves as a part of a social group in preschool period (Frost et al., 2008). Socialization of people is an evolutionary-adaptive behavior. Even before birth, infants develop interactions with environment, especially with their mothers. Both biological and environmental factors effect upon social development. While infants' social development is connected with biological changes and parental interaction, beginning from early childhood, peer interactions also have effect upon the complexity of social interactions (Card et al., 2002).

Frost et al. (2008) states that social development of preschool children is effected by their relationships with parents, siblings and peers. These interactions define the quality of their social competence. As they develop new skills, children become more confident about being separated from their parents and more prepared for social world. Social characteristics of preschool children are as follows:

- *Self-concept*: This is the ability of the child to understand that they are individuals. Physical characteristics as well as individual competencies are prominent qualities they usually concentrate on.
- *Self-esteem:* As they gain new skills, preschoolers tend to judge their competencies and own worth. They usually overestimate themselves while underestimating the difficulty of tasks.
- *Self-regulation of emotions:* During preschool years, children become aware of their own and others' feelings, their reasons, and use strategies to cope with them.
- *Empathy:* This is the ability to "understand and respond to the feelings of others". Development of language and gestures enable preschoolers provide support and comfort for peers (Frost et al., 2008, p. 140).

Designers should note that tools and materials children use should be suitable to their developmental characteristics in order to enhance the feeling of self-achievement. Since children develop a self-concept on their individual competencies and skills, it is important to support them in this sense with materials which they can develop and show skills. In addition to that, preschool children learn with or from their peers. This highlights the importance of a medium (in this case, a product) enabling such a communication between them.

#### 2.1.1.3 Motor Development

During preschool years, children gain a considerable amount of motor skills through practice. Frost et al. (2008) define gross-motor, fine-motor development, and perceptual-motor development as motor development areas. Definitions of these motor skills and physical developmental characteristics of preschool children will be discussed in this section.

Gross-motor skills enable children to be mobile through coordination of large muscles such as arms, legs and trunk. Gross-motor development continues in two areas. First one is *locomotor skills* which enable the child to move about such as jumping, running, climbing and rolling. Second component of gross-motor development is upper-body and arm skills. Fine-motor development, on the other hand, requires mastery in use of small muscle groups of the body such as hands, fingers and face. Coordination of hand and eye muscles is very critical in development of fine-motor skills. These skills include the control of small materials such as grasping a pencil, buttoning a jacket or lacing a shoe (Delahunt, 2002; Frost et al., 2008) (Table 2.2).

Perceptual-motor skills effect the physical interaction of children within their environment by using both senses and motor skills. As developments in auditory, visual and tactile sensory abilities are integrated with newly emerged motor skills, perceptual-motor abilities develop. These kind of motor skills consist of four categories: *body awareness*, the skills including an understanding of identifying and ability to make an efficient use of body parts; *spatial awareness*, the ability to make an efficient use of body in a given space; *directional awareness*, localizing and directing body in a space; and lastly, *temporal awareness*, the ability to understand

the relationship between movement and time. To be able to carry out rhythmic and sequential activities, for instance, a child should develop the sense of temporal awareness (Frost et al., 2008, p. 127).

Although there are individual differences in timing, motor skills emerge in a universal order (Table 2.2). Gallahue (2003) defines a four-stage developmental sequence in motor skills. During the first year of life is the *reflexive movement* phase, in which the baby gives reflexive movements toward environmental stimuli. Next two years is seen *rudimentary movement*, basic motor skills such as grasping, standing and walking. Preschool years are characterized with *fundamental movement*, mastering basic skills, developing gross and fine motor skills such as jumping, running and throwing, and an increased ability in combining them. Last stage is *specialized movement* phase, evident in school years and adulthood, including recreational and sports activities.

Table 2.2 Motor Skills of Preschool Children
(Delahunt, 2002, p. 281)

| AGE | GROSS MOTOR SKILLS | FINE MOTOR SKILLS |
|---|---|---|
| 3 years | Able to ride tricycle, briefly balance on one foot, walk up stairs with alternating feet | Copies a circle design, recognizes reversals in puzzle pieces, cuts across paper with scissors, places objects in small openings, stacks nine block towers |
| 4 years | Hops on one foot, throws ball overhead | Cuts out picture using scissors, copies circle and cross |
| 5 years | Run on tiptoe, balances on foot | Print a few capital letters, establish hand dominance, begin to tie shoes |
| 6 years | Catches ball with accuracy, hits ball with bat, jumps with rope turned by others or self, walks on balance beam | Cuts out more complex picture with scissors, writing more controlled, established handedness |

During preschool period, children should be encouraged to engage in activities which will help them to develop certain gross and fine motor skills. Products or activities that are promoted through these products may enable children in this way.
In this section, three areas of development were explored. There are other areas of development in psychology literature, such as development of language. However, cognitive, social and motor developments are chosen considering the scope of this

study. Next section is reserved for prominent child development theories of pioneers of the field, in order to draw a more comprehensive understanding about the developmental characteristics of preschool children from different perspectives.

### 2.1.2 Child Development Theories

Child development has been a popular subject matter of psychology. Developmental psychology explores the development of a person in several areas such as cognitive development or physical development. Developmental psychologists give emphasis on preschool period, and most of them give special names to this particular stage as Piaget calls is as *preoperational child* what Erikson calls *locomotor-genital stage* and Montessori as the *absorbent mind*.

Development is mostly interpreted as sequential stages, which constructs on the previous one. Each theorist attributes particular characteristics to this stage. In this section, theories of the major psychologists on child development and the characteristics they link with preschool period will be reviewed.

#### 2.1.2.1 Piaget's Theory of Intellectual Development

Jean Piaget is a Swiss psychologist who mostly worked on intellectual development of children. He is a very influential theoretician in the field of psychology and pedagogy, and most of the dominant approvals in this field are based upon his work. He believes that intellect is genetically-defined, meaning children can possess only certain skills at specific times due to biological limitations as well as personal experiences. Cognitive development occurs through a constant adaptation process of children to environmental changes. During this process, children not only "receive" information but also play an active part in intelligence growth (Singer and Revenson, 1996).

Piaget's theory of intellectual development of children consists of several stages (Figure 2.1). These stages are: *sensori-motor development* (0-2 years); *preoperational thought* (2-7 years) which consists of symbolic and preconceptual thought, and intuitive thought; *concrete operations period* (7-11 years); and *formal operations period* (11-15 years). These ages might change according to cultural

differences and personal experience levels. However, their sequence is stable and to be able to pass through each stage, the child should have passed the previous one (Singer and Revenson, 1996, p. 20).

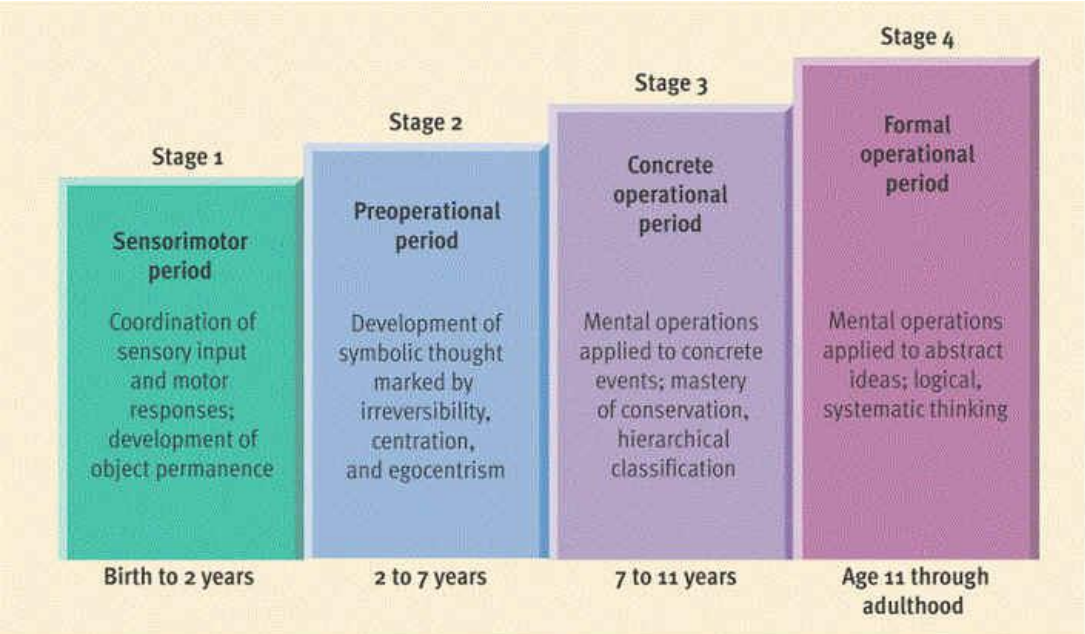



Figure 2.1 Piaget's Four Stages of Cognitive Development (Wadsworth, 2005)

Since the center of attention of this study is preschool children, it would be reasonable to concentrate on the characteristics of preoperational stage. The most dominant characteristic of preoperational child is the development of *symbolic functioning*. There are various kinds of representations emerge during this period such as symbolic play, drawing and spoken language. In general, the child learns how to use a *signifier* to represent a *signified*; in other words, representing objects and events with something else (Wadsworth, 1996). Other characteristics of preoperational thought are:

- *Egocentrism:* This is the inability of the child to understand other people's perspectives. According to the preoperational child, the only thoughts are his, and they are always right.

- *Transformational reasoning:* Preoperational child can understand the initial and final state of a transformation, but cannot pay attention to the in-between states. (For instance, falling of a pencil from upright position)
- *Centration:* This characteristic is the dominance of the perceptual aspects of an event on the cognitive ones. For instance, when one of the two rows of coins of the same quantity is spread apart but the numbers of coins are left the same, the preoperational child thinks the spread row has more coins because it is “longer”.
- *Reversibility:* Giving the same rows of coins example above, one reason the child cannot understand that both rows still have the same number of coins is that he does not understand the concept of reversibility, which means he cannot reverse the action in his mind.
- *Conservation:* Conservation is the stability of the amount of a substance when a change occurs in an irrelevant dimension (for instance, a spread row of coins mentioned above). Preoperational children lack this kind of conceptualization (Wadsworth, 1996, pp. 66-72).

Piaget gives particular emphasis on play and imitation, and their importance for child development. He defines three types of games each of which corresponding to a specific developmental stage or stages. *Practice games* are characteristics of sensori-motor stage; *symbolic play* is a characteristic of preoperational stage; and *games with rules*, even can be seen in preoperational period, mostly belong to concrete operational stage (Singer and Revenson, 1996, pp. 41-51). Piaget’s types and functions of play will be reviewed in detail in Section 2.2.1.

#### 2.1.2.2 Erikson’s Stages of Human Development

Erik Erikson is an American psychologist, who built the idea of psychosocial development, a set of stages including all the human life span. He was interested in the development of a healthy personality in particular, and not concentrated on cognitive development (Honig, 2005).

Erikson defined eight stages of a man, each of which is characterized with particular favorable outcomes. Preschool period (3-5/6 years old) is defined as

*locomotor/genital stage* (Table 2.3). At this stage, the child acquires the pleasure of mastery in using toys, especially constructive play. He enjoys his new physical and mental skills, becomes socially more outgoing and cooperative, plays with peers, and has increased curiosity about the world (Honig, 2005pp. 164-165).

Table 2.3 Characteristics of Preschool Children
(Extracted from Erikson's stages of Human Development. Retrieved August 10, 2011, from http://psychology.about.com/library/bl_psychosocial_summary.htm)

| **Stage** | **Basic Conflict** | **Important Events** | **Outcome** |
|---|---|---|---|
| **Preschool (3 to 5 years)** | Initiative vs. Guilt | Exploration | Children need to begin asserting control and power over the environment. Success in this stage leads to a sense of purpose. Children who try to exert too much power experience disapproval, resulting in a sense of guilt. |

Erikson (1987) was interested in child play, in his terms, "infantile play". He believes that the motivations of children for playing are different from the ones of adults. Adults play games for recreation, while children use play for stepping forward in mastering new skills (p.199). Play is also seeking for an identity for the child. The comfort of "standing on his feet" is not enough for them; they need to build their own identity in a playful way for the feeling of accomplishment and social prestige. If not allowed to interfere in the "adult world" by having a special condition as being a "child", he explores possible identities through play (pp. 211-214).

#### 2.1.2.3 Montessori's Theory of Child Development

Although she is famous for her pedagogical work, Maria Montessori bases her method upon scientific findings of neurology and psychology, as well as her observations of children as a psychiatrist (Montessori, 1949). Since educational approaches for early childhood will be presented in Section 2.1.3, her theory of human development will be briefly presented here rather than its implementation.

Montessori believes that human development occurs through basic stages, and each stage is not only essential for the next one, but also skills and concepts gathered in each stage is preserved life time. These stages are: infancy (0-6 years), childhood (6-12 years), adolescence (12-18 years), and maturity (18-24 years). The first and third stages are more dynamic in terms of psychological and physiological change, while others are more stable and more about integration. First stage is in this study's focus since it covers preschool period. Children construct themselves through their experiences in this stage. They need order in environment, explore their environment through their hands, and movement is a dominant characteristic of this period (Torrence and McNichols, 2005; Wardle, 2009).

Montessori (1949) names the child in ages between 0 and 6 as "Absorbent Mind", referring to the formation of mind. They develop their inborn cognitive powers by assimilating or taking in the environment. According to her, between 0 and 3 years old children absorb the environment unconsciously, and their mentality is unapproachable by adults. Between 3 and 6 years old, on the other hand, children become more approachable and they continue absorbing their surroundings in a more conscious way. There are also sensitive periods within basic stages, in which learned skills and concepts evoke new ones. When the child becomes nearly 5 years old, seeking for order in external environment diminishes, because children start to constitute their own mental order. This "inner sense of order" allows them to skip to the next level: the level in which abstract thinking and complex problem solving occurs (Wardle, 2009, pp. 77-78).

One distinctive characteristics of Montessori's conception of human development is the importance given on movement. According to Montessori, humans consist of three parts: brain, senses and muscles. She states that muscles had long been perceived as inferior to the brain, but it is both manifestation of the brain and helpful for mental and even spiritual development. Movement directed by the brain is called "voluntary muscles" and is a psychic organ through which children explore their environment. Hands are tightly connected to the psychic life, even to development of character. Without using muscles voluntarily, human development would be half finished (Montessori, 1949).

#### 2.1.2.4 Vygotsky's Social Cognitive Development

Lev Vygotsky is well known for his theory of social cognitive development, which stresses the importance of culture in shaping the individual. He is perceived as the founder of Marxist psychology, the perspective of which is the idea that human behavior is believed to be changed by social and institutional forces. Social cognitive development theory also defends that individual cognition occurs through social interaction (Kearsley, 1994; Pellegrini, 2009). Vygotsky states that:

> Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. (...) We may consider this position as a law in the full sense of the work, but it goes without saying that internalization transforms the process itself and changes its structure and functions. Social relations or relations among people genetically underlie all higher functions and their relationships. (Vygotsky, 1981, p.163 as cited in Daniels, 2005, p.7).

According to this theory, development occurs through social interactions which result in a cognitive transformation. Vygotsky uses the term *zone of proximal development* (ZDP) to define the "potential for cognitive development limited for a time span", which requires social interaction such as adult guidance or peer collaboration (Kearsley, 1994, p.47). ZPD constitutes the plane to bring individual and social together. As Vygotsky (1997) mentions, Dorothea McCarthy, who studied with children between 3 and 5 years old, states that there are two kinds of functions. First one includes the functions children already have, and the others are the ones they can only perform under guidance or in a group or in collaboration. Her study shows that this second kind is actually functions for children between 5 and 7 years old, and children are able to perform them alone –without guidance or collaboration- when they are 5 to 7 years old. According to Vygotsky (1997), ZPD is important in terms of developmental research. If observed, future development would be predictable.

Another prominent feature of Vygotsky's theory is his emphasis on symbolic development. Although he concentrated on the development of language, he

studied the relationship of symbolic play and language. He believes that symbolic play of preschool age children is a “leading source of development”. Preschool play is somehow “wish fulfillment”. For instance, when two children want to ride a horse but they know that they cannot do so in reality, they simply use a broom as a horse as make believe (Vygotsky, 2002). According to Vygotsky, play is the act of “reducing or eliminating an undesirable condition”, in this case, limitations of fulfilling a wish in the society. The child creates an imaginary world; a world which still conforms to the societal norms. This process is not only very normal at this age, but also the start of symbolic development (Pellegrini, 2009).

#### 2.1.2.5 Gardner’s Multiple Intelligences Theory

Howard Gardner is a developmental psychologist, who is famous for his Multiple Intelligences (MI) Theory. Gardner (2006) believes that there is a difference in people's cognitive strengths and styles, and he builds his theory on the findings from cognitive science and neuroscience.

*Definition of Intelligence*

Gardner has an original way of defining what intelligence is. He criticizes the approach of testing or scoring one's intelligence with standard paper-pen tests such as Intelligence Quotient or Scholastic Aptitude Test for being intelligence-discriminative and appreciating only linguistic and logical-mathematical competences. He suggests a pluralistic view of the mind, and perceives intelligence as a “computational capacity to process certain kind of information”. According to this view, intelligence is a human potential to be processed, and it operates in certain problem-solving contexts. Apart from that, he uses a scale in order to confirm whether a competence is an individual intelligence or not. According to this scale, an individual intelligence should be universal, and also empirical evidence is required. For example, there is considerable amount of neurological findings that specific areas of the brain are responsible from particular actions and damage in that locale of the brain cause no or malfunctioning of that action (Gardner, 2006).

*Intelligence Types*

Gardner (2006) defines originally seven intelligence types, all of which exist more or less in all human nature as a potential to be developed. These intelligences are;

musical intelligence, bodily-kinesthetic intelligence, logical-mathematical intelligence, linguistic intelligence, spatial intelligence, interpersonal intelligence and intrapersonal intelligence. There is also a newly identified one: naturalistic intelligence.

It is important to note that intelligence is only the computational capacity, in other words, a bio-psychological potential, which operate within a domain. A domain is "any kind of organized activity within a society, in which one can readily array individuals in terms of expertise". To gain expertise in a specific domain, a person should operate more than one type of intelligences (p. 31-32). Breaking mind into

frames does not necessitate that each frame will function all alone, rather there is a co-operation of frames for each task in a domain.

*Musical Intelligence*

Musical intelligence is defined by Gardner as "the capacity to think in music, to be able to hear patterns, recognize them, remember them, and perhaps manipulate them (Checkley, 1997). The existence of musical intelligence is evident in gifted people such as musical prodigies or children with autism, who are good at playing an instrument but cannot communicate in another medium. There is neurological evidence that music is percepted and produced in certain parts of the brain, and damage of these particular parts of the brain cause selective loss of musical ability. Also, music is universal not only for human beings but also for some animals (Gardner, 2006). Taking from vervet monkeys who communicate with different alarm calls for different situations, Mithen (2006) suggests that musicality has always had a survival value, including reproductive advantage by manipulating the emotional moods of the opposite sex.

Gardner's Multiple Intelligences Theory is significant for this study, since his approach is inclusive. By stating that every single human being has an innate musicality and valuing giftedness in a different level, he makes music possible for every child and not just for those who are 'gifted'.

Theories of Piaget, Erikson, Montessori, Vygotsky and Gardner show similarities, although they have diversities in approaching the subject. Either "biologically

unfolded" or "socially constructed", their conceptualization of child development presents parallel insights. Prominent concepts, which are also should be mentioned for the purpose of this study, are symbolic thinking, learning with experiences, peer learning, and the importance of play for child development. Hence; a versatile product, which enables various experiences, peer sharing and play, is a valuable source for children in order for them to construct their own skills and knowledge.

This study focuses on the use of musical instruments for children in educational environments. Considering this fact, next section is reserved for popular approaches to early childhood education as well as some national programs and strategies.

### 2.1.3 Approaches to Early Childhood Education

Preschools are intended to provide the necessary means for children in their developmentally important period. Being educational institutions, they provide material and social environment, which offer opportunities for children to experience various kinds of activities to build their own knowledge and skills.

There are various approaches and methods to early childhood education. Popular ones have certain common points in their philosophies such as the perception of child, and how children learn. Approaches especially highlighting suggestions for learning environment and materials, as well as musical materials and activities will be reviewed in this section.

#### 2.1.3.1 High/Scope Curriculum for Early Childhood Education

High/Scope Curriculum, formerly known as *cognitive oriented curriculum*, was first designed in 1962 by a team of educators led by David P. Weikart for the benefit of struggling students in Perry Preschool of Michigan, United States of America. The curriculum has been developed, and implemented by thousand of early childhood programs throughout the world (Weikart and Schweinhart, 2005; Wardle, 2009). Almost one-fifth of Head Start schools, the federal preschool program in USA, are using High/Scope Curriculum (HighScope Educational Research Foundation, n. d.)

Most prominent feature of High/Scope Curriculum is its basis on *active learning* of

children by taking initiative to “explore, solve problems, and construct personal meaning, which occurs within a social context of peers and adults” (Wardle, 2009, p.49). High/Scope approach is built on the ideas of theorists such as Jean Piaget, Erik Erikson, John Dewey and so on, some of which are reviewed in Section 2.1.2. Theoretical basis of active learning lies behind preoperational stage of children between 2 to 6 years old, defined by Piaget. According to this conception, at this stage children learn and intellectually develop through their constant interactions with their social and physical world (p. 49).

In High/Scope approach, learning environment, materials and adult support should be encouraging children for active exploration of their physical and social world. One of the activities of active learning is children's direct actions on objects to gain direct experiences through various kinds of materials (Wardle, 2009, p. 49). An ideal learning environment is also defined. According to the guides, a High/Scope learning environment should be tempting for children; space should be divided into interest areas such as sand and water area, block area, art area, music and movement area and so on; space should provide places for group activities; there should be enough materials in variety and reflect children's daily lives; materials should be accessible for children, and so on (p. 52-53). Weikart and Schweinhart (2005) state that High/Scope curriculum does not require specifically designed materials. Equipments available in most nurseries or mundane materials such as materials from the nature and household materials would be appropriate (p. 235).

High/Scope Curriculum includes 58 key experiences for preschoolers, grouped under 10 categories: creative representation, language and literacy, initiative and social relations, movement, music, classification, seriation, number, space, and time. Music includes following experiences:

- Moving to music
- Exploring and identifying sounds
- Exploring the singing voice
- Developing melody
- Singing songs
- Playing simple musical instruments (Hohmann and Weikart, 1995, p. 22)

High/Scope teachers are not provided with scripts to use while teaching the child. Instead, they closely observe and listen to the child to enrich the experience of the child. Teacher is merely a tutor but an active participant of the knowledge construction process.

### 2.1.3.2 Montessori Method of Education

As mentioned before briefly, Montessori method of education is developed by Dr. Maria Montessori, who was interested in how children learn and how environment enhance child development. Montessori's view of human development is characterized by the concepts such as developmental and sensitive stages of humans, perceiving the children as "absorbent minds" who can assimilate or adopt their environment, the importance of self learning and self-discipline and so on (Torrence and McNichols, 2005; Wardle, 2009). Program characteristics are; choosing freedom of the child for developing the feeling of success and self-discipline, a predictable and logically organized environment in harmony to develop an *inner order*, providing real-world objects instead of inferior copies, specifically designed learning materials, and development of community life through teacher-led group activities.

Figure 2.2 Knobbed Cylinders (Retrieved August 9, 2011, from http://4.bp.blogspot.com/.../DSC01078.JPG)

Figure 2.2 shows a child working with Knobbed Cylinders as a Montessori sensorial activity. He is expected to learn concepts such as height, depth, width and so on, as well as develop his motor skills by putting the cylinders into the right slot.

In Montessori approach, purposefully designed environment and materials should enhance children's learning without direct instruction and guidance of the children by adults (Wardle, 2009, p. 75). The environment should be specifically designed according to the children's both physical and psychological needs and interests. Montessori Method is usually associated with didactic learning materials designed by Maria Montessori herself. These standardized materials are part of the "prepared environment" based on trial-error principle, and still used in Montessori schools. Learning materials are the important promoters of the implication of curriculum. Curricular activities are: practical life, language, mathematics, sensorial, artistic expression, music, geography and science (Torrence and McNichols, 2005, pp. 375-380). Each activity is supported through specifically designed materials such knobbed cylinder for sensorial activities (Figure 2.2), and bells for music activities (Figure 2.3).

Figure 2.3 Montessori Bells (Dolata, 2011)

The figure above shows a child experiencing music notation with Montessori Bells with the guidance of his teacher. Notes on the paper visually comply with the array of the bells for a clear representation for the child.

#### 2.1.3.3 Project Spectrum Approach to Early Childhood Education

Project Spectrum is a 10-year project started in 1984 in Harvard University and Tufts University (Krechevsky, 1991), which is developed by a team of researchers for curriculum development and assessment of early childhood education. Project is theoretically based on Gardner's Multiple Intelligences (MI) Theory mentioned before, and Feldman's non-universal development theory which is defends the unique way of development rather than a universal one. The common points of these theories are that they both have a pluralistic conception of intelligence; the notion of intelligence is perceived as domain-specific. Since intelligence is not perceived as a static and innate competence in contrast with traditional approaches, importance of educational experiences and diverse cultures become prominent. Main arguments of MI theory draw basis for Project Spectrum approach, and the project is developed to meet the need for empirical evidence to test this theoretical framework (Chen, 2005). It aims to “measure the profile of intelligences and working styles of young children” (Gardner, 2006, p. 90). One of the reasons why Project Spectrum is applied to preschool settings at first is that young minds have cognitive plasticity to respond easily. Another reason is the flexibility of preschool curriculum which makes it a more logical candidate for such assessment and activities (Sherman et al., 1988).

Educational environment and materials of Project Spectrum are planned to engage children in meaningful activities. Since project is based on the identification of distinctive cognitive profiles of children, these educational materials are considered as tools for assessment. Activities, which are carried out with these materials, are also a part of the assessment process. Cognitive abilities examined in Project Spectrum through these activities are about: numbers, science, music, language, visual arts, movement, and social. Musical abilities are divided into two categories: music production and music perception. These abilities are examined accordingly:

- *Music Production Activity:* Measures a child's ability to maintain accurate pitch and rhythm while singing and his or her ability to recall a song's musical properties.
- *Music Perception Activity:* Assesses a child's ability to discriminate pitch. The activity consists of song recognition, error recognition, and pitch discrimination (Krechevsky, 1991, p. 44).

Project Spectrum was carried out of classroom in its later phases. Collaborating with a preschool and a children's museum, research team developed classroom-based instructional units and interactive museum exhibitions for enhancing learning environments (Chen, 2005, p. 253). Although there are several areas on which the impact of Multiple Intelligences Theory is seen such as curriculum design, instructional strategies, special programs for gifted and so on (p. 256), Project Spectrum is designed as a research project to evaluate the implications of the theoretical framework and it is an ever-developing approach.

#### 2.1.3.4 Reggio Emilia Approach to Early Childhood Education

Reggio Emilia Approach (REA) to early childhood education is originated from the town *Reggio Emilia* in Italy. In 1946, the first Reggio Emilia School was founded with the guidance of local teacher Loris Malaguzzi (Wardle, 2009). The approach has been popularized since 1990s especially in United States, and inspired some of the early childhood education programs (New, 2005).

The highlighted points of the approach are: the image of the child, the concept of negotiated learning, and the importance of documentation and social relationships. According to REA, the child is a natural researcher full of curiosity and full potential, learning through their social interactions and reflections of their actions on others; and documentation is used as an effective way of displaying the pedagogical process of children (Kim and Darling, 2009). According to her observations in Reggio Emilia preschools in Italy, Hertzog (2001) discusses the characteristics of the approach: respect for each child, understanding relationships which involve the highest levels of thinking, art as the chosen medium to represent children's thinking, importance of communication, flexible schedules, and changing role of teacher.

In Reggio Emilia schools, environment is considered as another teacher. Educational spaces are planned in detail to support children's self learning through their meaningful interactions with their physical environment, with each other and adults (Figure 2.4). Children's physical and psychological needs are prioritized while arranging the whole space. To promote social interaction, classes are connected to each other so that children can visit other classes to see what others do; and each classroom usually open into a large gathering space (New, 2005; Wardle, 2009).

Atelier projects are another distinctive feature of REA. The curriculum is flexible in terms of use of time and children are free to be in charge of deciding what kind of activity they will do. Atelier is an environment adjacent to each classroom where children can carry out long term projects without disturbance (New, 2005, p.319).

Figure 2.4 Reggio Emilia Atelier Environment (Retrieved 8 August 2011, from http://www.latelier.org/index.php?option=com_content&view=article&id=49&Itemid=19)

The figure above presents a studio environment for four and five years old children, from L'Atelier School, Miami, LA, USA. Children are playing freely, exploring the open-ended materials provided, engage in individual or social play.

#### 2.1.3.5 Bank Street Developmental-Interaction Approach

Being an American-originated educational method, Bank Street Approach is also known as developmental-interaction approach. The term "developmental" refers to the "children's modes of apprehending, understanding and responding to the world change", while "interaction" refers to the elements that "thinking and emotion are

interconnected, interacting spheres of development; and it highlights the focus on the importance of engagement with the environment of people and the material world" (Cuffaro et al., 2005, p. 280). Theoretical bases of the approach are the works of theoreticians and practitioners of child development and education such as Freud, Piaget, but mostly Dewey, who is considered to be the father of educational progressivism and focus on the social nature of education (Wardle, 2009). Fundamental principles of the program includes children's learning from their own experiences through their physical and symbolic interactions with people and objects, and the important role of the educators as assisting children (Bayhan and Bencik, 2008, p. 83).

Bank Street education is mostly concentrated on music and art, physical education, character education and overall social and emotional development of each child (Wardle, 2009). The curriculum highlights the concepts of: the learner, knowledge and experience, teacher, learning environment, experiencing and integrating knowledge, the family, the community, communities of the past, and assessment (Cuffaro et al., 2005).

Figure 2.5 Bread-making in Bank Street Classroom (Retrieved August 9, 2011, from http://bankstreetcollege.wordpress.com/...taking-bank-street-abroad/)

### 2.1.3.6 Waldorf Approach to Early Childhood Education

In 1919, first Waldorf School was established in Germany for the children of the workers of Waldorf-Astoria Cigarette Factory by Austrian philosopher and educator Rudolf Steiner. After World War 2, Waldorf schools spread around the world. Waldorf education comprises not only preschool but also elementary and high school, and teacher education centers as well (Barnes, 1991; Wardle, 2009).

Steiner believes that children are made up of body, soul and spirit, each of which refers to a specific developmental stage. During early childhood, children mostly use their bodies, and they learn through their physical experiences and imitation of adult behaviors (Barnes, 1991, p. 52). In contrast to many approaches of early childhood education, Waldorf approach does not perceive early years as simply a preparation for later academic success but an entity in itself. Development is a maturational process. At this stage, children should be given opportunities to "develop physical body and the senses, (…) learn through imitation of adult behaviors, creative play and role-playing" (Wardle, 2009, p. 97).

Waldorf Kindergartens are for children between 3 and 6 years old. Curriculum activities include imaginative play, fairytales, folklore and fables, imitation, art activities, 'real work' such as knitting and baking bread, playing musical instruments, dance, drama, awareness of nature, cycles, and seasons. Supporting imaginative play and creativity through toys and open-ended materials is an important characteristic of Waldorf preschool education. Typical classroom is designed as if it is an extension of home with miniature furniture and other equipment. There are no educational toys or academic instruction. Perception of the child as a child at first prevents teachers from the act of direct instruction. In this way, Waldorf education fundamentally differs from the contemporary educational approaches to early childhood education (Williams and Johnson, 2005, p. 339).

In this section, early childhood education methods are briefly reviewed in terms of educational environment, materials and activities, highlighting the musical ones. Being parallel with child development theories, prominent features of these approaches are: promoting children's self-learning through material explorations, social aspects of learning such as peer-learning, and facilitating role of adults (in this

case, educators). Instead of didactic teaching, preschools are suggested to be a materially rich environment, which promotes curiosity, exploration and discovery for children. Learning throughout the process is central in preschool education. Preschool materials should be versatile, arouse curiosity, invite children to interact, and offer multiple experiences.

Music is included in preschool programs with particular activities and materials. Designers should note that these materials should be meaningful in a desired environment by fulfilling the mentioned concepts above. According to that; musical instruments should not only be rich in terms of providing a sustainable and versatile experience, but also social sharing to promote a natural learning environment.

Similar with educational methods reviewed in this section, governments are developing different early childhood education strategies and programs for the young generation. In the next section, four selected programs including Turkey's will be briefly reviewed.

### 2.1.4 National Programs for Early Childhood Education

It is possible to say that, nowadays, there is an increasing emphasize in early childhood policies in different countries in governmental level. Some countries, for instance United Kingdom, are revising their early childhood programs and strategies, while some others, like Australia, construct their first. The importance of early years has been realized for the later years in life, and national educational programs and strategies have been developed for an inclusive and accessible early childhood education. Likewise, European Commission published a communication paper in 2011, stating that curricula of early childhood education and care services should serve for children to develop their cognitive and non-cognitive skills such as motivation and ability to interact with others. Given the fact that there various approaches to early childhood education throughout Europe, Commission highlights the importance of focusing on curricular quality and appropriateness to child development (European Commission, 2011, p. 6).

Governmental strategies and programs of early childhood education represent their objectives and expected outcomes of early childhood education. Educational

environment, activities and materials are tools to achieve these goals. Apart from that, these programs include music with particular materials or activities in order for children to gain several skills. First, due to limitations of language, early childhood standards and programs of three English-speaking states are selected to be reviewed in these terms in this section: State of Illinois USA, United Kingdom, and Australia. After, a similar exploration of related government-supplied documents will be made in order to understand the current early childhood learning strategies and implications in Turkey.

#### 2.1.4.1 "Preschool for All Program" in State of Illinois, USA

As United States of America is a federal constitutional republic, each state has the freedom to some extend to constitute its own educational program. It is possible to access educational policies and standards of the states from their official websites of departments of education. According to its Implementation Manual, Illinois State Board of Education have put "Preschool for All" program in action since 2006 for children 3-to-5 years old (Illinois State Board of Education, 2009, p.10).

*Primary features of the program*

Implementation manual outlines the educational program, learning environment, curriculum and assessment considerations, parent and family involvement as well as technical issues such as financing. Illinois Early Learning Standards accepts several *guiding principles*, including the multidimentiality of learning and development, which occurs in different but interrelated domains; the importance of giving children the opportunity for active exploration of their material environment; as well as the role of teachers and families as shareholders of the educational process (Illinois State Board of Education Division of Early Childhood Education, 2004, p.4-5).

*Activities, environments and materials*

In Early Learning Standards, learning benchmarks in different developmental areas are defined. These developmental areas are: Language Arts, Mathematics, Science, Social Science, Physical Development and Health, Fine Arts, Foreign Language, and Social/Emotional Development (p.7-32). Benchmarks regarding musical

activities are given under the developmental area of Fine Arts, which are (i) investigating the elements of music, and (ii) participating in musical activities.

Educational environment is defined from room arrangement to materials and learning tools. The indoor and outdoor classrooms should include interest learning areas accessible by children and accommodate more than one child at a time. Tools and materials are suggested to be open-ended to enhance creativity, appeal to multiple senses, include both natural and manufactured materials, and multiple sets to allow children to play with identical materials at the same time.

#### 2.1.4.2 The "Early Years Foundation Stage" in United Kingdom

Unlike traditional early childhood policies in England, which had little government intervention, goal-oriented and standardized curriculum implementations have been developed (Kwon, 2002). Since 2008, Early Years Foundation Stage (EYFS) has been put into action by the Department for Children, Schools and Families to provide a structured, developmentally appropriate activity-based program for children from birth to 5 years old.

*Primary Features of the Program*

Statutory Framework (2008) outlines both learning and developmental requirements and welfare requirements of the child. Developmental trends are examined in the program according to following age groups in Child Development Overview booklet: 0-11 months, 8-20 months, 16-26 months, 22-36 months, 30-50 months, and 40-60+ months (Department for Children, Schools and Families, 2007).

*Activities, environments and materials*

The early learning goals and educational programs cover the following inter-related, developmental areas which should be delivered through playful, adult-led and child-initiated activities: Personal, Social and Emotional Development; Communication, Language and Literacy; Problem Solving, Reasoning and Numeracy; Knowledge and Understanding of the World; Physical Development; and Creative Development (p.11). Among these developmental areas, music activities are placed under Creative Development. According to the educational program; curiosity, exploration and play are to be supported to enhance creativity. Music, along with other forms of

activities such as art, dance and design, was suggested as opportunities to share thoughts, ideas and feelings. By the end of the program, children are expected to be able to express and communicate through a wide range of materials including songs and musical instruments, recognize and explore the sound changes and patterns, sing a repertoire of songs, and move to music (p.15-16)

In Practice Guidance for the Early Years Foundation Stage, very little is said about the educational quality of the environments and materials, but the emphasis is on the cultural and safety issues. Children are told to be provided “safe and secure environments in which to interact and explore rich and diverse learning and development opportunities”, and premises should be suitable for children with disabilities and reflect the ethnic, cultural and social diversity in society (2008, p.20).

#### 2.1.4.3 The “Early Years Learning Framework” in Australia

Belonging, Being and Becoming: The Early Years Learning Framework (EYLF) is the first nation-wide program for early childhood learning in Australia, and has been effective since 2009. EYFL is the national quality standard for Early Childhood Education and Care (ECEC), and Australian Government Department of Education, Employment and Workplace provide several documents such as guides for educators, parents and service providers.

*Primary features of the program*

EYFL program highlights the appreciation of individual and cultural differences in learning styles, and the importance of respectful relationships and equity. Teachers are supposed to be responsive to children’s strengths and weaknesses, and provide a supportive environment of play for learning through discovery, creativity, improvisation and imagination. Learning environments should support the abilities and interests of the child; serve for different learning capacities and styles. The expected outcomes of EYLF are: having a strong sense of identity, being connected with and contribute to their world, having a strong sense of wellbeing, being confident and involved learners, and being effective communicators (EYLF Framework Report, 2009).

*Activities, environments and materials*

In framework report, children's learning is identified to be multifaceted, interrelated and dynamic processes in various domains: Physical, social, emotional, personal, spiritual, creative, cognitive and linguistic aspects of learning are mentioned. Play is suggested as a learning context, which enhances expression, curiosity, creativity and wellbeing; and as a tool for children to construct their own understandings. Learning through play is one element of EYLF Practices, and in Learning Through Play Booklet (2010), its cognitive and creativity, social and emotional, wellbeing, physical outcomes are highlighted (p.5-6).

Another emphasis is the importance of a safe and effective physical environment and accessible equipments that promote the use of multiple ways for exploration, creativity and keeping the children's attention alive (p.14). In Educators' Guide (2009), one section is reserved for “Framework in Action”, stories and models from educators (p.58-147). These stories include experiences of children’s' use of music instruments, sound explorations with mundane materials, experiencing various kinds of music styles, movement as a response to music and so on.

In governmental programs scrutinized, developmental theories become almost anonymous for the educational implications, and they are employed to build a general frame, which consists of expected outcomes of preschool education as well as suggested activities and materials. This kind of frame gives teachers flexibility to some extend in educational implications such as selecting and directing activities and materials. Hence, designers should consider them as very important stakeholders of the products. Flexibility in the programs, however, draws a blurry area of usage scenario. This kind of blurriness might bring unexpectedness in user-product or user-environment interaction. It is important to consider alternative scenarios and allow alternative uses accordingly.

Musical activities are more or less included in each program reviewed. Music, especially music production by singing or through various materials, is considered to be an expressive way of communication. Most of the music materials mentioned in the reviewed documents are drums and percussions. Children's exploration of sound is encouraged in order to develop a “language” as an expressive tool. Hence, a musical instrument would be expected to enable children to communicate through.

Preschool environment aims to provide both individual and social activities. Hence, individual and multiple user scenarios should be well explored by designers. Moreover, play is presented as an effective learning tool. Enabling children to engage in peer activities through the usage of the product is as important as promoting self-exploration. Preschool materials differ from individual materials for children to be used in home context. Accessibility and storage of the materials are also a part of the usage scenario within this environment.

National preschools in Turkey will be reviewed below to understand the current situation in Turkey in terms of the aims, suggested activities, play categories, and expected outcomes o the preschool program. The term “preschool” is used instead of “early childhood education” in order to stick to the terms and definitions in the program.

#### 2.1.4.4 National Preschool Program in Turkey

In Turkey, Preschool Education Directorate General of the Ministry of National Education is responsible from “the regulation of establishment, administration, education, function, and operation of public and private preschool education institutions affiliated with Ministry of National Education” (Republic of Turkey, Ministry of National Education, 2009, p. 3, own translation). The quality of preschool education is standardized by legislations and regulations constituted by Preschool Education Directorate General in Turkey.

In this section, a review of official materials such as program and guidebooks provided by Preschool Education Directorate General and Turkey Ministry of National Education will be presented. Especially the parts concerning fundamental principles, as aims and gains, play categories, and music-related issues are focus of attention. Data generated from these materials will be explored under following titles in accordance with the relevance of this study: fundamental principles and primary features of the program, curricular activities, play categories, suggested activities, and preschool music materials. These materials are all available only in Turkish, and the parts relevant with this study were translated by the author.

*Fundamental Principles and Primary Features of the National Preschool Program in Turkey*

Primarily, the program describes properties of preschool education, features related to implementation of the program, and roles of the actors who take place in child education such as teachers and parents. Developmental characteristics, and aims and gains are defined under three age categories: 36-48 months, 48-60 months, and 60-72 months.

Fundamental principles concerning preschool education was defined in program book (p.11). Basically, these principles are based on providing the proper conditions for children in order to acquire specific gains which are defined under the title Aims of Preschool Education (p.10). These aims include providing children to acquire physical, mental, and emotional development, as well as preparing them for primary education. According to these principles, preschool education should be child-oriented and support the development of the child in these areas: psychomotor, social-emotional, linguistic and cognitive development. Experimentations of child and play-based activities are encouraged as learning methods.

Two important points of the primary features of the program are that it is child oriented, and encourages teachers to take initiative. Articles given in Primary Features of the Program section (pp.12-18) indicates that the program is child-oriented, aims and gains of the child are the essentials, creativity of both the child and the teacher is in the forefront. Articles also imply that program is flexible and there are no scheduled monthly units or themes to follow, it allows teachers the freedom to build the means and environments to achieve aims and gains.

Although a considerable amount of flexibility is given to the teachers, basic qualities and requirements of a preschool environment is defined. The environment should enable the child to gain experience freely, practice everyday life experiences. Preschool teachers are advised to provide a rich environment with diverse materials and activities for the sake of the development of the child (p.16-17).

National preschool program in Turkey aims to diversify and enrich the child behavior in various developmental areas by providing a basis for dynamic interaction of these areas, and declare itself to be compatible with the highlights of Multiple Intelligences

(MI) Theory (p.12). This is the only part MI is mentioned; however, the suggested activities also compromise with arguments of Gardner's theory mentioned in the Section 2.1.2.

*Curricular Activities in the National Preschool Program in Turkey*

Educational activities for preschoolers defined in the program book are as follows: leisure time, Turkish language, play and movement, music, science and mathematics, literacy preparation studies, drama, field trips, and arts. Aim and scope of each activity is defined, and these activities constitute the preschool curriculum.

Music activities are defined as listening and differentiating sounds, singing, rhythm, creative movement and dancing, movement to music, creating musical stories, and auditory perception activities. Music is proposed as an assistant for other daily activities. Leisure time activities, for instance, consists of play and arts activities in interest corners such as music, puppet, and block. Hence, each classroom should have a stationary music corner.

The idea of "interest corners" is very much alike with Project Spectrum, an educational preschool classroom environment suggested by Gardner in accordance with the requirements of MI theory. In a Project Spectrum classroom, children are provided organized corners where they can experiment various activities as they play, and develop different kinds of intelligences in each activity (Gardner, 2006).

*Play Categories of Republic of Turkey Ministry of National Education*

In its Play Activities Book-1, which was prepared for vocational training of Child Development and Education, Ministry of National Education categorized types of play accordingly: play types according to their characters, play types according to play area, and play types according to the means used.

Play types according to their characters:

- *Functional play* [*tr.* Fonksiyon oyunları]: This category coincides with Piaget's practice play and Smilansky's functional play. It does not have a play character in real terms, but involuntary physical movements of infants.

- *Make-believe play* [*tr.* Hayal oyunları]: Also known as *pretend* or *symbolic* play, this type of play involves fantasies. During make-believe play, children talk to their toys as if they are alive. Since they have the control over how the play will continue, they feel strong.
- *Group play* [*tr.* Grup oyunları]: This type of games are played with peers, and mostly seen after 5-6 years old.

Play types according to play area:

- *Outdoor play* [*tr.* Açık hava oyunları]: Outdoor play eras include gardens, woods and streets. It is possible to play specific games, which are difficult to play indoors such as playing tag, ball games or hide-and-seek. Outdoor games include tagging games, mimicking games and circle games.
- *Indoor play* [*tr.* Salon-sınıf oyunları]: Indoor plays may be with or without rules and toys, alone or group play. This category is divided into three group: warm-up games, active games, and relaxing games.

Play types according to the means used:

- *Playing in/on objects* [*tr.* Araçta yapılan oyunlar]: This category defines the games played in or on playing equipments such as riding on a swing or teeterboard.
- *Playing with objects* [*tr.* Araçla yapılan oyunlar]: This category includes games played with equipments such as ball games or spinning a hulla hoop.
- *Playing without objects* [*tr.* Araçsız yapılan oyunlar]: This type consists of games, which are played without objects such as hide and seek or leapfrog (Republic of Turkey Ministry of National Education, 2007, pp. 19-27).

*Suggested Activities for Teachers*

Preschool Education Directorate General of the Ministry of National Education provided two guidebooks for preschool teachers. First book includes annual and daily plan samples for different age groups, while second book has various activity suggestions to preschool teachers. Each activity is planned for a specific age group, to develop a specific area, aims and gains derived from program book in different developmental areas, methods and techniques, materials, learning process, tips

about activity, evaluation of the activity, participation of the parents (if possible), and other suggested activities.

It is worth to mention that Gardner's Multiple Intelligences theory has a great deal of influence on the Turkish National Preschool Program as well as the activities. Each activity in Teachers' Guidebooks is proposed to function in various developmental areas. Although Gardner (2006) divides mind into 'frames', he perceives it as a unity, each frame is in cooperation with others while completing a task. In this respect, Turkish National Preschool Program is compatible with the main arguments of MI.

*Required Preschool Music Materials*

All of the necessary equipment in a preschool classroom is determined by Preschool Education Directorate General of the Ministry of National Education and presented in a document named "Preschool Equipment". Required music materials are defined as "musical instruments" and positioned under "Educational Materials and Toy Sets" (2010, p.4). According to this document, each classroom should have a set of music materials, which consists of following musical instruments: "two wooden tambourines, two drums, wooden xylophones in two different sizes, five wooden maracas, five hand bells, three sound blocks, four castanets, two steel triangles, and two sets of wooden rhythm sticks." (p. 4, own translation) Official curriculum offers rhythm instruments, which are drums and percussions as music materials to be present in a preschool classroom. This material selection seems as it matches with the aims and gains defined in the program book. During preschool period, children are supposed to be able to make rhythmic and coordinated movement by using tools (p. 26), and create rhythm by using various materials (p. 29)

Ministry of National Education requires CE marking for each toys and educational materials to be used in a preschool classroom. CE (Conformité Européene - European Conformity) is a European standard available for both professional and consumer market products such as cosmetics and toys. In toys section, CE defines what a toy is, safety regulations and standards, proper labeling and so on.

*Review of the National Preschool Program of Turkey*

Turkish National Preschool Program is the official guide to preschool education in Turkey. The Program defines the necessary requirements as well as suggestions in line with the aims. The importance of the program and the standards for this study can be presented in three categories: child-related considerations, teacher-related considerations, and material/environment-related considerations.

*Child-related considerations:* National preschool education program clearly defines the necessary gains and competences to be acquired by the children in accordance with their age-related developmental characteristics. The aims and gains of musical activities are also defined in the program. An educational material or toy should function to meet these needs, and be a part of the playful activities as play is suggested as the best learning method for children.

*Teacher-related considerations:* Program book not only makes the job definitions of the teachers, but also encourages them to take initiative in the application and enrichment of the program. This semi-structured nature of curricular activities gives teachers the freedom to organize the contexts and methods to be used in the activities, while highlighting them as important actors to be considered as facilitators and stakeholders in all kinds of activities and product uses.

*Material/Environment-related considerations:* Educational materials and environments are also described in the program. The environment along with the curriculum draws the borderline of the contexts in which materials will be used. For instance, each preschool classroom is supposed to have a music corner to reserve the music materials. Apart from that, required music materials for each classroom are also defined. These materials are predominantly drums and percussions, in accordance with the gains to be acquired by the child such as keeping a steady beat. The reason for that might be the easy usage technique of these materials both for children and teachers, who are not professional music performers or educators. These facts should also be taken into consideration.

Considering the importance of play, and toys as play facilitators for child development, next section is devoted to this issue. A review of the literature on child

play would be inspirational for designers, because it gives an idea about the usage contexts in which the designed musical toys will be used.

## 2.2 Play, Toys and Music in Early Childhood Period

Play is a characteristic behavior of preschool children. It is an opportunity for them to explore the material and social world. Also, it constitutes the context in which toys are used, and effects the child-toy interaction. Musical activities children engage in are also playful contexts in which they explore vocal and material sound qualities, and these activities promote social sharing. Musical experiences support child development in various aspects. It is beneficial for them concerning not only artistic, but also communication, problem solving, or physical skills.

In this section, functions and types of play and toys will be reviewed. After, benefits of musical activities, musical development and music education methods for preschoolers will be explored in order to present a comprehensive child-music relationship.

### 2.2.1 Child's Play and Toys

Relevant literature is dominated by theories of developmental psychology, mostly the works of Piaget, Vygotsky and their followers; exploring the functions and purposes of play in child development as well as types of play, and discusses curriculum applications. Recently, play has been a subject of interest among behavioral and evolutionary psychologists, exploring the biological foundations of play in human ecology.

Research concerning toys mostly depends on the literature on play and playing with objects, especially in developmental psychology. Significance of objects and child-toy interaction for child development is the main concern of this literature. Apart from developmental psychology and pedagogy, contemporary toys are also subject product design and Human Computer Interaction design, which will be presented in Section 2.3.

In this section, main emphasis will be given on the developmental aspects of play, play types and children's playing with objects. Functions of play and toys for children as well as play and toy categorizations will be reviewed.

#### 2.2.1.1 Importance of Play and Toys in Child Development

Sutton-Smith (2001) highlights the increasing rhetoric of play as "progress", and growing attention among scientists to child play and its relationship with child development. Frost et al. (2008) also mention the contributions of play to various developmental areas. Benefits of play on these developmental areas are given below:

- *Physical development:* Many types of play, especially outdoor plays, are associated with physical exercise. Both directed physical play (sports organized by adults) and free play (mostly on an equipped playground) are important for developing motor skills (pp. 127-129).
- *Cognitive development:* Especially pretend play increases imagination, creativity, thinking inventively, reasoning and academic learning (pp. 131-132).
- *Social development:* Some types of play help children to gain social competence as a result of continual interactions with peers, try new social skills, comprehend cultural roles and norms, and build self-confidence (p. 142).

Development of play is mostly associated with developmental stages of children. A very well known example on this relation is ideas of Piaget about changing nature and function of play through developmental stages mentioned in Section 2.1.2. According to Piaget (1962), there are three types of play and they emerge from infancy to adulthood in this order: *practice play, symbolic play, and games with rules*.

Inspired from evolutionary statement; "every organ develops through use", Piaget (1962) defines play as "mere functional or reproductive assimilation" (p. 87). In first stage, which is sensori-motor development covering first two years of life, infants mostly play practice games. This kind of games neither requires specific techniques

and thought processes or aim acquiring new behavior. In this respect, it shares similar with characteristics animal behavior. Being repetitive physical activities such as jumping or squeezing, practice games are merely for the pleasure of functioning, or exercising (pp. 110-111).

Beginning from age 2 to 7 years old, children pass through the second developmental stage. This period is called preoperational stage and characterized with symbolic play. Sensori-motor quality of play does not disappear at this period, but with the cognitive changes, subordinated by symbolic function. An absent object is represented mentally or with another object; for instance, a box for a car. Preoperational children begin to learn correlating a *signified* (the absent object) with a *signifier* (the representative object), which is the basis for symbolic thinking. Since this relation is subjective, it is satisfactory for the child (Piaget, 1962, pp. 111-112).

Last type of play during the developmental course is games with rules. They mostly emerge during concrete operational stage (7-11 years old), and go on throughout adulthood. Games with rules, such as playing marbles, include sensori-motor and symbolic functions too. In addition to that, this kind of games implies regulations as well as social relationships. There are also creative or construction games such as building a miniature vessel, which belong to no stage. These games are partially play and partially imitation (Piaget, 1962, pp. 112-113).

Furthermore, toys are the objects which affect the quality of children's play. Toys have an *indirect* effect on child development. Toys have an influence on the type and content of the play children deal with, and child development is closely related with play activities. On the other hand, the developmental level of children affects the use of particular materials in play (Johnson et al., 1999). Pellegrini and Jones (1994) also mention this unidirectional relationship of toys and children, and use the term *transaction*. According to this, children's features such as character, gender and age influences their interactions with specific toys; and meaning of toys changes as players ascribe in various contexts.

Gump (1989) states that toys could be interpreted a part of a "coercive environment". Being a part of a larger context, toys encourage specific behaviors (as cited in Pellegrini and Jones, 1994, p. 28). According to Pellegrini and Jones (1994),

this ecological psychology tradition, however, minimizes the role of human to follow what the environment presents them. As an alternative view, they suggest that children may redefine the meaning of toys through their interactions with each other and with toys. Children's definitions of toys lead their interactions with toys. Hence, the interactions themselves are highlighted, instead of the physical entities of toys (p. 29).

Pellegrini (2009) mentions the functional importance of interactions with objects, and names four categories: exploration of objects, play with objects, construction, and using objects as tools. These functions of objects might change according to the age characteristics of the user as well as outcomes. To speak of each function briefly:

- *Exploration of objects:* Exploration takes place when the child first coincides with the object. They investigate physical attributes as well as possible uses of them through direct contact and observing others use it. This exploration will soon define the utilization of the object in play.
- *Play with objects:* This category mostly refers to pretend play, as in symbolic use of an object for another one. Children usually observe and imitate adults in these simulations.
- *Construction:* Children use objects to create something. Different from other categories, Pellegrini believes that construction games do not show age-related changes in preschool and it is not play in real terms, since it is product-oriented rather than process-oriented.
- *Using objects as tools:* Tool use is highly influenced by social contexts, and age-related differences are quite evident. As children grow, the relationship between the behavior and the goal becomes clearer for him (pp. 118-120).

#### 2.2.1.2 Types of Play and Toys

There are various types of play and toys concerning the developmental level of children as well as activities they promote. In this section, categorizations of play and toys from different theoreticians will be presented.

**Types of Play**

Play categorizations of Parten, Piaget and Smilansky are prominent in child development literature. Parten concentrates on social aspects of preschool play. Her study is predicated on by Republic of Turkey Ministry of National Education (2007). Parten defines four types of social play: solitary play, parallel play, associative play, and cooperative play.

- *Solitary Play:* Seen in children between 0 and 2 years old, children play alone in speaking distance with other children. Materials are used in solitary play such as building a tower or throwing a ball.
- *Parallel Play:* Mostly seen in children 2 to 4 years old. Children play in proximity with similar toys independently. Their games might take the same name and they might sometimes use each other's toys, but they do not interfere with each other's games.
- *Associative Play:* Children with similar developmental levels play together. Children use the same materials and talk to each other. However, they play their own games and there are not any agreements on or rules of play.
- *Cooperative Play:* Children both share the same materials and play together. They need each other for carrying out play. They share roles and toys in an organized way, such as playing "hospital", sharing the roles of doctor, nurse and patient, and share the toys accordingly (Rubin and Watson, 1978; Fox, 1996; Republic of Turkey Ministry of National Education, 2007).

Piaget and Smilansky, on the other hand, concentrate on the cognitive aspects of play, and developed their categorizations accordingly. Piaget (1962) defines three types of play regarding the cognitive-developmental level of children. These are:

- *Practice play (0-2 years):* Practice play is characterized with the sensory-motor pleasure, in other words, pleasure of senses. It involves movement of limbs, touching, tasting, smelling, and listening.
- *Symbolic play (2-7 years):* In symbolic play, reality is distorted and an absent object is represented mostly with another object. For instance, a box is used as a car or a broom as a horse.

- *Games with rules (7-11 years):* These games are “institutional” and pass through generation to generation. They imply regulations and social relationships (Singer and Revenson, 1996).

Smilansky (1968) built her cognitive play schemes mostly on Piaget’s work. She defined four types of play: functional play, constructive play, dramatic play, and games with rules (as cited in Rubin and Watson, 1978).

- *Functional play:* This type of play is repetitive motor activities of infants and toddlers. Functional play may be with or without objects. In functional games with objects, children aim to explore these materials and possible uses of them.
- *Constructive play:* Constructive play is more purposeful than functional games. It involves creating something with objects, such as building a tower with blocks.
- *Dramatic play:* In dramatic play, an object is used as a representative for an absent object. An example for dramatic play is placing blocks on the plates around table and pretending it is food.
- *Games with rules*: This type of play is based on rules agreed by a group and is a characteristic for older children (Essa, 2010, p. 47).

**Types of Toys**

Similar with the plays, categorizations of toys are also mostly influenced by children’s developmental state. When the quality of the interaction between children and the toys is emphasized, the developmental level of children becomes a prominent factor. It is possible to categorize toys from a product-oriented perspective by highlighting their physical qualities as well, such as plush toys or dolls. However, since the user group is well defined, it is possible to approach from a developmental perspective.

In the brochure of Safety of Toys Project supported by European Commission Directorate-General for Education and Culture (2008), toys are categorized according to age groups and developmental areas. For children between 4 and 8

years old, which cover preschool period, brochure distributes toy types into developmental areas:

- For *motor development,* suggested toys cover open-ended materials such as blocks and cubes for constructive purposes; arts materials such as finger paint and clay; and ice skates and skipping rope for gross motor activities.
- For *cognitive development;* musical instruments, picture cards as well as group games are suggested.
- As for *social development,* commission suggests materials to encourage pretend play such as toy grocery shop equipment, and small plants to share responsibility.

Another categorization is made by Szymanski and Neuborne (2004) by grouping toys into two categories according to their usage places:

- Indoor toys category consists of stuffed toys, construction toys, dolls, cartoon toys, action figures, puzzles, board games, and activity toys.
- As for outdoor toys, there are riding toys, outside toys, and activity toys.

Johnson et al. (1999) also grouped play materials for children into six categories. These are: replica toys, educational toys, construction toys, gross-motor toys, games, and real materials. They also remind that this categorization is made according to the "intended uses" of these toys, and that children may anytime transform their use and meaning in play. Features and examples of these categories are given below:

- *Replica toys:* Miniature samples of real life objects (cars, houses, animals and so on) as well as miniature fantasy object (superheroes, spaceships and so on) are regarded as replica toys.
- *Educational toys:* Educational toys are more structured and outcome-oriented materials specifically designed for teaching specific skills and concepts such as reading, mathematics and science. This category includes toys such as puzzles, stacking toys, and stringing toys.
- *Construction toys:* These are open-ended toys and differently from educational toys, they have various uses. Set of blocks with different shapes, sizes and colors to construct various structures; and building sets, with

flexible and multipronged pieces that can be put together in many ways, are examples of construction toys.

- *Gross-motor toys:* This type of toys aims to develop large muscles of children. Examples of recommends toys are tricycle, rocking horse, lightweight bat, ropes, scooters and jump ropes.
- *Games:* As children gain longer attention spans, sit-down games with rules may be suitable. For preschoolers, games should have simple rules and not require complex strategies.
- *Real materials:* These are versatile and self-motivating materials such as sand, water and mud; art materials; literacy materials; wood and woodworking tools (Johnson et al., 1999, pp. 286-295).

Having a comprehensive understanding about the functions of play and toys for child development is crucial for designers not only to generate user-friendly and effective product ideas, but also to enable them to gain insights about other design considerations, such as material use or mechanical properties of the products.

#### 2.2.1.3 Musical Play

Being a considerably new subject, the term musical play mostly refers to the playful qualities of young children's musical activities rather than being another play category. Musical play may include a wide range of activities from infants' unstructured vocal sound explorations to structured, equipped and rule-governed plays of older children. It is important, however, to distinguish adult-directed and performance oriented musical activities from free-choice and process-oriented explorations of children themselves (Berger and Cooper, 2003; Niland, 2009).

Berger and Cooper (2003) mention the characteristics of play defined by various theorists. Although there is not a concurring definition of play, many of them agree on several characteristics such as involving free choice and self-motivation, enjoyment and focusing on the process rather than the product. According to this definition, although many preschool programs include music in their curriculum, not all of them can be labeled as musical play. Niland (2009) draws attention to this dilemma in arts education. Music education is mostly perceived as skills education.

However, timing is important and young children should be allowed to explore and understand the potential of music mediums at first.

Piaget defends that development of child play is closely related to the level of their cognitive development (Piaget, 1962; Singer and Revenson, 1996). According to Warrener (1985), it is possible to apply Piaget's learning theory based on cognitive development to musical development theory. Children's musical potential and interests are determined in accordance with their cognitive level. For instance, in sensori-motor period children tend to make repetitive rhythmic sucking motions; vocal sound explorations by trying to control their lips, tongue and mouth muscles; and move rhythmically. Both physical and cognitive maturation plays an important role in children's musical explorations. Three dominant characteristics of preoperational stage, which covers preschool period, are centration, egocentrism and symbolic thinking. These factors effect the children's both musical ability and play. The notion of centration leads to the selective attention of children to the dominant aspect of music. This results in limited experience in musical play. Since preschool children possess an egocentric world view, they tend to concentrate on familiar subjects, events and objects during musical play. Again in this stage, children's symbolic development helps them use objects in musical play and mix make-believe play in it (p. 23-24).

Inspired from Piaget's and Smilansky's play categorizations, Danette Littleton (1998) defines six types of musical play:

- *Functional musical play* includes vocal, instrumental and environmental sound explorations, and experiments on the potential of various materials.
- *Constructive musical play* is a more structured version of functional musical play through trying out different structural variants of rhythm, melody, tempo, and so on.
- *Co-operative musical play* involves children's social and interactive musical activities.
- In *kinesthetic musical play*, children accompany to a sound stimuli with physical responses such as bodily movement or dancing.

- Through *dramatic musical play*, children have the opportunity to integrate pretend play into music making by involving musical instruments or non-musical materials.
- Lastly, through *musical games with rules,* children may be involved in structured group experiences (Tarnowski, 1999; Niland, 2009).

Kenney (1989) mentions music centers for preschoolers, in which young children can explore music independently. Preparing alternative musical environments for exploring and developing listening, singing and instrument playing skills is crucial for initiating musical play. Children should have free choice for exploring independently, without direct instruction of adults. Instead, mixed aged groups can learn from peers. Kenney (1989) states that for early childhood education institutions who may not have enough budgets for supplying the music environments with enough instruments, it is possible to prepare some handmade materials out of domestic items such as filling containers with salt, beans and rice, or simply hitting tablespoons each other.

Figure 2.6 Outdoor Musical Play at Preschool (Retrieved August 19, 2011, from http://progressiveearlychildhoodeducation.blogspot.com/2011/05/outdoor-music-play-at-preschool.html

Figure 2.6 displays an outdoor musical activity. On the left, preschooler enjoys outdoor musical play with various, unconventional sound materials such as bucket and frying pan as drums, and a tree branch as a drum stick. The figure on the right shows timbrels hang on ropes are intended to promote unconventional uses of musical instruments in outdoor musical play.

Smithrim (1997), who observed 3 and 4 year olds during free musical play, proves that free musical play such as sound explorations, undisturbed musical activities, unconventional use of instruments, spontaneous games, and peer learning are very beneficial for musical development (as cited in Berger, 2003). It is also declared by Niland (2009) that children's physical (moving, dancing, dramatizing, playing instrument), vocal (singing, chanting), social (observing, imitating, leading), cognitive (interpreting, responding to musical aspects), and creative (inventing lyrics, movements, sound patterns) engagement in music can help children gain basic musical skills.

### 2.2.2. Preschool Child and Music

In this section, the relationship of preschool children with music is explored in terms of the benefits of musical activities, musical development of children in accordance with their cognitive development, as well as music education methods which are applicable in preschool level.

#### 2.2.2.1. Importance of Music for Children

This section intends to provide the basis for exploring the importance of music for children in cognitive level by drawing attention to the recent studies in cognitive neuroscience.

**Cognitive Neuroscience of Music**

Cognitive neuroscience is a new but rapidly developing field and due to its interdisciplinary nature, it has a wide range of research areas. The focus of this section will be the research on music cognition. The review of these studies aims to provide the necessary understanding for the next section concerning the relationship

of music with other competences. In order to be able to constitute a framework, perspectives on processing music in brain based on empirical studies will be given after brief information about cognitive neuroscience field.

The term “cognitive neuroscience” was suggested by psychologist George Miller and neurobiologist Michael Gazzaniga to define a considerably new field which began to develop rapidly since 1980s (Brook and Mandik, 2004). It is an interdisciplinary field which studies the physical brain functions that lie behind specific mental activities, in other words, brain-behavior relationships (Kosslyn and Shin, 1992; Sarter et al., 1996). Cognitive neuroscience is in the middle of three fields: *experimental psychology*, a field that study behavior to infer brain-mind operations; *neuroscience*, which is concerned with the neural structures and organizations in the brain to produce behavior; and *computer science*, which developed brain imaging techniques to enlighten the biological foundations that lie behind mental activities (Kosslyn and Shin, 1992).

The perceptional qualities of the external sound is decoded and synthesized in brain in a very complex process. Compositional elements of music such as melody or rhythm are processed separately in different parts of the brain and then synthesized into a meaningful composition (Jourdain, 2002; Sacks, 2007). According to neurological studies on amusia (disorder of processing music) and savant individuals (having brilliance in a specific area) by Sacks (2007) show that there are particular brain parts responsible from the cognition of music, and not in a single and precise location. However, studies present that children, who are subjected to one-year-long violin education, show a remarkable enlargement in the left hemisphere of the brain.

Some scientists, such as Peretz and Zatorre (2005), perceive music as a facilitator for cognitive neuroscience studies. The most important reason for this is that with the recent empirical studies, it became evident that music processing in the brain is a very complex activity and requires almost all functions to operate. Hence, studying brain on music may be a rich source of information to understand the organization of brain (Peretz and Zatorre, 2005; Zatorre, 2005). Similar with language, processing musical information in the brain facilitates various locales, and this makes music a

very complex to understand phenomena, but an easy instrument to stimulate almost all parts of the brain. As Zatorre (2005) states:

> Indeed, from a psychologist's point of view, listening to and producing music involves a tantalizing mix of practically every human cognitive function. Even a seemingly simple activity, such as humming a familiar tune, necessitates complex auditory pattern-processing mechanisms, attention, memory storage and retrieval, motor programming, sensory–motor integration, and so forth (p. 312).

This multi-level processing of music stems from its sophisticated structure. What differentiate an ordinary auditory stimulus from a musical piece are its structural components such as tone, melody, rhythm and so on. Not only these various components of music is processed in different areas of brain, but also different musical activities such as listening, performance or composition are associated with different brain locales (Jourdain, 2002).

It is also evident that some music processing areas in the brain overlap with other locales which are responsible from some other activities. For instance, there is an important relationship between music cognition and locomotor movement. Sacks (2007) states that sensory and motor cortexes are precisely integrated, which is a unique feature for human. Rhythm and melody cooperates with motor cortex, and sound impulse increases the activity in basal ganglia and cerebral cortex, which are responsible from motor activities. These cortexes are activated not only by listening to, but also by imagining music (p. 240-241). He also conveys several patient stories of him, which assert positive effects of music on memory. Furthermore, Storr (1992) uses the term *neurogami,* emphasizing the inseparable unity of music and religious rituals, ceremonies, not only for primitive tribes where individual is never seen separable from the community as a whole, but also funerals, political protests, concerts and other collective activities of modern society. This is the "marriage" of nervous systems of a group of people, having the same feelings and psychological experiences at the same time. Zatorre (2005) also points out possible correlations between music and language, emotions and development; but he is cautious enough to state that more empirical evidence is needed and there is a long way before we can confidently address this kind of relations.

**Benefits of Music for Children and its Relationship with Other Competences**

Despite the cautious approaches, there is a considerable amount of studies to draw effects of music on children, on patients with certain neurological defects, and even on animals. These studies attempt to enlighten the positive effects of music for children on other skills such as mathematics, spatial-temporal reasoning, literacy, creativity and so on. The possible impetus of such studies may be the recent advances in cognitive neuroscience mentioned in the previous section. These studies not only provide empirical evidence, but also evoke educational implications for both children and adults. In this section, a review of the studies seeking for possible effects of music on various competences of children will be presented.

Before the cognitive neuroscience revolution of the 1980s, Simons (1978) draws attention to the possible educational uses of music in early childhood. He states that music should be an integral part of preschool curriculum, since it provides various positive effects on children. First of all, children do enjoy music; and, it has the potential to make children feel pleased and successful, especially for those who have difficulties in other school activities. Another positive effect of music is its potential of being a medium for expressing emotions and ideas creatively. Sound explorations, playing instruments and composing simple pieces encourage children to use music as a powerful instrument for personal expression. In addition to that, Simons (1978) states that using music in preschool classroom results in enhancement of general learning. These extra-musical benefits include learning cooperation, belonging, self-discipline, self-realization, and enrichment of learning experiences. Performing music as a group requires cooperation as well as self-discipline and control. Apart from that, when integrated in school activities, music can enhance learning such as learning numerical concepts, alphabet or physical properties of sound.

Probably the scientific exploration of the effects of music has been accelerated when Gordon Shaw, Frances Rauscher and Katherine Ky published a paper in 1995, asserting that listening to Mozart enhances spatial-temporal reasoning of undergraduate students, which is the ability to visualize and manipulate spatial patterns in mind. This study shows that students, who are exposed to Mozart Piano Sonata for a period of time, show a significant increase in the success of spatial-

temporal performance in the relevant questions in Stanford Binet's Intelligence Scale (also known as IQ Test). This result, called "Mozart effect", created great public reaction. Listening to Mozart pieces is told to increase intelligence, especially for babies and children.

Demorest and Morrison (2000), however, are skeptical about this effect. They draw attention to the fact that in order to be able to make such generalizations, the study should be replicated and diversified. To begin with, this research was conducted with only one piece of one composer. They also question the assessment scale: Stanford Binet's Intelligence Scale, which is developed to measure only specific competences such as literacy, logico-mathematical intelligence and spatial-temporal reasoning. They state that musical experiences do make children smarter at music and it should be appreciated in its own right. Although Shaw et al. (1995) do not impose the idea that music makes children smarter in general, public reaction and suggestions for educational implications are to some extend misleading.

Despite such cautious approaches, there appears to be an increasing accumulation of research findings on the effects of music for children. A recent study by Mertoğlu (2010), for instance, is exploring the relationship between rhythm and mathematic skills of preschoolers. First, children's rhythmic abilities are tested with a standard form including eight different rhythmic patterns appropriate for the age of the child. The other measurement instrument is Intuitional Mathematics Ability Test (IMAT), developed to measure mathematics skills of children 4 to 6 years old. The test includes pictures and symbols to test the skills concerning mathematical concepts such as quantity, size, length, weight and numerical size. The results show that there is a meaningful relationship between general rhythm and mathematics skills (p. 32).

Based on neuroscientific findings, a report was published by John Hopkins University School of Education in 2009 to assert the relationship between learning, arts and the brain. This report presents an attempt to reveal the educational implications of recent findings in the field of cognitive neuroscience, and the term "neuroeducation" manifests this aim. The premise is that education of various forms of arts such as music, dance, drama and painting results in improvement of students' learning academic skills. The idea is that neurological changes and brain

plasticity gained through arts education may have educational outputs (Rich and Goldberg, 2009). Inspired from the idea of neuroeducation, Platz (2010) also asserts that through education in music and other areas of arts, children could gain “twenty-first century skills” which are essential for later success such as critical thinking, creativity, imagination, innovation, collaboration, and more.

One of the well-explored subjects is the relationship of rhythm with movement in preschool context. Discussions about rhythm and movement integrity date back older than other fields. One possible reason is that it can easily be observed. Infants as young as 2 years old show significant interest in rhythmic patterns of music, and begin to respond them with movement. Swanwick (1988) interprets this as the first expressive response to music, physical imitation of the sound (p. 59). Moreover, Jourdain (2002) states that rhythm gives meter, which means order to time, and phrasing, giving a kind of narrative to music. These features of rhythm make it prerequisite for music. According to Miyamoto (2007), sensitivity to rhythm and rhythmic movement are among musical characteristics of preschoolers. Metz (1989) mentions an emerging conceptual field, “the function of movement as a vital link between hearing music and perceiving music.” According to this conception, movement is considered as a tool for giving music the meaning (p.49). Retra (2006) describes the movement of young children as an important form of kinesthetic representation of musical information, which is a symbolic action. As a result of her empirical studies, she defines two kinds of movement types: rhythmic movement and gestural movement, and rhythmic movement can be exteriorized through different bodily actions such as marching, jumping, clapping, waving hands related to tempo/beat (p. 1254).

Gardner (2006) similarly builds his approach on recent findings in cognitive neuroscience. However, his perspective is different. He perceives mind as a unity and states that different competences such as musical intelligence, visual-spatial intelligence or bodily-kinesthetic intelligence are effective when combination of them is integrated in specific domains. A dancer, for instance, should employ his/her musical and bodily-kinesthetic competences in order to receive and reflect musical stimuli, visual-spatial competence is required to be able to use the space properly, and interpersonal competence is also important to receive, interpret and reflect the

stimuli coming from the audiences. According to his approach, these competences are very interrelated and each of them should be appreciated in its own right.

As Sarter et al. (1996) pointed out; the advance in brain imaging technologies resulted in localization perspectives, which is an increasing curiosity about neurophysiologic correspondences of certain mental activities. This interest transferred to education field as finding out possible relations between various mental activities. It also gives a hint about the expected benefits of musical activities. Designers should be aware of that in preschool context, the concern of musical activities is not only nourishing musical skills, but also other gains such as facilitating movement, enabling self-expression, or enhancing cognitive development. Hence, musical toys should provide rich experiences to reinforce the gains gathered from musical activities.

#### 2.2.2.2. Musical Development of Children

Accelerating from 1980s, there have been considerable amount of research on musical development of children. Neurological advances might have been an impetus for the interest in the field. Serious attempts have been made on theorizing the progress of musical thinking through empirical data or borrowing concepts from other theories such as the theories of cognitive development. Above all, three main approaches concerning theorizing musical development become prominent. The first one is best exemplified by the research of Serafine's *core cognitive processes* (1984), who builds her theory on cognitive processes to explain musical development with reference to her empirical study with 168 subjects from 5 years old to adults. The second is inspired from Piagetian account of intellectual development, particularly evident in the work of Swanwick and Tillman, who collected composition samples from children 3 to 11 years old (Swanwick 1988; Swanwick 2001). The last significant approach is of symbol system theories of Gardner (1973; 1990).

##### Serafine's "Core Cognitive Processes"

In her work, *The Development of Cognition in Music*, Serafine (1984) basically constructs her theory on the changing conception of cognition in the disciplines of

psychology and music. A recent trend of approaching cognition as an active and constructive process rather than a passive "receiving" act guides her to a "constructive definition of music cognition". She claims that decomposing music into its isolated elements is one error that music psychologists fall into, and suggests that "the focus of research should be on the *thought processes* by which musical compositions are constructed, formally and aurally, and not on the narrow issue of how sounds are received" (p. 220). Serafine (1980) criticizes the dominant "transmission/perception" approach to music since it sees the listener as a passive receiver, and puts musical stimuli on the focus as they introduce themselves to the "mind's ear". She believes that this dominant approach prevent alternative views such as putting musical thinking into focus of study instead of perception.

There have been studies which support Serafine or not. In their work "Developmental Theories of Music Learning", for instance, Hargreaves and Zimmerman (1992) state that those cognitive processes, which Serafine claims to exist, operate in empirical tasks such as composing, performing and listening. As another but rather recent criticism, Swanwick (2001) states that Serafine tested her theory with children only in the audience/listener mode, and believes that her empirical study needs to be replicated and extended for reliability.

**Musical Development Stages of Swanwick and Tillman**

Swanwick and Tillman (1986) introduce their theory based on a four-year-project carried out collecting 'composition' samples from children aged 3 to 11 and analyzing them according to children's tendencies and interests in musical elements/qualities dependent on age. They came up with the following categorization:

- *Sensory period (0-3 years old):* Children at this period seems to enjoy the sound itself, continuous strumming, experimental and unpredictable sound exploration, extreme sounds (too high and bass notes) are common. He also enjoys the control over the material and repeats the same note/pitch without showing any intention to organize them in a meaningful order.
- *Mastery period (4-5 years old):* Children tend to show interest in sound material and concentrate on mastering in using them in the right technique. They try to handle the instrument and enjoy it.

- *Personal expressiveness (4-6 years old):* With the newly acquired mastery on sound material, this period is characterized by manipulating the sound, especially in terms of speed and loudness, creating basic sound patterns and repeating them. Their compositions at this age group are fairly expressive. These ages are already considered being the period for the emergence of imaginative play by Piaget, which also requires a basic conceptual understanding and mastering with symbols.
- *Vernacular period (7-8 years old*): Starting from age 5, children begin to concentrate on the accepted conventional patterns, emulating the 'adult world' at these ages. Most of their works tend to be imitative.
- *Speculative period (9-11 years old):* Now fully mastered with the sound material and accomplished the conventions, children have the tendency to 'speculate' these conventions and search for new possibilities, distinctive pattern combinations, although they are usually far from being a fully integrated style (Swanwick, 1988).

Swanwick (1988) integrates imaginative play with musical performance from developmental approach, borrowing the terms *assimilation* and *accommodation* from Piaget. He organizes a three-step approach, not only for the musical development stages of a single child, but also for every adult in starting a new instrument. First stage is *mastery*, which is mastering with the sound material, handling it, exploring the capabilities and limitations. The very first musical products with this new sound material tends to be imitative; in other words, *accommodation*, trying to transfer the previous observations. Next step would be *assimilation*, as in imaginative play, borrowing symbols (in this case sound patterns) and reordering them in a creative manner. It is worth to mention that all these steps are cumulative and each one requires the precedent. For mastery, the child needs appropriate materials and environment, to handle the material smoothly in order to imitate basic sound patterns, and to master these patterns in order to recreate new ones and reorder them.

**Gardner's Symbol Systems Approach**

Koopman (1995), in his study of exploring stage theories in musical development, compares three approaches: one is the work of Swanwick and Tillman (1986) being the first comprehensive stage theory of musical development, and the two others are Gardner's stage theories (1973) covering an extended domain of arts. As Koopman conveys, Gardner defines two stages of aesthetic development: (i) presymbolic stage, and (ii) symbolic stage. According to these stages, the first years of life is time for exploration of music. By the age of 6, child handles musical symbols and develops a more accurate relationship with music in terms of performing and perceiving. Koopman criticizes Gardner's theory by pointing out that it deals only with musical structure and child's handling conventional symbols, and lacks the symbolic function of music for the child. As reformulated according to this content, artistic development consists of two stages: (i) exploration, and (ii) internalization of the musical system. Gardner (1973) believes that aesthetic development occurs qualitatively only by the age of 7. Later, changes will be quantitative. According to this formulation, the importance of experiencing all forms of arts as much as possible in the early childhood becomes evident.

In 1990, Gardner et al. updated this theory by expanding the domain from arts to all symbolic domains, including mathematics and scientific symbol systems, and dealt with creativity as the dimension. According to this update, they defined three developmental stages as follows:

- *Preconventional stage;* in which child's creativity is independent from the conventions of the culture, he/she explores the symbolic and deals with problems in his own way.
- *Conventional stage;* in which the child is dependent upon dominant conventions and dictates of the culture.
- *Postconventional stage;* which describes critical attitude towards cultural conventions and independence from them.

Musical performance, especially forming/creating music requires a better understanding of patterns as symbols, choosing and planning, organizing them into a meaningful whole. Gardner (2004) approaches children as full-time theoreticians,

producing intuitive theories in order to understand the world, immediately change these theories whenever it does not work anymore. This is similar with Piagetian approach of *assimilation* and *accommodation*, associated with infancy and early childhood, but in fact a whole life process.

Gardner (2004) defines stages about how children develop theories, which is also applicable for musical development. Language development, for instance, starts with the comprehension of words referring to real life entities; that they are symbols. Once they understand what a symbol is, children begin to employ them in a sequence, form simple patterns, usually imitating what they are exposed to. Then they can use them to state a point of view, to communicate with meaningful structures. It is not soon after they can understand that other people may have different thoughts and may not know a fact that they know. The next step is to understand irony and sarcasm -manipulating the tool-, which is language in this case. This sequence seems to match up with Swanwick and Tillman's (1986) developmental stages; differentiating meaningless sounds from intentional patterns, mastering in producing them with materials or voice, producing imitative sounds with the newly mastered product, employing these sound patterns for expressive purposes, intention to share them with other people –so try to learn the conventions and traditions-, and finally, to recreate meaningful structures by manipulating these patterns, assimilating them.

In brief, Serafine (1984) along with Swanwick and Tillman (1986) directly concentrate on music and development in this specific domain, while Gardner (1973; 1990) deals with the subject from a broader perspective. Similarly, Serafine does not deal with age-related changes, while Gardner, Swanwick and Tillman propose predefined stages of development. According to their conceptions, it is possible to draw an outline of musical characteristics of preschool children as mentioned above. Their common point is that they all have a cognitive-centered approach, connecting musical development o the child with their cognitive development.

#### 2.2.2.3 Music Education Methods for Preschool Children

There are various approaches to music training including the methods of Carl Orff, Zoltán Kodály, Émile Jaques-Dalcroze and Shinichi Suzuki. Being musicians and music educators, they developed educational methods for vocal, instrumental or bodily training (Turpin, 1986). Preschool music activities mostly include rhythm and movement, and since Dalcroze and Orff provide a holistic approach of obtaining musical understanding and integrate rhythm and movement in the program, they are applied in preschool contexts. Musical activities conducted in preschool context are the concern of this study; hence, methods of Dalcroze and Orff will be briefly reviewed.

**Dalcroze Eurhythmics**

Eurhythmics is developed by Swiss conductor, music educator and composer Émile Jaques-Dalcroze (1865-1950). He believes that traditional music education in conservatories failed to imprint musical expressivity in students, but concentrate on teaching a technical mastery of a classical repertoire. His method is based on the idea that musical expressiveness lies behind the bodily processes, rhythm and physical motion (Seitz, 2005). As Dalcroze (1930) states: (1) Rhythm is movement, (2) movement is essentially physical, (3) all movement requires space and time, (4) physical experience forms musical consciousness, (5) improvement of physical means results in clearness of perception, (6) improvement of movements in time ensures the consciousness of musical rhythm, just as improvement of movements in space ensures consciousness of plastic rhythm (as cited in Seitz, 2005, p. 422).

Dalcroze defends that a sound can be translated into motion, which can also be translated back into sound. Eurhythmics method consists of three main activities. Kinesthesia (rhythmics), a set of activities such as tossing balls to the floor or swinging arms high and low in accordance with musical input, aims to create the bodily basis of musical understanding. Solfége Rhythmique is ear training, adding singing to the first set of bodily activities. And last step is improvization both with instruments and solfége. According to Dalcroze, imagining sound physically will eventually result in imagining without the body. Physical learning is expected to be translated into cognitive learning (Abramson, 1980; Seitz, 2005).

Figure 2.7 Learning Music Through Play (Retrieved August 20, 2011, from http://www.clevelandorchestrablog.com/.../jumping-to-beat-dalcroze-style.html)

The figure above shows a Dalcroze musical activity in Robert H. Jamison School, Cleveland, Ohio, USA. Children are playfully learning the musical term “forte” by bouncing from hoop to hoop.

There are not musical instruments or toys designed specifically for this method. However, it would be an interesting field of study for designers concerning the design of products to be embedded into Eurhythmics activities.

**Orff Schulwerk**

Orff Schulwerk is a music education method designed by composer and music educator Carl Orff (1895-1982). The basis of his method is the integrity of music, movement and speech. They all have rhythym: many movements; for instance, such as walking, jumping and running can be presented in a rhytmic way (Zachopoulou et al., 2003).

Schulwerk, inspired from Dalcroze Eurhythmics, is based on the idea of learning music through creative play. Street games and chants are an important inspirational

source for Orff activities. Speech-rhythms, chants, songs and movement are resources for learning musical concepts. Through this method, Schulwerk aims to motivate children by presenting them a natural and familiar learning environment. Being the natural behavior of children; singing, dancing and playing are inevitable parts of Schulwerk activities (Banks, 1982; Shamrock, 1986; Shehan, 1986). Schulwerk suggests the following path of musical development:

- *Exploration:* First step is to enable explore and discover the possible movement and sound variants.
- *Imitation:* Covers development of rhythmic speech, body percussion, rhythmic and free movement through space as well as playing pitched and non-pitched percussions.
- *Improvisation:* Each individual creates original patterns and combinations to reinforce their skills. Group activities in which each child contribute to is also a part of improvisation.
- *Creation:* In this last section, children combine their previous knowledge to compose short pieces through instruments, singing, speech or movement (Shamrock, 1986, p. 54).

Figure 2.8 Glockenspiel for Children (Retrieved August 20, 2011, from http://www.woodbrass.com/images/woodbrass/CARILLON+GEWA.JPG)

Differently from Dalcroze Eurhytmics, Orff Schulwerk requires special instruments, known as “Orff instruments”, which are used during Schulwerk activities. Both pitched and nonpitched, various kinds of drums and percussions are used in these activities. Most popular instrument line, which is associated with Orff method, is the pitched instrument series including xylophone (wooden); metallophone, metal version of xylophone; and glockenspiel, a version of a metallophone but its keys are arranged in the order of a piano keyboard (Shamrock, 1986, p. 54).

Neurological findings show that musical experiences, such as processing, producing and performing music, facilitate various kinds of brain functions. Musical activities, which are integral parts of preschool programs, have several benefits for children not only on musical, but also cognitive, social and motor development. Experiences with material environment are very effective in this construction process. Hence, materials used in musical experiences should present versatile interactions in order to enrich the user-product interaction, through which the child can build different kinds of meaningful connections.

Musical development theories provide knowledge about the tendencies, capabilities and constraints of children in musical experiences. It is important for designers to enable children to interact with the materials that are appropriate for an effective experience. A product that suits to the tendencies and capabilities of children would prolong the interaction time with joy and self-confidence. However, if the product does not give opportunities for the exploration of undiscovered interactions, it will be boring and not efficient after a while.

The importance of Dalcroze Eurhytmics and Orff Schulwerk for this study is that they have implications in preschool level. Also, they differ from other music education methods in terms of suggesting playful activities instead of conventional educational techniques, which promote novice learning. On the other hand, there is this confliction that although the method suggests playful activities, Orff instruments are far from being playthings. Instead, they are professional instruments also used by adults. It is possible to enrich the activities through evolving and adaptable products.

## 2.3. Designing for Children

Designing for children is a serious responsibility with various aspects to be considered. Apart from common requirements such as product safety, which is essential for any kind of products to be designed for any user group, the specific needs of children should be taken into consideration. Children's material environment plays an important role on the relationships they build with their physical and social environment, as well as skills and knowledge they develop. Hence, materials they get in touch with should be designed meticulously.

Design research mainly adopts knowledge from other fields such as developmental psychology and ergonomics in order for design practitioners to benefit from. Recent studies go one step further to include children into design process. As for toy design, there is an effort to internalize the knowledge adopted from other fields by developing guidelines and tools for designers to be used in designing toys for children. In addition to that, design researchers make an effort for implementing these tools from a research through design approach. Recently, design of musical toys has been another research interest. Rather than traditional toys, these studies usually search for the inclusion of technology, use of human computer interaction and tangible user interfaces in musical toys.

In this section, after an exploration of children as a user group, recent tools and projects developed for enriching the play experience of children will be briefly presented.

### 2.3.1 Children as a User Group

As it is understood from what have been told so far, children are members of a rather special user group with different needs than adults. Their physical, social, and cognitive abilities and constraints, which are related to their developmental level, determine the quality of their interaction with products and environments. Not only needs, but also capabilities of children should be taken into consideration while developing any product that will be directly used by them. As age-related characteristics of preschool children are discussed in Section 2.1, in this section, an

understanding of addressing children as a user group will be briefly discussed instead of giving certain qualities about them.

The concept of user-centered design was first coined by Donald Norman in 1980s, who addresses the requirement of recognizing the needs and interests of the users by highlighting the usability factor (Abras et.al, 2004). In his book: *The Design of Everyday Things*, he defines user-centered design as a philosophy of "making products usable and understandable", and attempts to constitute a structured approach by defining a set of principles for designers to use while designing user-friendly products (Norman, 1990). Since then, user-centered design has been a center of attention by many design organizations, who emphasize the importance of listening to users, understanding their needs and designing products accordingly. Black (2008), for instance, writes the basics of user-centered design for Design Council:

> The central premise of user-centered design is that the best-designed products and services result from understanding the needs of the people who will use them. User-centered designers engage actively with end-users to gather insights that drive design from the earliest stages of product and service development, right through the design process (p.1).

The broad interest in this philosophy brought various research on design methods and tools for further inclusion of users into design process. These methods put users at the center of product development process from the beginning. Preece et.al (2002) define background interviews and questionnaires as primary sources of collecting data regarding the needs and expectations of the users at the beginning of the design process (as cited in Abras et al., 2004).

First step in inclusion of users to design process is to define the actual user group who will use the end-product. The primary users of children's toys are children themselves. Hence, the first step to satisfy the needs of this particular user group is to better know about the several factors about them which effect their interactions with their environments. Products, however, may also have secondary or tertiary users. "Primary users are those persons who actually use the artifact; secondary users are those who will occasionally use the artifact or those who use it through an intermediary; and tertiary users are persons who will be affected by the use of the

artifact or make decisions about its purchase" (Eason, 1987; as cited in Abras et al., 2004). Apart from the actual users, these needs of these stakeholders should also be considered. The actual user of an educational toy, for instance, is children themselves. However, parents, teachers, and/or school management might have a voice in the purchase of the product, or control of the environment in which it will be used. In this case, needs and desires of these stakeholders or their expectations from the product should also be taken into consideration.

In preschool context, teachers are secondary –and also may be tertiary- users of musical toys. They guide children in using these products effectively, they may play with them as a part of an activity, and they also may be in a key position of the decision making process of the purchase of these products. In addition to that, besides their educational background, teachers have the opportunity to directly observe children, their interactions with their environments, and their possible reactions to certain materials and situations. Thus, their expert opinions through classroom experiences may constitute an important source of knowledge for designers.

The focus of this study is to consider preschool children as a special user group with their own needs and characteristics by identifying them with knowledge adopted from developmental psychology and pedagogy literature. In order to develop a body of knowledge for design research and practice, it is essential for designers to consider the age-related characteristics of children, which are shaped by their capabilities and tendencies regarding their developmental level, and their needs in accordance with this perspective.

Several design methods and approaches are developed for designers to better understand the needs of particular user groups. These methods also employ knowledge and tools from other disciplines. Kouprie and Visser (2009), for instance, create a framework for emphatic design based on psychology literature. There are particular design methods and tools to help designers for designing products for children. For instance, within participatory design approach, which mainly concerns including users actively into design process, researchers are in quest of developing methods particularly for incorporating with children. These studies show that

children should be treated as a special user group with distinctive characters and needs.

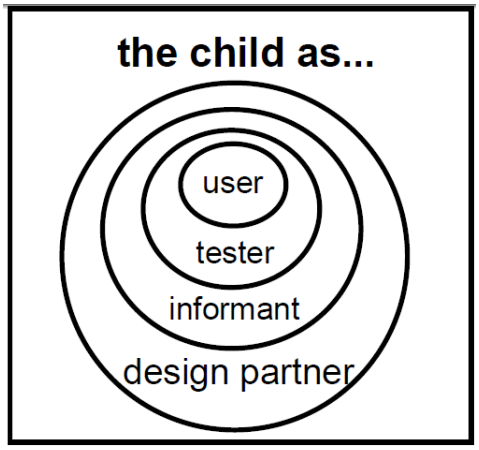



Figure 2.9 Roles of Children in Technology Design Process
(Druin et al., 1999, p. 3)

Figure 2.9 determines the level of inclusion of children to the design process. Incorporating children in the initial steps of the process result in a more user-oriented output. Druin (1999) defines four roles of children in design process according to “how adults relate to children, what stage in the design process that children use technology, and what goals researchers may have for inquiry with children” (p. 3). From indirect to elaborative, these roles are sorted as: *user, tester, informant*, and *design partner*. Children’s influence on design increases from *user* role to *design partner* role.

Designing products for children is a challenging task, and requires serious attention to various sources of knowledge. Another difficult task is to develop a user-oriented design research, and employ it into design practice. Druin’s effort is directly related to the design process itself. Similarly, relevant literature is dominated by several tools and techniques to directly involve children to this process. Recent academic research on designing for children, in the meantime, is dominated by the issues of Human Computer Interaction (HCI) and tangible interfaces for children. Instead of adult-oriented perspectives, it is essential to develop design issues which focus on children as a user group. Crook (1998) draws attention to this problem in HCI field.

He states that adult-oriented traditions of cognitive science do not function while developing products for children and that developmental psychology should inform design. He follows a three-stage path for it:

1. Identifying the significance of educational practice and early cognitive development,
2. Analysis of the psychological process,
3. Implications for designers (pp. 237-238).

Crook's study involves Druin's techniques in the third step. However, he extends this process to a few steps back, and attempts to build a bridge between research and practice. Such an approach holds together with the multi-disciplinary nature of design as an activity. For instance, Crook (1998) draws attention to the play of primary school children, the nature of which is to explore the possibilities of scripted pretence by making, controlling and exchanging things. This observation also has reference in developmental psychology literature to some extent, and this characteristic behavior of children can be a basis for a design implication (p. 244).

Developmental psychology and pedagogy literature has a great body of knowledge, which could be employed in several design areas such as Human Computer Interaction, educational environment design, toy design or game design. However, it requires a designer's perspective to consult to this literature to gain relevant knowledge, which is essential to a particular design process. In a musical toy design project, for instance, children's musical-developmental level, the relationship of them with music as listeners, producers or performers regarding this, the conditions of the environment in which the product will be used, and pedagogical concerns should be taken into consideration. Apart from that, a total comprehension of how children think, and how they behave in particular conditions is a valuable source of knowledge, or even an intuition for designers.

### 2.3.2. Designing Toys for Children

Toys provide opportunities for play, exploration and social interaction (Benson, 2006); they are rigidly connected with the psychology of the child, and they affect the nature of play. Designing toys for children requires familiarity with child psychology, such as play types and abilities of a certain age group. Design practice

requires its own methods and tools to employ knowledge from relevant literatures. These methods and tools should serve as bridges between this knowledge and design practice.

Design researchers have recently been aware of the necessity of making use of knowledge from relevant literature, and attempt to fill the gap between theory and practice from a user-oriented design perspective. Recent studies on toy design concentrate on novel child-toy interactions and use of digital technology for toys, and they borrow the theories and terminology from developmental psychology. In this section, two recent academic researches on toy design will be reviewed. First one is a play classification and ideation tool for toy design (Kudrowitz and Wallace, 2010). Second one is a guideline for toy design (Hinske et al., 2008), and an implementation of it to a technologically augmented toy environment project.

**The play pyramid and sliding scales of play**

Implementing knowledge from psychology to toy design is not an easy task. Kudrowitz and Wallace (2010) present two tools to overcome this problem: the play pyramid and sliding scales of play. Authors prefer to use the term “toy products” instead of “toys”, since any kind of material might be a toy for children while toy products are specifically designed and produced to promote play. Toys are in the minds of the users, while toy products are in the minds of the designers. The play pyramid is a three-dimensional map to classify toy products according to the types of play it serves for. Sliding scales, on the other hand, is an ideation tool for designers to use in designing or revising toy products.

Although inspired from existing categorizations such as Piaget’s and Parten’s, authors stress the impracticability of implementing existing play categorizations into design practice, and the necessity of constructing a design-oriented classification of play. Hence, they categorized play into four types: sensory, fantasy, construction and challenge. The play pyramid is a pyramid-shape 3D map, each corner of which is defined with one play type. The pyramid is used to determine if a toy product afford play. A toy product, which has an action potential (affordance) should at least one type of play. Despite the proximity to one corner, toy products usually float inside the pyramid and support more than one play type (Figure 2.10). A toy product

that enhances musical play, for instance, may be near construction and sensory corners.

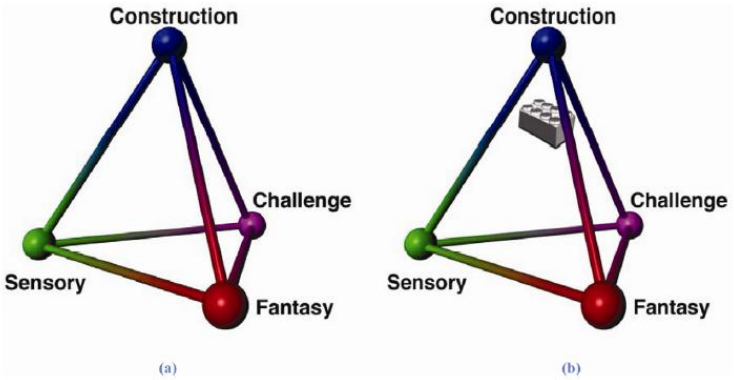



Figure 2.10 Play Pyramid Classification (a) and Play Pyramid with Suggested Placement of Lego® (b) (Kudrowitz and Wallace, 2010)

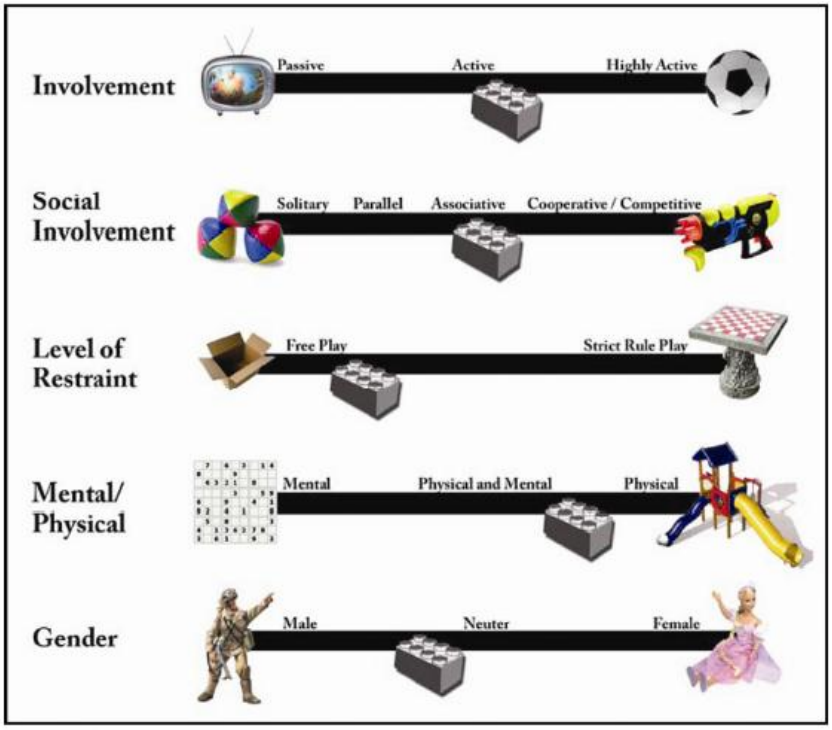



Figure 2.11 Placement of Lego on Modifier Scales

Sliding scales, or modifier scales (Figure 2.11), are two dimensional tools to modify the play experience without changing the category of play. Kudrowitz and Wallace (2010) define five types of modifiers: involvement, social involvement, level of restraint, mental/physical, and gender. This modifier scales are designed to allow ideation on toy products, and imagining other possibilities of play. Since the modifiers are not a play classification, they do not determine if a toy product have play value or not.

According to authors, theories of developmental psychology, such as Piaget, can be used to determine the appropriateness of a toy product for a certain age group, but not to classify them. However, the play types in play pyramid are also compatible with Piaget's developmental stages (Section 2.1.2).

Play pyramid and sliding scales are classification and ideation tools developed for designers in designing and modifying toy products. Designers should consider that a toy product floating in the middle of the pyramid or in the sliding scale does not guarantee it a better product, but extends its potential users. It is an analysis tool to promote new design ideas, see the gaps and market opportunities.

**Augmented Knight's Castle**

There are several guidelines for toy designers to implement and evaluate the play value of toys they design. Within their technologically augmented toy environment project, *Augmented Knight's Castle*, Hinske et al. (2008) review design guidelines for traditional, augmented, tangible and educational toys, and develop a summary guideline for each (Table 2.4).

Hinske et al. (2008) designed a toy environment, and use the design guidelines to check how it meets the requirements. *Augmented Knight's Castle* (AKC) is a technologically augmented, educational toy environment for encouraging the learning of children at elementary school age about Middle Ages in playful way (Figure 2.12). This tangible environment aims to enrich the pretend play of children with implemented technology such as auditory and visual feedback in reaction to the actions of the user.

Table 2.4 Summary of Design Guidelines for Toys
(Hinske et al., 2008)

| | |
|---|---|
| TRADITIONAL TOYS | 1. Emphasize fun and provide good “gameplay”<br>2. Offer mental challenges<br>3. Adapt to the toy to the target users (incl. age-appropriate and respect the children’s intelligence)<br>4. Make the toys reliable (i.e., it always works), durable (i.e., long-lasting), and safe<br>5. Support social interaction<br>6. Support physical experience (i.e., tangible)<br>7. The toy should be easy to understand and simple to use<br>8. Encourage the children’s imagination and story-telling<br>9. Supply immediate feedback<br>10. Let the toy extend the children’s playground and let it support the high dynamics of such environments<br>11. Integrate children in design process |
| INTEGRATING PERVASIVE COMPUTING TECHNOLOGY INTO (TRADITIONAL) TOYS | 1. The technological enhancement must have an added value<br>2. Specify what actions / tasks are to be supported<br>3. Let the focus should remain on the toy and the interaction itself, not on the technology.<br>4. Integrate the technology in such a way that it is unobtrusive, if not completely invisible<br>5. Toys should be still usable (in the “traditional” way) even if technology is switched off or not working<br>6. Tightly intertwine design and implementation<br>7. The technology should be reliable, durable, and safe<br>8. Offer immediate and continuous feedback<br>9. The added technology should support the high dynamics of play environments<br>10. Employ an iterative development process, including rapid prototyping and testing |
| TANGIBLE USER INTERFACES IN THE CONTEXT OF AUGMENTED TOYS | 1. Exploit the (3D) space when designing (meaningful) interactions; make use of the inherent richness of tangible interaction<br>2. Enable continuous and seamless interaction by multiple possibilities of interaction and manipulation<br>3. Spatially map input and output<br>4. Provide rich multimodal feedback<br>5. The physical appearance should be consistent and meet the children’s perceptual abilities and mental models (especially how things behave and how they are used)<br>6. Allow distributed interaction and shareable interfaces<br>7. Design the toy (environment) with an indisputable and consistent semantic mapping |
| EDUCATIONAL TOYS | 1. Provide clear challenges and feedback<br>2. Stimulate sensory and cognitive curiosity<br>3. Allow the children to control the (learning) environment<br>4. Support fantasy by relevant metaphors and analogies<br>5. Iteration of important sequences with opportunities for reflection |

Table 2.3 is a summary of toy design guidelines, which compiles considerations for traditional toys, traditional toys into which pervasive computing technology is integrated, tangible user interfaces for technologically augmented toys, and educational toys. As seen in the table, there is an effort in providing tangible interaction of children with technological toys by providing an unobsturive integration of technology into toys in order to enrich play experiences of children. Considerations for traditional toys include social, physical and cognitive development concerns, while input of technology shifts focus on cognitive interaction instead.

Figure 2.12 The Augmented Knight's Castle

Elements of the play set are tagged with radio frequency identification (RFID) technology (Figure 2.13). Explorative and educational quality of the environment is enhanced with using this technology to detect the actions of the child and giving feedback, such as individual play figures telling about their professions, or life in Middle Ages. RFID tags attached to the elements of play set are sensible for several actions of the user. Movement of the "magic bottle", for instance, is recognized as pouring the magic potion and gives feedback accordingly. Similarly, the knight can complain about "being put to dungeon again".

Figure 2.13 Unobtrusive Integration of RFID Technology into Elements

Hinske et al. (2008) use guidelines to evaluate the toy environment. AKC is only an example of how guidelines can be applied to toys. It may be difficult to meet all the requirements in guidelines for designing a toy, but they serve as an evaluation tool to see the strengths and weaknesses of the product.

### 2.3.3 Designing Musical Toys for Children

It is possible to name musical materials for in different ways according to their intended use and gains such as musical toys or musical instruments. However, musical instrument is inevitably associated with musical performance. If there is no such intention, musical materials might be instruments for musical exploration. As mentioned in Section 2.2.1, exploration and trial error is the nature of play. Musical activities of preschool children have this similar playful nature. Hence, the term “musical toys” is preferred.

Researchers have been developing new models of interaction between children and toys/play environments, by bringing various fields of research such as human-computer interaction (HCI), early childhood education, early childhood music education and so forth. The common point of these studies is that they concentrate on supporting active participation of children to music/sound production process by exploring tangible interaction scenarios. Hereby, three of these projects are reviewed. First one is Toy Symphony; a project developed in 2000-2003 by

Massachusetts Institute of Technology (MIT) Media Lab staff in collaboration with international symphony orchestras. Second one is Panze; a music educational entertainment environment for preschoolers developed by Jansen et.al (2008). Last one is a conceptual work by de Götzen et.al (2008) an investigation of including non-visual senses to enactive toys.

**Toy Symphony**

Toy Symphony was a 3-year-project, developed by a team of designers, inventors, musicians and educators in MIT Lab, with the directorship of composer and inventor Tod Machover. The project consisted of a series of workshops and concerts, and the target user groups were children with little or no musical experience or novices (Figure 2.14). The aim was to present the expressive potential of music without bothering them with musical technicalities.

Figure 2.14 Using Beatbugs
(Berlin Toy Symphony Workshop, 2002)

A set of non-traditional, easy-to-handle, tactile instruments called “Music Toys” were used in Toy Symphony to transform expressive gestures and touches into musical output. A soft and tactile controller called *music shaper* (Figure 2.16) and a

networked rhythm toy called *beatbug* (Figure 2.15) are used as instruments by children to produce musical input with common and simple skills such as touching, squeezing, tapping and so on. Hyperscore is a computer software for creating musical compositions, which translate the graphical input created by the children into musical output. *Beatbug, music shaper* and *hyperscore* are the tools and instruments used in Toy Symphony to include children as active participants of music, being performers and composers as well as listeners, by eliminating the exclusion of many children from music production process due to technical difficulties (Machover, 2004).

*The Beatbug*

Beatbug was developed by Weinberg and his team as a hand-held percussion instrument to enhance socio-musical experience by enabling the real-time manipulation as well as sharing and enrichment of the created rhythmic motives within a network of interconnected beatbug players. They structure their project on constructionist pedagogical approach, which defends that children construct their own understanding by means of interaction and active participation with the objects and events that occur in the environment (Weinberg et al., 2002).

Figure 2.15 The Beatbug

*Music Shapers*

Designed by Orth, music shapers are soft, tactile, and squeezable instruments to enable children engage in expressive musical performances. This toy instruments are operated by simple tangible hand-held interactions such as squeezing and stretching. Each stuffed fabric balls contain eight continuous pressure sensors, which direct the input created by physical manipulation of the ball to a multimedia computer through wired connection to create music (Weinberg et al., 2000). The final prototype was tested both with novices and professional players, and the acts of squeezing and pulling were found to be comfortable and intuitive, as the control of the device is expressive and challenging (Weinberg, 2002).

Figure 2.16 The Music Shaper

*Hyperscore*

Hyperscore interface (Figure 2.17) was developed by MIT Media Lab as a graphical music composition technology to allow children between 7-12 years old create their own musical pieces. The input created by the child is then converted into traditional musical notation through this software and ready to be performed by professional orchestras. This is a semi-automatic program working through a simple interface, supporting direct and intuitive manipulation. (Machover, 2004)

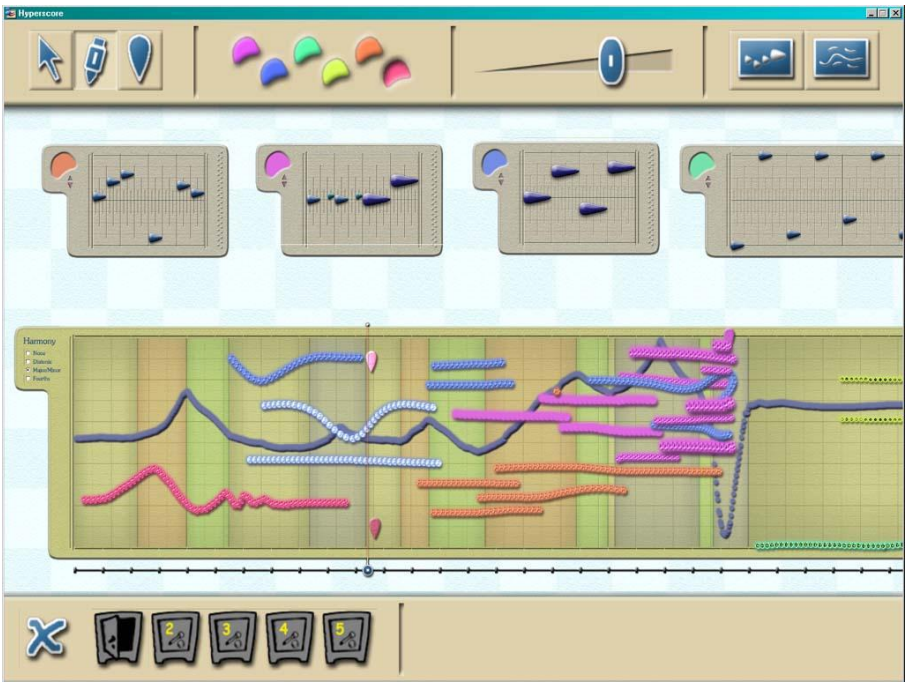



Figure 2.17 The Hyperscore Interface


Figure 2.18 Pixter Color Symphony Painter by Fisher-Price

Hyperscore provides the advantage of accessibility unlike other Toy Symphony instruments such as beatbug and music shapers, since it eliminates the materialization and shipping processes (Pasztor, 2002). Hyperscore technology was commercialized as a toy for children as in “Symphony Painter” of Fisher-Price, a toy producer company for infants and children (Figure 2.18). In addition to that, a series of workshops was held in Tewksbury State Hospital to explore the transformative experience of expressive musical activities with Hyperscore for seniors as well as physically and mentally disabled. Compositions created in these workshops were then performed in a public concert.

**Panze Environment**

Jansen and van Dijk (2008) from University of Twente, and Retra from University of Exeter in UK present their interactive computer environment design, and the results of the experiment they conducted with a prototype. The aim of the study is to make the child an active participant of musical experience through a multimodal interaction environment. The target group is two and three-years-old children, since they realize the cause-effect relationship between themselves and their environment, they can sing parts of familiar songs, and their gross motor skills are developed enough to be recognized by computer detection (p. 196).

The requirements of the environment were specified according to the official Dutch preschool music education method, “Music on the lap” (MoL). This method has several developmental goals, three of which are chosen in this project: (1) sense of rhythm and timing, (2) sense of dynamics (loud and soft), and (3) listening skills. Singing and movement with music is the core of MoL, which are expressive tools for all aspects of sound and are also detectable external input for a computer (Jansen et.al, 2006, p.164).

Panze is a discovery-oriented environment, which allows the child to discover the operation of the system through playing with it. The environment is activated with a CD. Panze the kangaroo is the agent character of the system to direct the child with MoL activities, and she is available both as the tangible input device and on the screen reacting according to the input created by the child (Figure 2.19). Panze detects the child's

actions with motion, sound, touch sensors and RFID technology to provide a multimodal interaction (Jansen et al., 2008, p.197).

Figure 2.19 Tangible and Digital Interfaces of Panze Environment

Testing Panze with preschoolers implicated that enjoyment and control are very important factors to initiate such an environment. Children who seem to enjoy themselves made more experimentation with the tangibles. Also children seemed to be more comfortable when they understand what to do to influence the environment (p.200).

**Multimodal Enactive Toys**

De Götzen, Mion and Avanzini from University of Padova in Italy and Serafine from Aalborg University in Denmark (2008) explored the active exploration and play of children with the enrichment of toys by involving non-visual senses. Similar with Panze, they seek for providing multimodal interaction of children with toys to be explored through all senses, and emphasize the importance of vibrating, smelling reactive toys instead of imposing stereotyped learning patterns, in order to embrace all children including disadvantaged such as visually impaired (p. 213).

According to this approach, they developed two different play environment concepts to “enhance the children’s awareness of everyday life’s multimodal feedback”. First conceptual scenario is not a musical experience environment, but it was fictionalized as a playground theme where several interaction models can be experienced by children. Each sub-scenario may represent different environments such as kitchen or garden, and the tangible exploration of the objects such as touching or shaking may give multiple feedbacks to the child similar to everyday life experiences (p.218).

Second scenario is Reactoy-Band, and it is based on an existing and commercialized table-based tangible interface technology. Inspired from reacTable, an example of tabletop tangible musical interface, musical play experiences are suggested to encourage social interaction and collaboration of children with each other (p.219-220) (Figure 2.20).

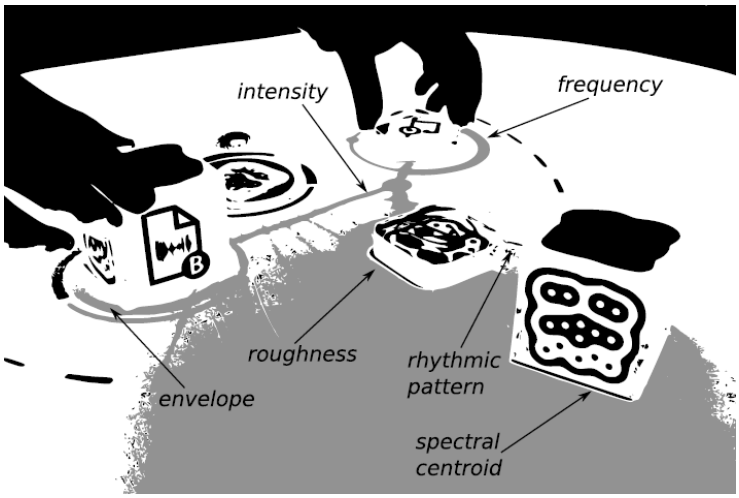



Figure 2.20 Conceptual Sketching of the Reactoy-Band
(De Götzen et.al, 2008, p. 220)

In brief, this conceptual study of De Götzen et.al (2008) suggests new pathways to explore toys for children, putting multimodal interaction approach at the center. They name these toys as *enactoys*, based on an existing technology using the human action as the source of a multimodal feedback. This kind of interaction is richer in terms of interactivity than the widespread sound toys in the market which reproduce the prerecorded sounds by push-button input (p.221).

One of the common points of above mentioned projects is that all of them are conceptualized for the use of musically untrained children and/or novices to provide them an inclusive musical experience and provoke the expressive character of music production. Apart from Hyperscore software of Toy Symphony, they all use tangible interfaces as input mechanisms and direct them into digital media devices to create musical output. Also, they are all inspired from pedagogical approaches and constrain the requirements of the design accordingly.

Each project is based on a similar working process. A more controlled and sophisticated real time input model is provided to the child compared to the digital push-button toys, which only allow the child to repeatedly receive the predefined output. The output itself effects the interaction of the child with the toy/environment, since it is variable according to the input created by the user. As children comprehend the effect they can cause on the environment, in other words, as they gain control over it, both the interaction and the output product becomes richer.

The motives of these projects seem to be similar, but their contexts and intended gains for the child vary. Toy Symphony may be considered as a non-traditional interface project to include musically untrained children as active participants of the production of traditional musical pieces/outputs. Children compose and perform musical pieces with the provided tools; hence the main purpose is to overcome the technical constraints of music production. Unlike Toy Symphony, Panze environment was not designed to be a medium for music production. Rather, it is based on an official Dutch preschool music education program and tries to meet the needs and support the activities suggested by that program. As for Enactoys, enrichment of the play experience and inclusion of disadvantaged children by the embodiment of non-visual senses is the main focus.

From a designer's perspective, play may be considered as a habitat in which play materials are used. Factors such as play environment, type of play, and players effect the interaction of children with these materials. Being aware of such dimensions of play is a rich source for designers to design developmentally appropriate and appealing play material for children.

Play materials, or toys, are an important reflection of the world of children. Yet again, children themselves may transform these toys according to their world. Preschool children do not need real-life resemblances on objects. Furthermore, unstructured materials nourish imaginative play, and serve children as a versatile instrument by allowing a multifaceted transformation. Structured materials, on the other hand, discourage imagination, and impose pre-determined roles and interactions.

Toys are also categorized according to specific criteria. Instead of product-oriented categorizations, it is useful for designers to benefit from developmental perspectives on toy classifications, which may promote design of used-friendly musical toys. When considered as toys, primary reference point for the design of these products should also be these developmental approaches.

Researchers have been recently developing projects to overcome such problems, and provide children a more creative, open-ended experience that enhance their active participation to music production process in playful way with tangible interfaces. The projects scrutinized are fed from a multi-disciplinal source, integrating psychology, pedagogy, interaction design and design for interaction. The strengths of them are that they are based on a developmental approach, do or may encourage musical experiences as a collective activity, and enrich the interaction of children with the musical medium.

Similar with many examples in the world, early childhood education program of Turkey is built on knowledge from developmental psychology and pedagogy. This is a flexible program drawing a set of standards and expected outcomes, and suggesting activities and materials by encouraging teachers to take initiative in implementation. As a result, classroom experiences become diverse in terms of the activities conducted and materials used, as well as diverse professional backgrounds and perspectives of the educators.

From this point of view, an exploration of the diverse classroom experiences is considered to be necessary in order to make a more reliable conceptualization of the usage context. The field study, which is presented in the next chapter, aims to enlighten these experiences in order to draw insights for musical toy designers.

# CHAPTER 3

# FIELD STUDY AND DATA ANALYSIS

Literature research concentrates on knowledge about early childhood period and early childhood education in terms of characteristics of preschool children and educational requirements in accordance with their developmental level. Literature provides a comprehension of how young children think, how they tend to interact with their environments, and how educational materials and environments should be organized accordingly.

This theoretical background is necessary, but inadequate to present an overview of practical implications. Products are designed for real people in real contexts. Hence, it is required to enrich theoretical knowledge with information gathered from the usage context. Considering this fact, a field study is designed in order to provide a more integrated and reliable source o knowledge for designers, which is intended to support them in designing musical instruments for preschool children.

In this section, the field study will be presented in terms of its aim, expected results and methodology. In addition to that, limitations of the study will be explained.

## 3.1 Aim and Expected Results of the Field Study

The aim of the field study is to enrich the knowledge gathered from literature and a deeper exploration of the practical implications in preschools in Ankara/Turkey in order to provide qualitative data about the educational settings in terms of material environment, and children's attitudes and preferences towards musical instruments.

Flexible nature of preschool education environment raises the need for exploring the usage context of musical instruments for preschool children in detail in order to better understand the user needs considering the applications of the program. Field research is expected to explore the perspectives and expectations of preschool educators, as well as varied classroom experiences concerning the usage of musical instruments in preschool context. Analysis of plans and strategies in the application of the curriculum is expected to be guiding for designers along with the formal requirements of preschool education.

### 3.2 Methodology of the Field Study

Preschool educators are given a significant amount of flexibility in the application of the preschool program, which may result in the diversity of the experiences they gain and materials they use. Hence, semi-structured interviews are conducted with preschool educators by the aid of an interview guide. Interview guide consists of questions and prompts in order for the interviewer to remember which topics to cover to be able to structure the interview.

At the beginning of each interview, the participant was informed about the aim of the research. After, the interview was started with warm-up questions. Interviews were conducted as informal conversations in either classroom or office environments. Participants were encouraged to share their personal opinions and experiences under the guidance of the interviewer.

Interviews were recorded with a digital voice recorder for subsequent analysis. Voice records were transcribed in a word processor software. Each interview lasted 22 minutes on average, ranging from 12 to 38 minutes.

#### 3.2.1 The Interview Guide

A guide was prepared in order to be able to structure the interview. Interview guide consists of seven questions and prompts related to them.

*Firstly, a warm-up question was asked to understand the relevant background of the participant:*

**Q1:** What is your original expertise?

**Q1P1:** Preschool teacher, child development specialist, psychologist, etc.

**Q1P2:** How long have you been working in this job?

*A general question was asked to support warm-up and as an introduction to the point at issue:*

**Q2:** Can you briefly talk about what do you do in a regular school day?

**Q2P1:** How does music is included in these activities?

*Leading in the intended subject, a question was asked to understand the participant's with the music, perspective on music education, and opinions about the expected contributions of music:*

**Q3:** What do you think about the contribution of music to child development?

**Q3P1:** Is it important in its own good, does it assist other activities, is it for entertainment of the child, etc.

*To understand what kind of materials are preferred by the participant to be used in a preschool classroom, if there is any:*

**Q4:** Do you use music toys/materials during lessons?

**Q4P1:** Are there any particular materials you especially prefer to use? Such as percussions, sound toys, strings, keyboards, etc.

*(Here, a brief explanation is made to the participant indicating that from now on, these materials/toys will be named as "products")*

*To understand the participant's selection and/or evaluation criteria of musical instruments they use:*

**Q5:** Who selects the products to be purchased?

**Q5P1-A:** (If she selects the products to be purchased) Are there any particular criteria you consider while you select these products? If so, what are they? Educational standards, interests and preferences of children, product attributes, etc.

**Q5P1-B:** (If she does not select the products to be purchased) Would you evaluate the products you use? Educational standards, interests and preferences of children, product attributes, etc.

*To better understand the participant's expectations from a musical toy:*

**Q6:** Do you ever make musical materials/toys with children? If so:

**Q6P1:** What kind of materials/toys do you make?

**Q6P2:** Why do you prefer to make them instead of using ready-made products? Ready-made products' falling short of expectations, being an opportunity to make an activity with children, etc.

*To reinforce and confirm the participant's selection and evaluation criteria of musical toys as well as her expectations:*

**Q7:** If you had the chance to enhance existing products, what kind of modifications would you like to make? Educational concerns, interests and preferences of children, product attributes, etc.

### 3.2.2 Participants of the Field Study

Preschool educators are one of the users of the musical toys. They guide children in their use of the products in question in terms of usage context and techniques. They are also direct observers of children in their natural behavior of everyday life. In addition to that, existing formal preschool program of Turkey give preschool teachers a considerable amount of freedom in the application of the curriculum, which results in variety in the classroom experiences. Considering all these factors, preschool educators were selected as participants of the field study.

A semi-structured interview was conducted to 10 participants: one preschool manager, one preschool music teacher, and eight classroom teachers. Participants are currently working in different preschools of different status. They also have different professional backgrounds and experience. Professional background of the participants, the age group they are currently responsible from, and the legal status of the institution they work in are given in the table below.

Table 3.1 Participants of the Field Study

| Participant | Duration of Professional Experience | Position | Current Age Group | Status of the Current Institution |
|---|---|---|---|---|
| Participant A | 12 years | Classroom teacher | 2-6 years old | Private nursery affiliated to Turkish Social Services and Child Protection Agency |
| Participant B | 5 years | Classroom teacher | 5-6 years old | Preschool section of a primary school, affiliated to MNE |
| Participant C | 21 years | Classroom teacher | 5-6 years old | Preschool section of a primary school, affiliated to MNE |
| Participant D | 3 years | Classroom teacher | 3-4 years old | Preschool, affiliated to MNE |
| Participant E | 10 years | Classroom teacher | 5-6 years old | Preschool, affiliated to MNE |
| Participant F | 20 years | Assistant manager/ Education specialist | 3-4 years old | Nursery of a public institution |
| Participant G | 7 years | Classroom teacher | 3-4 years old | Nursery of a public institution |
| Participant H | 15 years | Classroom teacher | 4-5 years old | Nursery of a public institution |
| Participant I | 26 years, (music teacher for 10 years ) | Music teacher | 3-6 years old | Mixed |
| Participant J | 4 years | Classroom teacher | 4-5 years old | Private nursery |

### 3.2.3 Limitations of the Field Study

There are certain constrictions due to the timing of the study and financial issues. Interviews were conducted in June-July 2011, a period of time when schools affiliated to Ministry of National Education are officially closed for summer break, and seminars were held for teachers. This fact limited the number of possible participants, as well as observation opportunities. The strict policies of private schools, which restrict the access of researchers, was another constriction in reaching a larger number of participants. Hence, participants were reached by restricted personal contacts among the educators working in institutions which provide service also in summer time.

All the interviews were conducted in Ankara, Turkey. Except one participant, who came to a summer seminar from Siirt (a province in southeastern Turkey), all of the participants are currently working in institutions within Ankara. Financial limitations restricted an extensive study that would be conducted in a broader field.

These limitations are expected to be overcome by diversification of the participants' professional background and status of the institutions they work in.

## 3.3 Data Analysis

Analysis of the data gathered from the field research was made in a number of steps (Figure 3.1). In data collection phase of the research, general themes began to appear in the transcripts. These categories were parallel with the interview guide, which was prepared to obtain answers to the research questions. They were noted to be a "starting list" of themes (Miles and Huberman, 1994) for the further phases of analysis.

After completing data collection, transcripts were investigated in the light of the starting list of themes. Raw text was purified into "relevant text" (Auerbach and Silverstein, 2003), which consists of relevant phrases and paragraphs for forming themes and categories. Starting list of themes are refined into themes by color-coding each relevant phrase from the text. Each theme was labeled with a name

relevant to its content. For instance, the theme, which includes statements about types of activities in a musical context, is labeled as “Musical activities”.

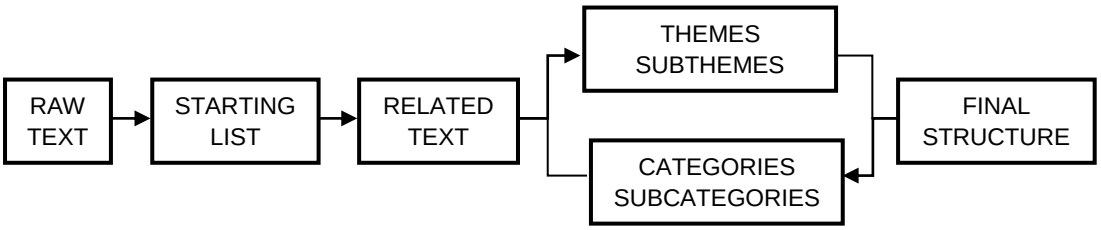



Figure 3.1 Data Analysis Strategy

After tagging each theme with a label, the color-coded relevant texts were kept in different digital documents in order to group repeating patterns of phrases to form sub-themes, categories and sub-categories for each theme. For instance, Participant D states: “We make a *morning sport with music* for 5 or 10 minutes, so that they can wake up and also to warm up with their friends” (own translation). Here, the activity *morning sport with music* as stated by the participant is labeled as the category of “moving to music”. As categories emerge, raw text was lastly investigated to crosscheck the relevancy of themes and categories.

Data is classified under two themes with two sub-themes for each. Themes and sub-themes are constructs derived from the relevant text in order to organize the data into meaningful concepts to be able to interpret data. Categories and sub-categories are formed for each sub-theme by grouping and labeling the repeated patterns in the text. The analyzed structure of the data is given in Table 3.2.

Table 3.2 The Analyzed Structure of Data

| THEMES & SUB-THEMES | | CONTENT CATEGORIES |
|---|---|---|
| MUSICAL EXPERIENCES IN PRESCHOOL CONTEXT | Types of Musical Activities Conducted in Preschool Context | Musical Activities With Material Use |
| | | • Using Rhythm Instruments<br>• Using Hand-Made Instruments<br>• Drama/Role Playing<br>• Exploring Sound<br>• Using Melodic Instruments<br>• Performing Music |
| | | Musical Activities Without Material Use |
| | | • Moving to Music<br>• Singing<br>• Listening to Music<br>• Performing Music |
| | Expected Outcomes of Musical Activities Conducted in Preschool Context | Musical Outcomes |
| | | • Enhancing Auditory Development<br>• Developing Interest in Music |
| | | Non-Musical Outcomes |
| | | • Enhancing Learning Environment<br>• Enhancing Communication Skills<br>• Enhancing Cognitive Development<br>• Promoting joy and relaxation<br>• Developing Self-Discipline |
| MUSICAL INSTRUMENTS USED IN PRESCHOOL CONTEXT | Ready-Made Musical Instruments Used in Preschool Context | Types of Ready-Made Musical Instruments Used in Preschool Context |
| | | • Percussions<br>• Melodic Instruments |
| | | Materials of Ready-Made Musical Instruments Used in Preschool Context |
| | Ready-Made Musical Instruments Used in Preschool Context | Evaluation Criteria of the Participants About Ready-Made Musical Instruments Used in Preschool Context |
| | | • Child's needs and interests<br>• Durability of the Product<br>• Safety of the Product<br>• Cost of the Product<br>• Teacher's Musical Background<br>• Repairing Opportunities of The Product<br>• Sound Quality of the Product<br>• Hygiene of the Product |

Table 3.2 The Analyzed Structure of Data (Continued)

| THEMES & SUB-THEMES | | CATEGORIES & SUB-CATEGORIES |
|---|---|---|
| MUSICAL INSTRUMENTS USED IN PRESCHOOL CONTEXT | Hand-Made Musical Instruments Made/Used in Preschool Context | Kinds of Hand-Made Musical Instruments Made/Used in Preschool Context |
| | | • Maracas<br>• Drum<br>• Castanet<br>• Rainstick<br>• Guitar |
| | | Materials of Hand-Made Musical Instruments Made/Used in Preschool Context |
| | | Evaluation Criteria of the Participants About Hand-Made Musical Instruments Made/Used in Preschool Context |
| | | Strengths<br>• Transparency of the process<br>• Personalization opportunities<br>• Accessibility of materials<br>• Variety of sound<br>Weaknesses<br>• Poor sound quality<br>• Poor visual quality<br>• Short life-span |
| OTHER FINDINGS | Age Characteristics Concerning Child-Instrument Interaction | • Technical level of the child in using musical instruments<br>• Attention span of the child and complexity in using musical instruments |

Data analysis resulted in two main themes. First one is Musical Experiences in Preschool Context, which includes types and expected outcomes of musical activities conducted in preschool context as sub-themes. The second theme is Musical Instruments Used in Preschool Context. This content includes ready-made and hand-made musical instruments used and made in preschool context. The term “instrument” is preferred instead of “toys” considering the fact that participants prefer using this term, since the musical materials they have in classrooms are mostly replicas of musical instruments for adults, but smaller in size.

Relevant text was investigated in order to determine the frequency of each category and/or sub-category. The weights of them are calculated by giving one point for the relevant category if it is mentioned by the participant at least once. Each category then was ranked on a scale from 0 to 10 points and presented in a bar chart in order to better interpret the data regarding the participant’s background, general preschool

environment, set of activities and materials, and processes. For instance; “performing music” is a sub-category mentioned by only one participant. This does not mean that it is less important than the sub-category “using rhythm instruments”, which was mentioned by all of the participants. Rather, it is interpreted according to the expectations of the participant who mentioned this theme due to her professional background.

### 3.4 Results of Data Analysis

In this section, each theme and sub-theme will be presented with a brief definition. After, frequency of categories and/or sub-categories will be shown in bar charts, followed by explanations regarding their contents.

#### 3.4.1 Musical Activities Conducted in Preschool Context

This theme covers types of musical activities conducted in preschool context as well as participants’ insights about the expected outcomes of these activities for the child. Categories and sub-categories of these sub-themes will be presented in this section.

#### 3.4 1.1 Types of Musical Activities Conducted in Preschool Context

This sub-theme covers a range of classroom experiences that include music. Content of this category is mostly generated by responses of the participants to the following questions in the interview guide:

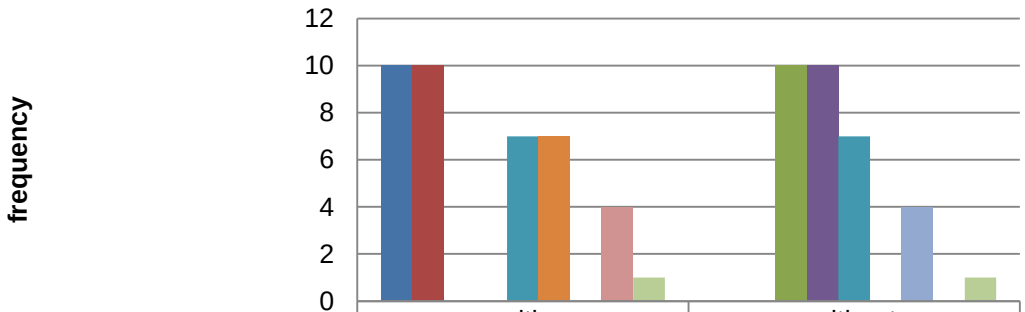
**Q2:** Can you briefly talk about what do you do in a regular school day?
**Q2P1:** How does music is included in these activities?
**Q4:** Do you use musical instruments/materials during lessons?

The content was analyzed regarding the statements of the participants about the activity itself, and labeled accordingly. Since experiences concerning material use are central for this study, in order to highlight the data referring material experiences, activities then categorized according to the fact that whether they include use of an instrument/sound material by children or not. *Drama/role playing*

and *musical performance activities* are common in both categories, since drama/role playing may be performed by using instruments/sound materials or as a response to music, while musical performance may be vocal or instrumental.

The frequency of each activity is calculated by giving one point for the relevant activity if it is mentioned by the participant at least once. Each activity was ranked on a scale from 0 to 10 points. The results are shown as a bar chart in Table 3.3. Original versions of the statements in Turkish are given in the Appendix D as they numerated in order of appearance in the main text.

Table 3.3 Frequency of the Types of Musical Activities Conducted in Preschool Context




| | with instruments/materials | without instruments/materials |
|---|---|---|
| using rhythm instruments | 10 | |
| using hand-made instruments | 10 | |
| moving to music | | 10 |
| singing | | 10 |
| drama/role playing | 7 | 7 |
| exploring sound | 7 | |
| listening to music | | 4 |
| using melodic instruments | 4 | |
| performing music | 1 | 1 |

**Using Rhythm Instruments (10/10)**

As a musical activity, *creating rhythm with instruments* was mentioned by all of the participants. These instruments will be presented in Section 3.4.2.1. This activity is performed by accompanying to a song with instruments while singing or listening.

Except from developmental characteristics of the child and curricular frame, musical background of the teacher also determine the emergence of rhythm production as an important characteristic in preschool context. As Participant G states:

> Music, actually rhythm, is what we are supposed to contribute. Rhythm is in every part of our life; preschool education should be well equipped to construct a background of musical ear, be informed about all areas of music, be realize the kinds of music that children will use, should be aware of them. So, all of the educators have had more or less this kind of education. (S1, Participant G)

Participant C, on the other hand, drew attention to the musical abilities of the teacher effecting their role as a guiding children:

> We conduct singing and rhythm activities too, but I can't dwell upon it since I have a thin ear. Sometimes we ask for help from our music teacher. (S2, Participant C)

**Using Hand-Made Instruments (10/10)**

All of the participants stated that they use hand-made instruments referring to the sound materials made by children with the guidance of the teacher. Maracas become prominent as a wide-known hand-made musical instrument used in musical activities. A detailed investigation of hand-made instruments will be made in Section

> For example, if we don't have maracas, it is a common activity, stones or dry legumes such as dry beans are put into a plastic bottle. Rhythm is made with them, they all have different sounds. (S3, Participant D)

Making these instruments is considered as an arts activity instead of a musical one. However, they are used in music hours to create rhythm.

> We make them in arts activity, as an arts activity. Then we use the instruments we made in music education, they keep good rhythm. (S4, Participant F)

> It completes with the arts activity. Creating a product is an arts activity in a way. Then we can proceed to a game, or another thing [activity]. Everyone can create his or her own music. We can play a well known song with the

> instruments we made, we can use that rhythm. We can use different materials in each activity. (S5, Participant H)

**Moving to Music (10/10)**

All of the participants mentioned the importance of music as an assistant to motivate children to make physical movements in various contexts such as dancing, physical exercise or playing as a group.

> We can make children to get up from a passive desk work with music and rhythm to move, and than sit again for story-telling hour. Well, music is such a saviour for us which is always in our hands. (S6, Participant H)

Body percussion is also included under this activity category. Body percussion is to use body to create rhythm by using body such as clapping or tapping. Some teachers perceive body percussion as a preparation for using rhythm instruments, while others state that it is an alternative when they lack rhythm instruments.

> First step in rhythm studies for the child is to recognize his or her body. We try to make sound, use our bodies, clap, we can make sound with our bodies. We can both dance or make movements, and make accurate sounds. (S7, Participant G)

**Singing (10/10)**

Singing songs, which are composed especially for children is another activity mentioned by all the participants as a daily musical activity. In some cases, keeping rhythm is also added while singing these songs. It is also possible to transform this activity into a group play. For instance, as Participant D states, she groups children into two as boys and girls, and girls sing while boys accompany them by clapping.

**Drama/Role Playing (7/10)**

Drama, or role playing, is another preschool activity in which music is included in several ways, such as imitating a natural sound with an instrument or dramatizing music with bodily movements in a story context.

> Apart from music education, we use that instruments in drama or so. For example, we use that [instrument] by giving simple directives [to the child] such as “now it is raining”. Or “now you are walking slowly”. We use them in all of the activities, using according to the directives you give [to the child]. (S8, Participant E)

> There are these upbeat musics. You make up a story for them. For example “be dwarfs”, they walk with quicksteps. Then “be giants”, [children] marching… Together with music. (S9, Participant J)

**Exploring Sound (7/10)**

Participants stated that they use mundane materials to make sure that children explore different sounds, try and hear the results of their actions on materials. These materials might be objects available in the classroom such as toys and furnitures, as well as stones and tree branches from the nature. The importance of familiarizing with musical instruments by individual explorations is also mentioned, since they are considered to be important activities for children’s cognitive development.

> When you say rhythm instruments, everyone think of maracas, tambourine… I start with the toys available in the classroom. The sound of hitting wooden sticks eachother, but it produces a different sound when we hit the plastic bucket with wooden sticks. This is something different. A different sound when we hit to glass. But it produces a different sound when we hit the glass with fork and spoon. These differences, similarities, why different, how do you hit, I start with such kind of things. Lastly we skip to the musical instruments. So we have sounds that we use, but on the other hand ready-made instruments too. (S10, Participant G)

**Listening to Music (4/10)**

Not only music hours but also other curricular activities such as meal times, sleeping hours include listening to music. Music is used as a background sound in various activities.

> I use music as a tool for relaxing kids, when they go to sleep on their beds. (S11, Participant E)

> They now have things, Orff music, which are recorded on CDs. Like it is a background music while I am telling a story. In my opinion, these are quite effective. (S12, Participant J)

**Using melodic instruments (4/10)**

Participants mentioned the use of melodic instruments such as keyboard, melodica, and xylophone. However, two of them also drew attention to the constraints of using these instruments due to developmental characteristics of children, or the poor sound quality of instruments they have in classroom. Instruments which are satisfactory in terms of sound quality, on the other hand, are not affordable.

> [Referring to a small, plastic imitation of a xylophone] I don't know what can be done with that instrument, how it is played, or how I can be beneficial for the child. He or she only tries it. Tones are not clear, maybe it's the poor quality, it doesn't give clear sounds. (S13, Participant D)

**Performing Music (1/10)**

Only Participant I mentioned musical performance as a musical product. Most of the participants emphasized the importance of process than the results. Hence, sound explorations are considered to be a more effective learning tool. Only Participant I, who is a music teacher carrying out music lessons with Orff method in preschools, mentioned the orchestra as a presentation of what they have studied in the whole year.

> It is not the result though, the process we have been throuh is important. It is important what we have experienced through. However, at the end we come out with a product, which generally is an orhcestra. Therefore, we are exhibiting it; all the things we worked on. (S14, Participant I)

### 3.4.1.2 Expected Outcomes of Musical Activities Conducted in Preschool Context

This content is mainly derived from responses to the following question in interview guide:

> **Q3:** What do you think about the contribution of music to child development?

Data is categorized according to expectations include music-related and non-music related outcomes, and possible short-term/long-term positive effects of the musical experience on educational environment and children themselves. In-depth analysis of the interview transcripts gave seven sub-categories of expected outcomes of musical activities. Figure 3.2 represents categories and sub-categories.

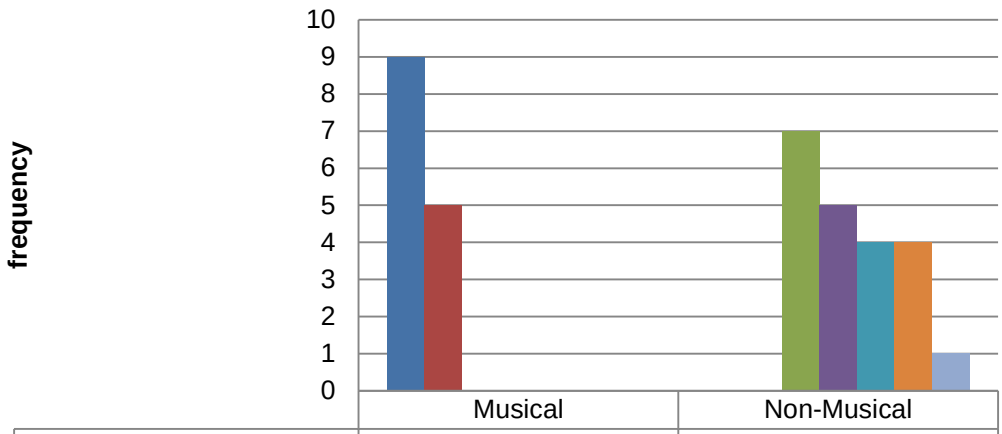
<table>
<tr><td rowspan="2">SHORT-TERM OUTPUTS OF MUSICAL ACTIVITIES</td><td>Enhancing learning environment</td><td rowspan="4">NON-MUSICAL OUTPUTS OF MUSICAL ACTIVITIES</td></tr>
<tr><td>Enhancing joy and relaxation</td></tr>
<tr><td rowspan="4">LONG-TERM OUTPUTS OF MUSICAL ACTIVITIES</td><td>Enhancing communication skills</td></tr>
<tr><td>Enhancing cognitive development</td></tr>
<tr><td>Developing self-discipline</td></tr>
<tr><td>Enhancing auditory development</td><td rowspan="2">MUSICAL OUTPUTS OF MUSICAL ACTIVITIES</td></tr>
<tr><td>Developing interest in music</td></tr>
</table>

Figure 3.2 Expected Outcomes of Musical Activities Conducted in Preschool Context

**Musical and Non-Musical Outcomes**

Defined sub-categories are first categorized as musical and non-musical outputs of musical activities. Table 3.4 shows the distribution of the opinions of the participants about the expected outcomes of musical activities conducted in preschool environment.

Table 3.4 Frequency of the Expected Musical and Non-Musical Outcomes of Musical Activities Conducted in Preschool Context




| | Musical | Non-Musical |
|---|---|---|
| enhancing auditory development | 9 | |
| developing interest in music | 5 | |
| enhancing learning environment | | 7 |
| enhancing joy and relaxation | | 5 |
| enhancing communication skills | | 4 |
| enhancing cognitive development | | 4 |
| developing self-discipline | | 1 |

*Musical Outcomes of Musical Activities*

- *Enhancing Auditory Development (9/10):* The content of this sub-category includes development of rhythm, learning basic musical concepts such as tempo or tone, and development of interpreting auditory stimulus. Basically, children are expected to differenciate basic qualities of sound as well as being able to show simple rhytmic performance.

> We are giving directions as “low sound” [whispering], he whisks in low sound; and “louder”, he whisks louder. This way, he understands and arranges the volume of the sound. (S15, Participant E)

Participant E, mentioning the poor sound quality of the plastic xylophone in the classroom, and drew attention to the importance of hearing the accurate

tone of a keyboard for child to perceive. Similarly, Participant J stated that it would be better for the child to hear the accurate tone of a piano while accompanying it vocally. Participant H, who is a musical teacher, stated that a child at 6 years old may transfer the rhythm patterns or produce his or her own.

*Developing Interest in Music (5/10):* Although they admit that musical activities and music education is limited in a preschool environment due to time limitation and teachers' musical background, participants highlighted the importance of developing interest in music by introducing children various music types and musical instruments, and encouraging children in this way.

> We would like to involve students' parents who play instruments into our education program. They introduce the instruments they play to children (...) We try to make it tactile, because it is how children learn. (S16, Participant F)

Participant I and Participant J stated that musical activities in preschool classroom may have a positive effect on children to develop interest about playing an instrument or love of music in their further life. Similarly, Participant I suggested that it is possible to enrich the music perception of children by presenting them various kinds of music.

*Non-Musical Outcomes of Musical Activities*

*Enhancing Learning Environment (7/10):* Seven participants mentioned the effect of music in enhancing the learning environment in preschool classroom such as play, drama, and Turkish language hours, or as background music. It is a supplementary element in various contexts, motivating children to engage in the intended activity.

> [Referring to an instrument in which the child lost interest] After a while, when you use it in a Turkish language activity, his interest arouses again. (S17, Participant F)

Participant A, who works with children whose mother language is Kurdish, emphasizes the role of music in learning environment:

When I say something, for example, they have problems understanding it. But they understand more easily when it is presented musically. First they learn, but learn their meanings later; especially in where I work. (S18, Participant B)

*Enhancing Joy and Relaxation (5/10):* These are short-term benefits of musical activities for children mentioned by the participants such as joy and relaxation. As stated by the participants, children like to engage in musical activities, since they enjoy themselves and feel good.

> It works very well, kids become happy and like it so much. They relax with music. (S19, Participant E)

> For example, when we finish practising, the kid feels like this: “Wow, it was very good.” Is there anything better than this? (S20, Participant I)

*Enhancing Communication Skills (4/10):* Music production through singing or using instruments is thought to be an alternative way of communication for children. Participants emphasized that children can express themselves through musical mediums. Also, the kind of music children listen to is perceived as an important indicator of their view of life, which also effects their communication with each other.

> Children can discover areas to express themselves with music . When you use it as such an important tool, it makes perfect sense in educational activities. Music really relaxes [the child], and it becomes one of the most important tools for the child to express himself. (S21, Participant H)

*Enhancing Cognitive Development (4/10):* Participants emphasized the benefits of music on cognitive development of children. Musical activities are thought to be important cognitive processes and beneficial to the cognitive development of the child.

> All your rediscovering facilities like in this are helpful for children’s creative and cognitive development. (S22, Participant F)

Participants F, G and H draw attention to the scientific evidence about the positive effects of listening to music, moving to music, and using instruments for the child on cognitive development. In addition to that, Participant E predicated that children can learn mathematical concepts through rhythm activities.

*Developing Self-Discipline* (1/10)*:* Only Participant H mentioned the importance of musical activities for preschool children to develop self-discipline and planning in further life. She is a music teacher in preschool who works with Orff method of music education. Hence, she also perceives music and musical activities in a discipliner point of view, which could be the reason for her statements.

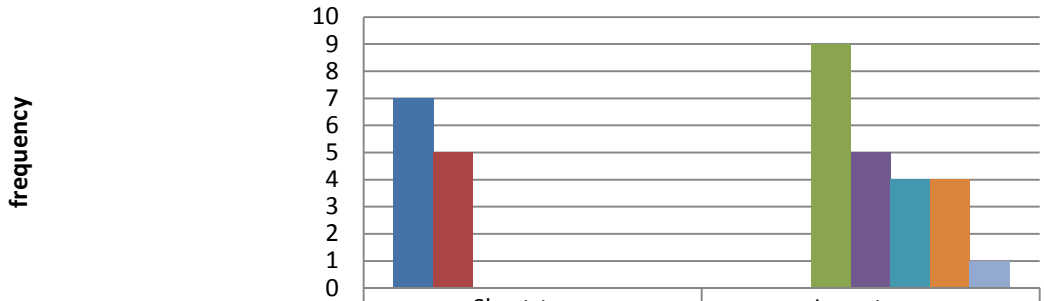
> Well, all in all it's required to develop children's sense of aesthetics, because there are planning in the context of orchestra works. The child would be very planned in architecture, rather, planned in every area of life, too. If you mean transferring it to life, this is how they will benefit from our studies. (S23, Participant I)

**Short-Term and Long-Term Outcomes of Musical Activities**

In addition to musical/non-musical benefits of musical activities, this category is created to show the expectations of the participants from musical activities for short and long-term periods. The sub-categories are explained above; hence they will not be repeated.

Short-term outcomes define instant values added to the child's experience. Long-term outcomes, on the other hand; points out the importance of musical activities for children to gain certain skills and interests Table 3.5 shows the distribution of these activities according to the two sub-categories.

Table 3.5 Frequency of the Expected Short-Term and Long-Term Outcomes of Musical Activities Conducted in Preschool Context




| | Short-term benefits/outcomes | Long-term benefits/outcomes |
|---|---|---|
| enhancing learning environment | 7 | |
| enhancing joy and relaxation | 5 | |
| enhancing auditory development | | 9 |
| developing interest in music | | 5 |
| enhancing communication skills | | 4 |
| enhancing cognitive development | | 4 |
| developing self-discipline | | 1 |

Short-term outcomes define instant values added to the child's experience. Long-term outcomes, on the other hand; points out the importance of musical activities for children to gain certain skills and interests Table 3.5 shows the distribution of these activities according to the two sub-categories.

### 3.4.2 Musical Instruments Used in Preschool Context

Various musical instruments are used in preschool in musical activities. The content of this sub-theme will be presented in two categories: ready-made and hand-made musical instruments used or made in preschool context. Ready-made musical instruments stand for the products, which are purchased to be used in musical activities. Hand-made musical instruments, on the other hand, are the kind of materials made in *arts activities* by children with the guidance of teacher to be used in musical activities along with ready-made ones.

### 3.4.2.1 Ready-Made Musical Instruments Used in Preschool Context

This content is generated mostly from the responses of the participants to the following questions in the interview guide:

**Q4:** What kind of musical instruments/materials you use during music hours?

**Q6-A:** (If she selects the products to be purchased) Are there any particular criteria you consider while you select these products to be purchased? If so, what are they?

**Q6-B:** (If she does not select the products to be purchased) Would you evaluate the products you use?

**Q8:** If you had the chance to enhance existing products, what kind of modifications would you like to make?

According to the observations done during the interviews conducted in preshools as well as responses of the participants, most of the instruments are common in every classroom, although there are exceptions. The instruments mentioned are grouped according to their types, materials, and evaluation criteria defined by the participants. Results are given in Table 3.6.

Table 3.6 Ready-Made Musical Instruments Used in Preschool Context

| | | | |
|---|---|---|---|
| MUSICAL INSTRUMENTS | TYPES | PERCUSSIONS | Drums, maracas, bells, tambourine, timbrel, xylophone, rain stick, rhythm sticks, castanets |
| | | MELODIC INSTRUMENTS | Keyboard, xylophone, melodica, block flute |
| | MATERIALS | | Plastic<br>Wood<br>Leather<br>Metal |
| | EVALUATION CRITERIA | CHILD-RELATED | Children's developmental requirements and interests |
| | | TEACHER-RELATED | Teacher's musical background |
| | | PRODUCT-RELATED | Safety, durability, sound quality,versatility, cost |

**Types of Musical Instruments Used in Preschool Context**

Instruments mentioned by the participants are grouped into two, as percussions and melodic instruments as given in Table 3.7. Percussion instruments mentioned by the participants are: drum, tambourine, timbrel, bongo, maracas, rainstick, rhythm stick, wrist bell, hand bell, finger bell, castanet and triangle. Melodic instruments mentioned are: xylophone, metallophone, melodica, block flute, guitar and keyboard. Xylophone and metallophone are grouped with the melodic instruments, although they are percussions. The reason for that is participants categorize them as melodic instruments rather than percussions emphasizing their feature of giving tone.

Frequency of the types of instruments does not reflect the preferences of the participants, but the types which are available in their classroom to be used. Also, some participants mentioned various percussions in response to only one xylophone or a keyboard. Only Participant B, who is a teacher in a public preschool, stated that they have no ready-made instruments available in the classroom due to financial issues. However, she tries to overcome this problem by making hand-made maracas with children.

Table 3.7 Frequency of Types of Ready-Made Instruments Used in Preschool Context

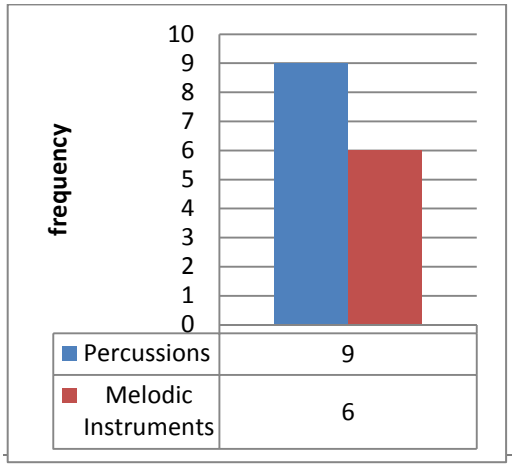


Figure 3.3 Musical Instruments in a Preschool
(Nursery of a Public Institution)

Figure 3.3 presents ready-made musical instruments used in a nursery of a public institution, in which Orff method of music education is used. Various kinds of drums, maracas, rhythm sticks, and timbrels are stored in play room.

**Materials of Musical Instruments Used in Preschool Context**

According to the statements; plastics, wood, leather and metal are the materials of which the ready-made instruments they use are made of. There variants of the same instrument concerning the material they are made of. Instruments are characterized according to their materials as (a) the “original” kind of instrument, and (b) cheaper plastic “replica” of the original one. Figure 3.4 presents an original drum made of wood body and leather skin, and a plastic replica of it drum as named by the participant.


Figure 3.4 Original (A) and Replica (B) Drums
(Preschool Section of a Primary School, Ankara)

Comparing the original and replica instruments; participants emphasized that the former is more expensive and vulnerable, while latter is cheaper but inferior in sound quality. Participants presented an understanding of low and high budget schools, and associating them with the materials of the instruments they use. For instance, they suggested that public schools run with low budget; hence they cannot afford original instruments and prefer their plastic replicas.

> After all, it is a public school. You have a certain level of budget, and it takes a lot of time to replace them [instruments] when they are broken or something. It is upsetting for you when four or five of them get broken in a semestr. (S24, Participant G)

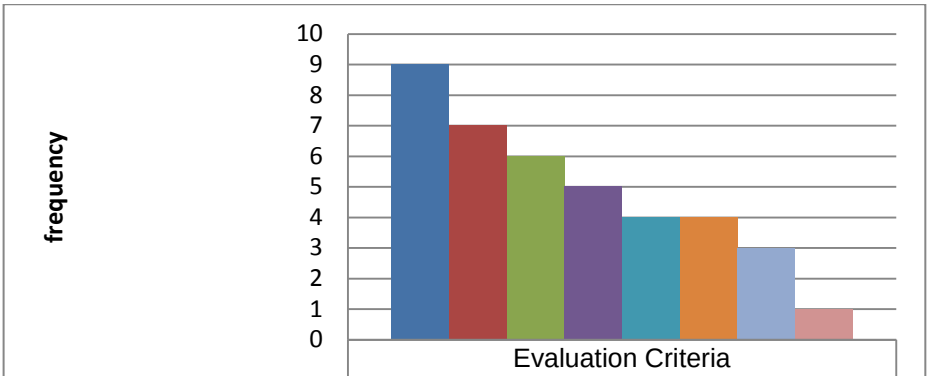
Figure 3.5 Musical Instruments in a Preschool
(Preschool Section of a Public Primary School, Ankara)

Figure 3.5 shows various musical instruments in a preschool classroom. There are different kind of percussions, with an exception of the xylophone (in the middle) being the only melodic instrument. Plastic timbrels are decorated colorfully, while wooden bodies of instruments are remained natural. Surface of the metal keys of the xylophone, the original material of which is wood, are also colored and printed information about the musical notes they are supposed to produce.

**Evaluation Criteria of Musical Instruments Used in Preschool Context**

Participants evaluated ready-made products from several point of views as presented in Table 3.8. These considerations are related to children, teachers and institutions as stakeholders, and product attributes related to them.

Table 3.8 Frequency of the Evaluation Criteria of the Participants about Ready-Made Musical Instruments Used in Preschool Context




| | Evaluation Criteria |
|---|---|
| child's needs and interests | 9 |
| durability of the product | 7 |
| safety of the product | 6 |
| cost of the product | 5 |
| teacher's musical background | 4 |
| repairing opportunities of the roduct | 4 |
| sound quality of the product | 3 |
| hygiene of the product | 1 |

*Child's Needs and Interests (9/10)*

Nine participants mentioned child-related criteria, which include children's developmental requirements such as physical ergonomy, complexity of the instrument, and color. Participant G, for instance, indicated that younger child prefer simple instruments, which he or she can easily grasp and understand how to use. As the child grows older, he or she becomes more curious and explore other possible ways of using them.

> Using colour, proper colour is very important to get attention of children. Having lively colours is important. And it's important that sound should provoke wonder and satisfaction. And while using, they should have fun, also if it is needed to be hold, ergonomics is important. If it is a maracas that is hold, handles of macaras should be ergonomic for the child to hold. Or the size of rhythm sticks should be adjusted according to that. The children's

> hands size should be considered. And next, well, there should have been standards already, related to the instruments we use. But for those to be developed: ergonomics, colour and sound is important. (S25, Participant F)

> Very often, I encounter children sit on their knees, who shouldn't do so for long considering their development. So, I would really want alternative intstruments that can be played by standing, too. (S26, Participant I)

*Durability of the Product (7/10)*

Durability of the instruments are mentioned as an important criteria in product evaluation. It is also parallel with the financial concerns as well as the quality of children's physical interaction with the materials.

> No matter how you teach children using instruments properly, sometimes there are impulsive children. For example, that child remembers for a while but after some time forgets. He or she may put his/her arm like this [on the instrument] or may hit so hard that the instrument blows out. Durability of them may be increased accordind to [age] groups of children. It's also the same with tambourines. Maracas that break quite easily when hit. You may say; there are plastic replicas, but it's important to use real and high quality ones. (S27, Participant G)

*Safety of the Product (6/10)*

Product safety is highlighted as another important evaluation criterion by more than half of the participants, such as avoiding sharp edges and the quality of the materials and the paint. Children's physical interactions with the products may result in unexpected accidents.

> For example, spiky, stringy… We are attentive not to use those kinds. Because child may hurt himself, stick it to his body. [We select] as possible as the harmless ones. Even when choosing finger bells, we don't prefer the ones that have sharp edges. Child can harm himself out of blue. (S28, Participant C)

> Buttons can get to their mouths [throats] as children take everything to their mouths. (S29, Participant D)

> For example, 3 years olds mostly do picking up things to their mouths. As he/she still use his mouth, he takes many things to his mouths. Although in the market almost everything is made in China, at least being harmless and safe is important for us. This kind of criteria is important. (S30, Participant G)

*Cost of the Product (5/10)*

Participants draw attention to the difficulty of purchasing or replacing instruments due to financial issues. The insufficient quantity of the instruments is mentioned as a reason for an unsatisfactory learning environment. The term “budget” is frequently mentioned to highlight the financial concerns rised by the school administration rather than the educators.

> You see, if there are 20 children, there should be 20 drums, 20 macaras, and all other 20 things. Supposing that there are 20-40-60 students in this school, cost will be devil a lot. Frankly, I don’t know, but no one would budget that much for music education. (S31, Participant E)

*Teacher’s Musical Background (4/10)*

Participants highlighted their position of directing children in using musical instruments. They suggest that their musical background and experience is an important factor, which effects the quality of their interaction with the product. importance of teachers’ musical backgrounds as well as the products’ enabling them to be facilitators for children in usage of musical instruments.

*Repairing Opportunities of the Product (4/10)*

Participants mentioned repairing or post-using of musical instruments as a strategy they use for prolonging product life. It is also suggested as an activity that could be carried out with children.

> Well, when our materials become worse, we can fix them with children as an activity. (...) Or, when something happens to buttons of the keyboard, we can talk with children about what we can do; and getting their opinion, we can do different things. I mean, solutions can be generated together with children. (S32, Participant D)

Materials of the instruments are also evaluated in terms of enabling repairing of the product or not. For instance, Participant C suggests that leather skin of a drum can

be repaired or replaced, while plastic ones are not (Figure 3.6). Similarly, Participant I indicates that a broken wooden part of an instrument can be fixed or replaced, but it is not possible to repair broken plastic parts.

> [referring a drum that is taped after its leather skin is torn] We use,yes, we use fixing it. [referring a plastic drum] This is so fragile, and well, there is no chance to fix this. When it's broken, it goes waste. (S33, Participant C).

Figure 3.6 Torn Skin of a Leather Drum Repaired With Tape

*Sound Quality of the Product (3/10)*

Musical instruments are also evaluated by their quality of sound, such as tone discrimination, which means the instrument's quality to give clear sounds. Materials of the instruments are thought to be an important factor that effects on the sound quality. Plastic replicas of xylophones, tambourines, or timbrels, for instance, are found unsatisfactory in these terms.

*Hygiene of the Product (1/10)*

Only one participant draws attention to the possible hygiene problems due to the shared use of wind instruments. The reason why other participants did not mention

hygiene of the products as an evaluation criteria may be because they mostly consider rhythm instruments, use of which are more common in preschools.

#### 3.4.2.2 Hand-Made Musical Instruments Made/Used in Preschool Context

Making hand-made instruments with children is a common *arts activity* in preschools, as mentioned by all of the participants. The content of this sub-theme is generated from the following question is in the interview guide:

**Q6:** Do you ever make musical materials/toys with children? If so:

**Q6P1:** What kind of materials/toys do you make?

**Q6P2:** Why do you prefer to make them instead of using ready-made products? Ready-made products' falling short of expectations, being an opportunity to make an activity with children, etc.

Three categories emerged under this sub-theme: kinds, and materials of hand-made musical instruments made/used in preschool context, and the evaluation criteria of the participants about them (Table 3.9). The content of the first category is the kinds of instruments made in a preschool classroom. In second category, kinds of materials used to make these instruments are listed. Lastly, strengths and weaknesses of using such instruments are compiled.

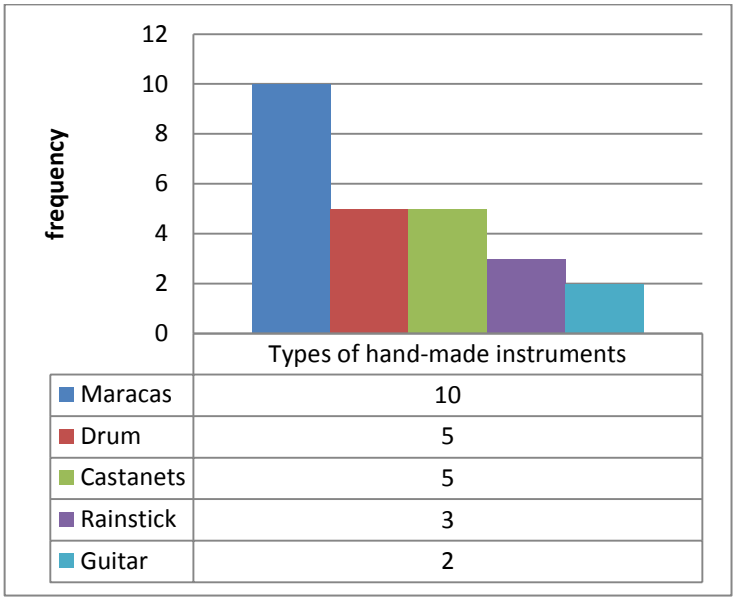
Table 3.9 Hand-Made Instruments Made/Used in Preschool Context

| HAND-MADE MUSICAL INSTRUMENTS | | | |
|---|---|---|---|
| KINDS | MATERIALS | EVALUATION | |
| | | STRENGHTS | WEAKNESSES |
| Maracas | Containers, contents | - Transparency of the process<br>- Personalization opportunities<br>- Accessibility of materials<br>- Variety of sound | - Low sound quality<br>- Low visual quality<br>- Short life-span |
| Drum | Bodies, skins, binding materials | | |
| Castanets | Bodies, binding materials | | |
| Rain stick | Containers, contents, barriers | | |
| Guitar | Bodies, strings | | |

**Kinds of Hand-Made Musical Instruments Made/Used in Preschool Context**

Musical instruments made in preschools are imitations of ready-made musical instruments. Five specific instruments are mentioned by the participants. These are: maracas, drum, castanets, rainstick, and guitar (Table 3.10). Among these, guitar, which has been mentioned twice, is the only melodic instrument. The rest are percussions and their ready-made counterparts are also mentioned to be used in preschools (Section 3.4.2.1).

Table 3.10 Frequency of the Kinds of Hand-Made Musical Instruments in Preschool Context




| | Types of hand-made instruments |
|---|---|
| Maracas | 10 |
| Drum | 5 |
| Castanets | 5 |
| Rainstick | 3 |
| Guitar | 2 |

*Maracas (10/10)*

A *maraca* is a percussion instrument made of a gourd shell with dry seeds in it (Harvard Dictionary of Music, 1974, p.504). All of the participants mentioned making maracas with children as an arts activity, and they are used in music hours.

Maracas are made by a container material such as waste PET bottle, cardboard milk carton or can with a kind of ingredient such as dry legumes, stones or beads in it. The tone of the instrument varies according to the container and ingredient used.

Children can personalize the instruments they make by decorating them. These instruments are then used in musical activities to keep rhythm.

Figure 3.7 A Hand-Made Maraca Made of PET Bottle and Dry Beans
(Nursery of a Public Institution, Ankara)

Figure 3.7 shows a hand-made maraca. Waste PET bottle is used as a container with dry beans in it. Exterior surface is ornamented with fringed strip.

*Drum (5/10)*

In general sense, a *drum* is a stretched skin over a frame, which produces sound when hit by hand or a stick (Harvard Dictionary of Music, 1974, p.263). Five of the participants mentioned making drum as classroom activity. Participant E indicates that they tape acetate film upon a plastic bucket and decorate it to make a drum. However, she emphasizes the fact that this instrument does not provide a sufficient sound quality, and she only aims to visualize it for children.

Creativity of the teacher becomes prominent in making musical instruments concerning the materials and methods used. For instance, Participant I mentiones making a pot-drum with pot as a frame and parchament paper as skin. Plastering each layer with wallpaper paste, a number of parchaments are upholstered around the frame, and then it is left to dry out to stretch. Shrinkage property of the paper provides a stronger surface tension, hence better sound quality.

Participants F and G states that they use pieces of rainwater pipes approximately 20 cm in diameter as drum frames. They stretch elastic materials such as balloons upon the frame as drum skin. These participants work in the same preschool; hence, it is possible to say that sharing experiences lead to the spread of materials and methods in making hand-made instruments.

Participant A states that children themselves use plastic barrels as drums by turning them upside down. According to her, previous experience is an important motivation for children, since they have seen drums in various contexts such as wedding ceremonies.

*Castanets (5/10)*

*Castanets* are “clappers” made of two sets of wooden pieces bond with strings which fits to the player’s fingers (Harvard Dictionary of Music, 1974, p.153). Five participants stated that they make castanets with children.

> In our classrooms, we make castanets by fixing the dimidiated and emtied walnut pieces onto the front [inner] facets of a paper [carton]. (S34, Participant F)

*Rainstick (3/10)*

*Rainstick* is an emptied tubular wood, which is then filled with materials such as seeds, cactus needles, and grains. As the rainstick is turned upside down, the inside content pours slowly within the natural barriers caused by the inner wall of the wood, giving a sound effect like raining (Birchfield, 2004). Three participants state that they make rainstick with the similar method of making maracases. Only the dimension of the container is bigger, and it is pierced with additional materials to create barriers.

*Guitar (2/10)*

A *guitar* consists of strings on a flat back body (Harvard Dictionary of Music, 1974, p.378). Two participants mention making primitive guitars. One of them states that she did not make such an activity in classroom, but she has seen examples of it.

> They mostly resemble existing musical instruments. Well, for example reeving rubber thread or strings on boxes, tall boxes. (S35, Participant F)

**Materials used for making hand-made instruments**

There are various materials used for preparing hand-made instruments. These may be waste materials such as empty packaging, mundane materials such as dry legumes, balloons and strings, as well as stationary equipments.

Participants tend to list these materials according to their functions for particular instruments, even though they do not specifically mention these functions. Data is interpreted accordingly, as a collection of used materials for a particular function for each instrument kind. Results are shown in Table 3.11.

Table 3.11 Materials of Hand-Made Musical Instruments in Preschool Context

| MATERIALS USED FOR MAKING HAND-MADE INSTRUMENTS | | |
|---|---|---|
| MARACAS | **CONTAINER** | Waste/empty bottles and boxes: plastic, metal or cardboard |
| | **INGREDIENT** | Dry legumes, bead, button, stone, sand, shell |
| DRUM | **FRAME** | Clay pot, installation pipe |
| | **SKIN** | Acetate film, paper, rubber balloon |
| | **BONDER** | Adhesives, rubber string |

Table 3.11 Materials of Hand-Made Musical Instruments in Preschool Context (Continued)

| | | |
|---|---|---|
| CASTANET | **BODY** | Walnut, plastic box, cardboard |
| | **BONDER** | Rubber string (for finger grip), adhesives |
| RAINSTICK | **CONTAINER** | Paper towel roll, cylindrical chips box |
| | **INGREDIENTS** | Beads, dry legumes |
| | **BARRIER** | Pin, stick, pencil |
| GUITAR | **BODY** | Waste/empty boxes |
| | **STRINGS** | Rubber string, rope |

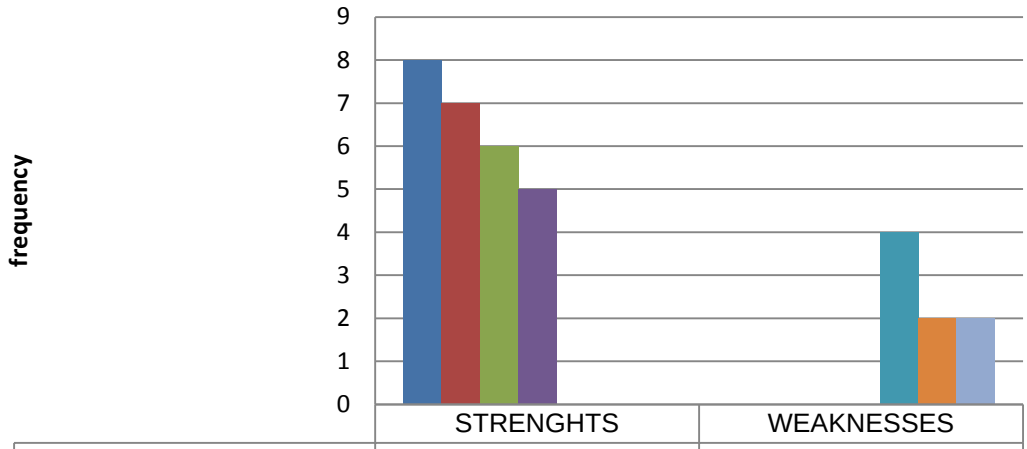
**Evaluation of hand-made instruments**

Participants state particular strengths and weaknesses of making and using hand-made instruments. Positive statements are related to the instrument making process, while negative ones are related to the usage phase. Table 3.9 summarizes this evaluation in terms of strengths and weaknesses.

*Strengths of hand-made musical instruments*

When asked the reasons why they prefer to make hand-made musical instruments with children, participants mentioned four positive features superior to ready-made musical instruments besides three weaknesses as shown in the Table 3.12.

Table 3.12 Frequency of Strengths and Weaknesses of Making and Using Hand-Hade Musical Instruments




| | STRENGHTS | WEAKNESSES |
|---|---|---|
| personalization opportunities | 8 | 0 |
| variety of sound | 7 | 0 |
| accessibility of materials | 6 | 0 |
| transparency of the process | 5 | 0 |
| low sound quality | 0 | 4 |
| low visual quality | 0 | 2 |
| short life-span | 0 | 2 |

*Personalization opportunities (8/10):* Making musical instruments is a hands on activity, which includes children to the production process from the beginning. Hence, children act as actors in selecting the type and amount of materials; they can make combinations, and decorate them.

> You can have various tones and timbre through ingredients you use. The sound changes as you use stones, sand, peas, dry beans, or lentil. You can paint the outher surface, and decorate. You can make a great variety of maracas. (S36, Participant G)

Since children take initiative in decision-making process, they appreciate what they make, and they use them with joy.

> But they value the ones they make more than the others. They say “Hey, this is the one I made!”. They appreciate their values, they use them with joy and embrace them. (S37, Participant D)

Figure 3.8 A Hand-Made Maraca Made of Medicine Box
(Nursery of a Public Institution, Ankara)

In Figure 3.8, container of the maracas made of a medicine box is decorated with a cord, which also functions as a name tag (“Nehir”).

*Variety of sound (7/10):* Participants mentioned the richness of sound obtained with hand-made musical instruments. The variety of materials used in this activity is reflected upon the richness of auditory experience. Children explore sound qualities such as tone and timbre by trying various combinations of materials.

> For example, we have six pair of cans. As ingredient, we put tea, peas, lentil, pieces of paper, stones for each pair. We cover their top facets with the same kind of paper. So, when you give them to children intracately, and they find the same kind of sound. Both play, and auditory perception. (S38, Participant I)

*Accessibility of materials (6):* Participants highlighted the advantage of easy access to the materials which are used to make hand-made musical instruments. Waste and mundane materials, as well as materials from nature can be used to build these instruments.

> Because it is easy to make, you access the material easily. For example, we tell children to bring the empty boxes at your homes, we will make toys, maracas, musical instrument out of them. Then everyone brings something. (S39, Participant C)

It is also a way to overcome the financial constraints. Hand-made instruments are offered as a replacement for ready-made products for a qualified learning environment if it is not possible to provide enough instruments for children. Participant B stated that they have difficulty in ready-made musical instrument supply, and they solve this problem by making hand-made maracas with children. Participants E and J presented hand-making musical instruments as an alternative to purchasing ready-made products in order to overcome financial constraints. Participant H, on the other hand, suggested that although professional instruments are attractive, it is always possible to make even an orchestra with materials such as waste materials, paper, or natural materials.

*Transparency of the process for children (5/10):* Participants draw attention to the positive impacts of the instrument-making process on cognitive development of children. They learn by doing; examining, experimenting, decision-making, and creating a product in the end. They can instantly see which material produces what kind of sound.

Participants also stated that except from financial difficulties, they do not perceive hand-made instruments as an alternative to read-made ones. Although ready-made products are more successful concerning musical performance, the production process of hand-made instruments is more satisfying in terms of self-learning.

*Weaknesses of hand-made musical instruments*

As participants stated, there are also weaknesses of hand-made instruments. This data is generated through participants' comparisons hand-made instruments with ready-made products especially in usage after production process.

*Poor Sound Quality (4/10):* Participants stated that the finished hand-made instrument which is ready to use is weak in terms of sound quality. These instruments provide an opportunity for children to explore various sounds; however,

they fall short in terms of producing a satisfying “right” instrument sound when compared to ready-made products.

Participants E and Participant I suggested that craftsmanship is an important factor that effects the sound quality of the hand-made instruments. The difficulty of stretching the skin of a drum around the frame, for instance, is indicated by Participant E as a reason for poor sound quality of the instrument. Participant I suggested that children may use less or more ingredient than necessary; hence the sound of the hand-made maracas might not be satisfactory.

*Low Visual Quality (4/10):* Participants stated that, although named as “drum”, “guitar” and so on, these instruments may not be satisfying in terms of resemblance to ready-made products due to craftsmanship.

*Short life-span (2/10):* It is also stated by the participants that craftsmanship or materials used may reduce the lifetime of hand-made instruments.

> Of course, we keep them here; but thrown when it becomes worse. If there are dry legumes inside, they may become infested. I throw out a lot. (S40, Participant D)

> But it may not be durable; it may be torn after a while. (S41, Participant I)

The reason why only two participants suggested short life-span of as a weakness hand-made musical instruments may be because their durability is beyond expectations. Throwing away a hand-made musical instrument is not a significant financial lost, since they make them out of waste or mundane materials.

### 3.4.3 Other Findings

Data analysis also resulted in an undersigned theme covering the age characteristics of children that effect their musical experiences. Content of this theme is generated through participants’ responses concerning their current experiences as well as previous ones.

Musical interests and abilities of children between 3 to 6 years old are not homogenous. Children's interactions with musical instruments change as they grow up. Participants mentioned these changes by refering children as "3 to 4 years old", "younger children" or "as they grow older".

**Age Characteristics Concerning Child-Instrument Interaction**

As participants' statements are reviewed, it is possible to say that the processes of changing interaction models are related to the physical and cognitive development of the children. Younger children interact with the musical instruments and environments in a more physical way, while older children develop a more complex and technical interaction in accordance with their cognitive development. According to that, following categories are formed concerning age characteristic:

- Technical level of the child in using musical instruments
- Attention span of the child and complexity in using musical instruments

It should be highlighted that *physical interaction* and *cognitive interaction* mentioned above do *not* suggest that younger children interact only physically and older children only cognitively. Physical and cognitive interactions are integrated processes. As participants stated; younger children, who need to develop their motor skills, tend to have a more physical interaction with instruments rather than presenting complex techniques. As children grow, they show a more complex -also physical- interaction due to their cognitive developmental level.

*Technical level of the child in using musical instruments*

This sub-theme is about the level of children developing certain strategies in using musical instruments such as developing techniques to obtain an intended quality of sound. Physical and cognitive development level of children is an important factor in technical advance. It is stated that plastic replicas of some instruments may be more appropriate for younger children concerning both the ease of grasp due to its lightweight, and preventing the damage of instruments.

> Plastic materials are a bit more appropriate for 3 year olds. You know why? They can experience how to hold, hit, strenght of hitting with plastic. Because some children hit it so hard that it is worn through. (S42, Participant H)

Participant C mentions the use of keyboard by younger children, fine motor skills of whom are not developed enough to stroke one key each time. It is not only difficult, but also not meaningful for them to make music with a keyboard. She stated that children stoke many of them at once for fun instead of using it purposefully.

*Attention span of the child and complexity in using musical instruments*

The concentration time of children was also mentioned by the participants. According to their statements, children can focus on an activity longer as they grow older. Also, as children grow, their various musical experiences become more complex. Younger children prefer to engage in more simple activities while older children develop a curiosity on the material to explore its potential.

> Curiosity arouses [as child grow up]. 3 years old touches, examines, and puts that back if he can not understand how to use it. But as he grows older, he begins to explore it. Asks himself: “What can I do with it?”. He experiments it, because his sense of curiosity changes. (S43, Participant G)

In this chapter, data analysis and findings of the field study was presented. In the next chapter, findings of the field study and literature review will be interpreted as suggestions for musical toy designers.

# CHAPTER 4

# CONCLUSION

In order to provide a strong background for musical toy design process, this study seeked for the possible ways of enriching musical experiences of preschool children through musical toys, considering their developmental needs and characteristics, as well as educational concerns regarding the requirements for preschool experiences. In order to find answers for the research questions declared at the beginning of the thesis; a versatile literature survey, and field study for having an opinion about the state in Turkey were conducted. In this chapter, an overview will be made to present the answers found to research questions addressing concluding remarks, and suggestions for further study.

## 4.1 Research Questions Revisited

The main research question of this study was as follows:

> *In which ways musical toy design for preschool children can enrich musical experience considering the developmental needs of children and educational requirements?*

Putting child's developmental and educational needs at the center, a great deal of literature survey consisted of an overview of relevant developmental psychology as well as pedagogy literature. In addition to that, the review of recent studies concerning toy and musical toy design for children also provided the theoretical basis for the study. Field study was conducted to enlighten the practical implications of theories and methods presented in literature review concerning the factors in usage context in Turkey. In this section, answers to the following research questions will be presented with an overview of both literature and findings of the field study:

- What are the factors related to preschool children to be considered when designing musical toys?
- What kind of music materials are used and musical activities are conducted in preschool context?
- What sorts of outcomes are expected to be gained by preschool children from musical experiences?

### 4.1.1 Factors Related to Preschool Children to be Considered When Designing Musical Toys

The answer to this specific question was seeked in literature review. These factors include developmental characteristics of children regarding their capacities and skills to be supported; the ways through which children learn and develop skills; educational requirements concerning material and social environment, and expected outcomes for the child; functions of play and toys as they serve for development of the child; musical characteristics of preschool children considering their capacities and the skills to be supported.

Developmental psychology and pedagogy literature present a highly consistent body of knowledge of how children interact with their material environment due to their developmental level, and what kind of experiences are expected to be provided through this medium in musical activities in preschool context. However, a comprehensive source concerning developmental and educational considerations of musical toys is not available for designers. Design research; however, is recently interested in producing design knowledge in this field, and design projects are conducted based on knowledge from developmental psychology literature.

Music is an important foundation for children, which have positive effects on developing several skills such as critical thinking, creativity, imagination, collaboration (Platz, 2010), or academic skills such as mathematics (Mertoğlu, 2010). It is also motivates physical response (Metz, 1989; Miyamoto, 2007). Recent neurobiological findings also support this point of view (Jourdain, 2002; Sacks, 2007).

Piaget (1962), Montessori (1949) and Erikson (1987) suggest that child development occurs within stages, in which children present several characteristics. Preschool children are passing through a very sensitive period. This is a dynamic process, through which their cognitive, social and motor development accelerates (Singer and Revenson, 1996; Montessori, 1949). This dynamism is also reflected upon their material interactions, which is effected by their cognitive, social and physical abilities. Not only providing usability concerning these constraints, but also giving room for the child to develop new skills is essential to be presented by a developmentally sound musical toy.

Children learn through their own material interactions. Developmental psychology literature, which provides basis for early childhood education methods, suggests that children should be provided a rich material environment in which they can explore and experience, and build their own knowledge. According to Erikson (1987), children begin to master in using materials, especially toys; and enjoying the newly acquired skills of theirs. Montessori (1949) and Piaget (1962) also draw attention to the importance of physical exploration for cognitive development of the child.

In preschool period, social development takes a turn that children become more socially outgoing and cooperative (Honig, 2005). Also, social environment emerges as a learning context for children. Peer collaboration is suggested as an effective way of building knowledge and skills (Vygotsky, 1997; Montessori, 1949; Erikson, 1987). Hence, the child's material environment should give room for individual explorations, as well as promoting peer sharing.

Play is the dominant context in preschool period. Piaget (1962) and Vygotsky (2002) perceive play as an effective source of development, through which they master in various skills. According to Erikson (1978), play is significant for further life, since children built identities through play by exploring possible relations and roles. Frost et al. (2008) draw attention to the importance of play concerning physical, social and cognitive development of the child. Play is a dynamic context during which children are in charge, and constantly adopting new roles and skills.

Toys are tools which encourage specific behaviors in play context. Not only toys effect the nature of play, but also children change the nature of toys by attributing

diverse meanings in accordance with their intentions. Preschool period, which is identified with *symbolic*, *imaginative*, or *make-believe* play referring to the same type (Piaget, 1962; Vygotsky, 2002), is significant regarding use of materials. Hence, open-ended toys that may adapt into various contexts are valuable in terms of encouraging child's imagination.

Musical play is a considerably new subject in developmental psychology field. Instead of being a new play category, it is rather interpreted as an added quality to existing categorizations such as Piaget's (Tarnowski, 1999; Niland, 2009). Musical play is also related to the cognitive, physical and social development of the child. Musical play of preschool children is parallel with symbolic play. It includes a wide range of activities such as sound explorations, moving to music, or playing an instrument. However; not only musical instruments, but also unstructured or mundane materials may be a medium for musical play (Niland, 2009; Smithrim, 1997 as cited in Berger, 2003).

Musical development level of the child is significant as it effects the activities they engage in and their way of using musical toys. Musical development theories of Serafine (1984), Swanwick and Tillman (1986), and Gardner (1973; 1990) suggest a cognitive-oriented approach. Among them, works of Swanwick and Tillman, as well as Gardner present a stage-based structure, suggesting that preschool children are in a particular state of mind that effects their musical experiences. In this period, children try to develop strategies to use a music material, concentrate on sound manipulations, use music as an expressive tool, be uninterested in conventions and use the materials on their own way. A musical toy should be versatile enough to present this kind of experiences for the child.

Dalcroze Eurhytmics and Orff Schulwerk are music education methods that can also be applied in preschools. Musical concepts are given to children in a playful way, integrating use of body and rhythm instruments in particular. These methods also present an understanding of developmentally appropriate musical activities. Children in preschool age tend to concentrate on the rhythmic quality of music in terms of bodily responses and music production. This may be a standing point for designers concerning what kind of activities to facilitate through a musical toy.

Educational approaches, as well as national preschool programs, are consistent with developmental theories. Material exploration, social learning, and the importance of play are emphasized in this methods and programs. Another prominent concept is the role of adult as a facilitator, and even an active participant of preschool activities. Along with educational approaches and other national preschool strategies scrutinized, national preschool education program of Turkey suggests particular activities and materials in regard with the expected skills to be gained by the child. These considerations may form a basis for design implications that will satisfy the expectations.

National preschool education program of Turkey also presents a flexible curriculum, which gives the teacher the freedom in choosing the activities to be conducted and materials to be used. This significance of preschool teachers in implementing preschool program makes them secondary users of the products to be designed for preschool children.

Apart from that, flexibility in implementation of the preschool education program results in diversity and unpredictability of the usage context, which raises the need for a field investigation. Conclusions concerning the usage context are presented in Section 4.1.2 and 4.1.3.

### 4.1.2 Kinds of Music Materials Used and Musical Activities Conducted in Preschool Context

The answer to this question is mainly seeked in field study. Various types of activities involve music, and various musical materials are used in preschool context as presented in Section 3.4.1 and 3.4.2.. In this and the next section, answers related to classroom experiences will be presented with interpretations on design implementations, which would enrich these experiences.

#### 4.1.2.1 Kinds of Music Materials Used in Preschool Context

Ready-made and hand-made musical instruments, as well as CD players and CD's are the materials used in preschool context. Among them, musical instruments are the materials, which are directly used by children.

Use of percussion instruments is dominant in preschools. Use of melodic instruments, on the other hand, is limited due to musical development level of children, as well as musical background of the teacher. Designers should note that musical toys that promote rhythm experiences would have more effective usage in preschools.

Plastic, wooden, leather and metal are the materials that ready-made instruments are made of. This result becomes meaningful when interpreted along with the evaluation criteria of these instruments presented by the participants. Kind of the material not only effects the musical experience of the child, but also its durability, cost, and repairing opportunities of the product.

Each criterion of the participants about ready-made musical instruments manifests a design consideration for musical toys. According to that, a musical toy should;

- meet the developmental needs of children and raise interest;
- be durable, safe and affordable;
- enable teachers in guiding children in musical activities;
- present opportunities for repairing and re-using,
- and meet musical quality standards.
- Also, hygiene raises as another concern, since the instruments suggested are not private property, but common materials used by all of the children in a classroom.

Participants value both sound quality and visual appeal of ready-made musical instruments; however, this also brings a conflict. Material choice effects the quality of the sound, as well as the opportunities of surface treatments. Plastic imitations present a wide range of color and graphical pattern alternatives, but they fall short of the required sound quality. Original materials such as wood and leather, on the other hand, are satisfying in terms of their clear sound, while being visually less appealing for children as well as far from being affordable. This may be a result of the perception presented by the participants that colorful plastic variants are “toys” rather than “instruments”, and qualified instruments are considered to be performance oriented instead of being a play material. A musical toy, however,

should present both qualities. If a musical toy provides visual appeal as well as a satisfactory sound quality, it would fit in many different activities; most importantly in musical play, by arousing child's interest in terms of its visual quality and various sound exploration opportunities it presents.

Hand-made musical instruments, which may be an interesting source of inspiration for designers, are very common in preschools as participants stated. Similar with ready-made instruments, these are also dominated by percussions, since it is easier to both make and use. Hand-made musical instruments are remarkable in such a way that they present various kinds of experiences, which ready-made products do not provide.

The evaluation criteria of the participants as strenghts and weaknesses regarding hand-made instruments also present a set of considerations for musical toy designers. First of all, the production process of the instruments is found quite beneficial for cognitive development of the child. Hand-making musical instrument is a process-oriented activity instead of a performance-oriented one. Ready-made instruments fall short of satisfying this need. Hence, this may be a source of inspiration for designers to develop musical toys that facilitate a richer exploration experience for children.

Another strength of hand-made musical instruments is that they provide a prolonged and satisfying musical experience for the child, since they present a variety of personalization opportunities as well as sound explorations. Ready-made instruments, however, are weak in this regard. They are more structured and stable, while hand-made instruments are structured by the child himself. A musical toy that allows personalization in a way that hand-made instruments do would encourage children to explore possible varieties, and engage in various musical activities with joy.

Not only variety of sound they provide, but also accessibility of materials for hand-made musical instruments is an important standing point. Waste and mundane materials gain value in this process, by providing richness that ready-made products are lack of. Hence, integrating or embedding such kind of materials into musical

experience presented by musical toys would also enable personalization whilst promoting auditory development of the child.

Three weaknesses of hand-made musical instruments as mentioned by the participants are poor sound and visual quality, and short life span. The level of craftsmanship effects these qualities. However, the expectations from hand-made musical instruments are mostly in making phase instead of usage. Being a ready-made product; however, it is essential for musical toys to be satisfying in this regard. This way, musical toys may promote a richer and more qualified interaction than hand-made musical instruments do. Also, half-way product opportunities may also be explored by the designers to provide the strengths of hand-made musical instruments in terms of personalization and sound variety.

#### 4.1.2.2 Types of Musical Activities Conducted in Preschool Context

According to the results of both literature and field study, it is possible to say that in preschools, activities are learning contexts in which children experience various ways of “doing things”. Instead of didactic teaching, children are encouraged to interact with their social and physical world.

As stated in the above section, use of ready-made and hand-made rhythmic instruments are the common musical activities mentioned by all of the participants, through which children gain a musical background that is appropriate for their musical development level. Use of melodic instruments, on the other hand, is restricted. However, it is possible to include the concept of melody into musical experiences with a musical toy to nourish the musical development of children as a background for further musical experiences. Besides, teaching musical concepts such as high and low pitched sound is stated by the participants to be a part of sound exploration activities in preschools.

Field study resulted in various kinds of activities that include music in a way, with or without use of music materials. These are not only activities conducted for experiencing music, but also the ones for which music act as a facilitator such as drama/role playing and moving to music. Since it is fun and motivating, as the participants stated, use of music in preschool activities is far more than suggested in the national preschool program. Hence, this may be an important point for

designers, which put emphasis on the integration of musical toys into various preschool activities. The experiences without use of material may also be enriched with musical toys.

Moreover; preschools encourage activities that are playful for children, since play is a learning context for them. Play is “the language of the child”, as one participant stated. It is a dynamic context, during which children can explore various physical and social experiences. Toys also have the power on the quality of play experience. Regarding that, the quality of a musical toy enabling such a dynamism and adaptation into diverse contexts would add value to the musical experience of the child.

As one participant stated, toys offering alternative physical interaction models may also be an important standing point for designers. Musical instruments generally offer a limited physical action to produce sound such as grasping and shaking, grasping and hitting, or just pushing buttons. Moreover, they usually do not facilitate, for instance, use of them in activities in which children are standing up or be mobile. Movement is not only an essential part of the preschool curriculum, but also an integral part of musical activities. Moving to music is stated by all of the participants as an important musical experience. Existing products; however, present only a limited physical use of hands and arms. A developmentally sound musical toy, which also fits in the curricular activities in preschool, may offer opportunities for children to experience more integrated activities that musical instruments do not.

### 4.1.3 Outcomes Expected to be Gained by Preschool Children from Musical Experiences

Musical activities, likewise all the other activities in a preschool classroom, are designed for specific purposes. Results of the field study show that musical experiences are expected to serve for various musical and non-musical benefits for children. Also, the outcomes of these experiences are expected to provide both short-term and long-term benefits to the child.

Similar with musical instrument evaluation criteria, each expectation of the teachers may be a standing point for designers to satisfy that intended outcome, although

musical experiences usually serve for gaining more than one skill at a time. Play is never only a play for preschool children; hence, intended educational requirements set a frame of the skills of the child to be nourished through musical experiences.

Making musical instruments by hand, is a strategy developed in preschool context for satisfying the need for enhancing the auditory development of the child, which ready-made musical instruments fall short of. What hand-made musical instruments are weak at is the quality of sound and appearance they present as mentioned previously. Designers may take the enhancement of auditory development of children as basis, enabling children to engage in experiences in which they can explore various properties of sound and music in a playful and qualified way.

As stated by the participants, music is a very powerful tool for preschool teachers to promote certain activities. Musical experiences are expected to be integrated in them to enhance learning environment. Hence, identification of these activities and investigation of the needs for these particular contexts would be helpful for designers to enrich these experiences for children through musical toys.

Participants suggested music as an expressive tool for children. A musical toy that enables self-expression as a way of alternative communication would be valuable in this concern.

Moreover, musical experiences are thought to be beneficial for cognitive development of the child by presenting opportunities that develop problem-solving skills, concept of cause-effect relationship and so on. This expectation constitutes a significant function for designers to consider in developing musical toys. A musical toy that presents potential versatile interactions would enable children to engage in several experiences that promote cognitive development.

Additionally, musical experiences are expected to be enjoyable and relaxing. Although there is always an educational concern, it should be noted that one of the key factors of these activities is child's voluntarily engagement with joy. Long instructions and restricting actions in order to be able to use a musical toy properly would bore children, and be far from being a "toy".

## 4.2. Other Concluding Remarks

Participants shared their experiences regarding age characteristics of children in musical activities. According to that, children present a changing interaction with the same musical instrument due to their developmental level. Although every child is unique in this sense, designers may explore possible ways of enabling children in different developmental level to engage in meaningful experiences through an evolving product, if not designing musical toys or them separately.

Although not specifically mentioned by the participants, the importance of social environment is a significant character in preschools. This is a context which acts upon the activities conducted and experiences gained. Also, the importance of peer collaboration for child's learning is emphasized developmental psychologists and educational methodologists as mentioned in 2.1. Hence; not only individual interactions, but also opportunities for multiple user scenarios may be explored by designers in order to enrich the musical experience as well as learning environment for children.

## 4.3 Implications for Practice

This section presents a summary of suggestions for musical toy designers concerning the conclusions drawn from both literature review and field study. Suggestions do not imply that they all should all be implemented in a single product, but highlight possible design contributions for specific concerns to enrich musical experiences of preschool children.

Table 4.1 Suggestions Related to Children's Needs

| SOURCE OF CONSIDERATION | SUGGESTIONS FOR MUSICAL TOY DESIGNERS |
|---|---|
| LR, MI, MA, EO | Present opportunities of exploring various musical concepts such as **rhythm, pitch and tempo** |
| LR, MI, MA, EO | Integrate use of **waste and mundane materials** into musical toys to enrich **sound explorations**, hence cognitive and auditory development |
| LR, MA, OT | Enable **single** as well as **multi-user** usage scenarios |
| LR, MA | Promote **music and movement** integration for an enriched experience and support physical development |
| LR, OT | Present **evolving** features to enable and raise interest for children in different developmental levels |
| LR, EO | Promote **self-expression** as an alternative way of communication |
| EO | Promote **joy and relaxation** for children |
| MI | Guarantee **safety** and **hygiene** for single and multi-user scenarios |
| **LR** *Literature review* **MI** *Musical Instruments* **MA** *Musical Activities* **EO** *Expected Outcomes* **OT** *Other* | |

The table above presents possible design contributions regarding the developmental needs of children as well as safety and hygene issues. Although each suggestion in this section is related to children and their product use, the ones presented in the table above are directly related to the musical experiences of the child.

Table 4.2 Suggestions Related to Teachers and Learning Context

| SOURCE OF CONSIDERATION | SUGGESTIONS FOR MUSICAL TOY DESIGNERS |
|---|---|
| LR, MI | **Enable teachers** in guiding children by presenting potentials of the toy clearly |
| LR, MA | Enable **versatility and adaptation** of musical toys into the dynamic context of play |
| MA | Explore possible uses of musical toys in **various preschool experiences** by investigating the needs for these particular activities. |
| **LR** *Literature review* **MI** *Musical Instruments* **MA** *Musical Activities* **EO** *Expected Outcomes* **OT** *Other* | |

Table 4.2 summarizes the suggestions for Musical toy designers regarding the educator and educational environment. Enabling teachers, since they are secondary users and guiders of children, and the adabtability of the toy into diverse and dynamic preschool learning context are suggestions in this part.

Table 4.3 Suggestions Related to Product Attributes

| SOURCE OF CONSIDERATION | SUGGESTIONS FOR MUSICAL TOY DESIGNERS |
|---|---|
| MI, MA | Present **half-way** products and/or enable **personalization** opportunities for a prolonged and satisfying experience. |
| MI, MA | Guarantee a satisfying **sound quality** and **visual appeal** |
| MI | Present **repairing and reusing** scenarios both as an alternative preschool activity, and to prolong the lifetime of the toy |
| **LR** *Literature review* **MI** *Musical Instruments* **MA** *Musical Activities* **EO** *Expected Outcomes* **OT** *Other* | |

Table 4.3 presents suggestions related to product attributes which are strategies for product longevity, as well as audial quality and visual appeal.

As seen in the tables, there are various ways through which designers may contribute to the enrichment of musical experiences for preschool children. A multi-disciplinary investigation to better understand the user needs and usage contexts from a designer's point of view would not only inspire design practice, but also help the development of design research by producing required design knowledge.

### 4.4 Implications for Further Study

The scope of this study was to explore possible design contributions on musical toys, which would enhance the musical experiences of preschool children. Hence, an investigation of child's developmental needs and educational requirements was found necessary.

Due to time limitations, field study was conducted with the contribution of a limited number of participants. Moreover, this study concentrates on the general environment of preschool experiences gained through a variety of activities and materials. Hence; a more detailed investigation seeking for a specific design contribution area would be helpful in order to determine the needs of that particular context.

Preschool educators are chosen as participants of the field study due to their significant role in designing curricular activities, which results in a body of diverse preschool experiences as well as forming basis for the contexts in which musical toys will be used. In addition to their expert opinion, a study conducted directly with children would enrich the results.

Concerning the scope of the study, human factors were not explored. However, results of a detailed investigation on this subject would provide an important source of knowledge for designers.

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## APPENDIX A

## INTERVIEW GUIDE (ENGLISH VERSION)

**Q1:** What is your original expertise?

**Q1P1:** Preschool teacher, child development specialist, psychologist, etc.

**Q1P2:** How long have you been working in this job?

**Q2:** Can you briefly talk about what do you do in a regular school day?

**Q2P1:** How does music is included in these activities?

**Q3:** What do you think about the contribution of music to child development?

**Q3P1:** Is it important in its own good, does it assist other activities, is it for entertainment of the child, etc.

**Q4:** Do you use music toys/materials during lessons?

**Q4P1:** Are there any particular materials you especially prefer to use? Such as percussions, sound toys, strings, keyboards, etc.

*(Here, a brief explanation will be made to the participant indicating that from now on, these materials/toys will be named as "products")*

**Q5:** Who selects the products to be purchased?

**Q5P1-A:** (If she selects the products to be purchased) Are there any particular criteria you consider while you select these products? If so, what are they? Educational standards, interests and preferences of children, product attributes, etc.

**Q5P1-B:** (If she does not select the products to be purchased) Would you evaluate the products you use? Educational standards, interests and preferences of children, product attributes, etc.

**Q6:** Do you ever make musical materials/toys with children? If so:

**Q6P1:** What kind of materials/toys do you make?

**Q6P2:** Why do you prefer to make them instead of using ready-made products? Ready-made products' falling short of expectations, being an opportunity to make an activity with children, etc.

**Q7:** If you had the chance to enhance existing products, what kind of modifications would you like to make? Educational concerns, interests and preferences of children, product attributes, etc.

## APPENDIX B

## INTERVIEW GUIDE (TURKISH VERSION)

**Q1:** Uzmanlık alanınız nedir?

**Q1P1:** Anaokulu öğretmeni, çocuk gelişim uzmanı, psikolog vb.

**Q1P2:** Ne kadar süredir bu işi yapıyorsunuz?

**Q2:** Okulda bir gününde yapılan etkinliklerden kısaca bahsedebilir misiniz?

**Q2P1:** Bu etkinlikler içerisinde müzik ne şekilde yer alıyor?

**Q3:** Müziğin çocuk gelişimine katkısı hakkında ne düşünüyorsunuz?

**Q3P1:** Başlı başına önemli midir, diğer etkinliklere yardımcı mıdır, eğlence için midir vb.

**Q4:** Derslerde müzik oyuncakları/materyalleri kullanıyor musunuz?

**Q4P1:** Özel olarak kullanmayı tercih ettiğiniz materyaller var mı? Perküsyonlar, ses oyuncakları, telliler, tuşlular vb.

*(Bu noktada katılımcı, bu andan itibaren bu materyallerin/oyuncakların "ürün" olarak adlandırılacağı konusunda bilgilendirilecek)*

**Q5:** Satın alınan ürünleri kim seçiyor?

**Q5P1-A:** (Eğer kendisi seçiyorsa) Bu ürünleri seçerken göz önünde bulundurduğunuz belli kriterler var mı? Varsa nelerdir? Eğitim standartları, çocukların ilgi ve tercihleri, ürün özellikleri vb.

**Q5P1-B:** (Eğer kendisi seçmiyorsa) Kullandığınız ürünleri nasıl değerlendiriyorsunuz? Eğitim standartları, çocukların ilgi ve tercihleri, ürün özellikleri vb.

**Q6:** Çocuklarla birlikte müzik materyalleri/oyuncakları hazırlıyor musunuz? Hazırlıyorsa:

**Q6P1:** Ne tip materyaller/oyuncaklar yapıyorsunuz?

**Q6P2:** Hazır ürünler yerine bunları yapmayı tercih etmenizin sebepleri nelerdir? Hazır ürünlerin beklentileri karşılamaması, çocuklarla birlikte bir etkinlik gerçekleştirme imkânı vb.

**Q7:** Var olan ürünleri geliştirme şansınız olsaydı, ne gibi değişiklikler yapmak isterdiniz? Eğitim standartları, çocukların ilgi ve tercihleri, ürün özellikleri vb.

## APPENDIX C

## SAMPLE DATA ANALYSIS SHEET

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | **THEME / SUB-THEME** | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | A | B | C | D | E | F | G | H | I | J | TOTAL |
| 5 | category / sub-category 1 | | | | | | | | | | | |
| 6 | category / sub-category 2 | | | | | | | | | | | |
| 7 | category / sub-category 3 | | | | | | | | | | | |
| 8 | category / sub-category 4 | | | | | | | | | | | |
| 9 | category / sub-category 5 | | | | | | | | | | | |
| 10 | category / sub-category 6 | | | | | | | | | | | |
| 11 | category / sub-category 7 | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | **EXPECTED OUTCOMES OF MUSICAL ACTIVITIES** | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | A | B | C | D | E | F | G | H | I | J | TOTAL |
| 5 | enhancing auditory development | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 9 |
| 6 | enhancing learning environment | | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | 7 |
| 7 | developing interest in music | | | ■ | ■ | | ■ | ■ | | ■ | | 5 |
| 8 | enhancing joy and relaxation | | | | | ■ | ■ | | ■ | ■ | ■ | 5 |
| 9 | enhancing communication skills | | | | ■ | ■ | | ■ | ■ | | | 4 |
| 10 | enhancing cognitive development | | | | | | ■ | ■ | ■ | ■ | | 4 |
| 11 | developing self-discipline | | | | | | | | | ■ | | 1 |

## APPENDIX D

## ORIGINAL VERSIONS OF THE PARTICIPANTS' STATEMENTS IN TURKISH

(S1) Yani müzik aslında ritm, bizim temel kazandırmamız gereken şey. Ritm hep var hayatımızın içinde her yerde var, alt müzik kulağı oluşturma adına bir okul öncesi eğitimin çok donanımlı olması lâzım, bütün müzik alanlarından haberdar olması lâzım, çocukların kullanacağı müziklerin farkına varması lâzım, farkında olması lâzım. Dolayısıyla bu eğitimleri az çok her eğitimci almıştır (p.99).

(S2) Şarkı söyleme, ritm çalışmaları da yaptırıyoruz ama benim kendi müzik kulağım çok iyi olmadığı için çok üzerinde duramıyorum. Bazı müzik öğretmeni olan öğretmen arkadaşımızdan yardım istiyoruz (p. 99).

(S3) Mesela maracasımız yoksa plastik şişelerden, bilindik bir şeydir bu, içine taş ya da şey koyulur, baklagillerden bir şeyler koyulur kuru fasülye falan gibi. Onlarla ritm tutulur, her birinin çıkardığı ses farklıdır (p. 99).

(S4) Sanat etkinliğinde bunları yapıyoruz sanat etkinliği olarak. Yaptığımız aletleri müzik eğitiminde kullanıyoruz, güzel ritm tutuluyor (p. 99).

(S5) Bu aslında şeydir, aslında sanat çalışması birbirini tamamlar. Bunlarla bir ürün oluşturmak da bir yandan bir sanat çalışmasıdır. Birbirini tamamlayan çalışmalar yapılır. Onun üzerine bir oyun, bir başka bir şeye geçilebilir. Herkes kendi müziğini oluşturabilir. Ya da çok iyi bildiğimiz bir şarkıyı yine kendi yaptığımız müzik aletiyle çalabiliriz o ritmi kullanabiliriz. Her çalışmada farklı bir şey kullanılabilir (p. 99-100).

(S6) Bir pasif etkinlikten bir masa başı etkinlikten aldığımızda yine müzikle ritmle çocukları kaldırıp küçük bir müzikle devinim, hareket yaptıktan sonra tekrar geri oturtturup çocuklarla bir hikâye saati yapabiliriz. Yani hep böyle müzik elimizin altında duran bizim için koskoca bir kurtarıcı (p. 100).

(S7) Ritm çalışmalarında da ilk baştaki aşama çocuğun kendi bedenini tanımasıdır. Ses çıkarmaya çalışıyoruz, bedenimizi kullanıyoruz, ellerimizi çırpıyoruz, bedenimizle ses çıkarabiliyoruz. Hem dans edip hem hareket edip hem doğru sesler çıkarabiliyoruz (p. 100)

(S8) Bizde o aletler hepsi müzik eğitiminin dışında da dramada falan da kullanıyoruz öyle şeyleri. Çocuğa basit yönergeler verip mesela "şimdi yağmur yağıyor" diyorsun onu kullanıyorsun. Ya da işte "yavaş yavaş yürüyorsun" diyorsun. Hani verdiğin komuta göre kullandığın etkinliğin, bütün etkinliklerde kullanıyoruz (p. 101).

(S9) Hareketli müzikler oluyor böyle. Onlara göre bir hikâye uyduruyorsunuz işte. Mesela "cüce olun", böyle hızlı hızlı yürüyorlar. Sonra "dev olun" filan böyle rap rap rap… Müzikle birlikte (p.101).

(S10) Ritm aleti derken herkesin aklına şey gelir maracas, tef… Önce ben sınıftaki oyuncaklarla başlıyorum. Tahta çubukları birbirine vurduğumuzda ses çıkıyor, ama tahta çubukları plastik kovaya vurduğumuzda başka bir ses çıkıyor. Bu farklı bir şey. Cama vurduğumuzda farklı bir ses. Ama çatal kaşığı cama vurduğumuzda farklı bir ses çıkıyor. Yani bu farklılıklar, aynılar, neden farklı, nasıl vuruyorsun gibi şeylerle yola çıkıyorum. En sonra müzik aletlerine geçiyoruz. İşte bizim kullandığımız sesler var ama bir de bizim hazır kullandığımız enstrümanlarımız var (p.101).

(S11) Ben müziği uyku saatinde de kullanıyorum. Çocukları rahatlatmak için yataklarında (p.101).

(S12) Yine böyle Orff şeyleri var müzikleri falan, böyle CD'lerde hazır. Onlar öyle. Mesela işte bir hikâyeyi anlatırken bir yandan müzik dinletmek ona uygun böyle fon müziği gibi. Bunlar çok etkili geliyor bana (p.102).

(S13) [Küçük, plastic bir imitasyon ksilofonu kastederek] Ama o aletle ne yapıldığını, nasıl bir şekilde çalındığını, ben çocuğa bunla nasıl faydalı olacağımı bilmiyorum. Çocuk sadece alıyor onu ve deniyor. Ses ayrımları belli değil, belki de çok kaliteli olmadığı için olabili sesler çok rahat çıkmıyor (p.102).

(S14) Şimdi asla sonuç olarak değil, bizim geçirdiğimiz süreç çok önemli, süreç içinde yaşadıklarımız çok önemli. Ama hani çalışmanın sonucunda çıkardığımız bir ürün var bir şey var. O da çoğunlukla tabii ki dersimiz müzik olduğu için bir orkestra oluyor. Ve bir sunum yapıyoruz, çalıştığımız bütün şeylerin (p.102).

(S15) Biz yönerge veriyoruz "alçak sesle" [Fısıldayarak söylüyor] alçak sesle sallıyor, işte "yüksek sesle" yüksek sallıyor. Yani çocuk hani sesin volümün boyutunu, hani sesin alçaklığını ya da yüksekliğini bu şekilde kavrıyor (p. 104).

(S16) Enstrüman çalmayı başarabilen velilerimizi mutlaka sınıftaki eğitim programımıza dâhil ederiz. Ve onlar çocuklarla birlikte yeni enstrümanları, kullandığı enstrümanı tanıtır. (…) Yani dokunsal bir hale, daha temasın yakın olduğu bir hale getirmeye çalışıyoruz çünkü çocuğun öğrenme metodu o (p.105).

(S17) Çocuğun ilgisini kaybettiği bir enstrümanı kastederek] Bir süre bırakıp arada bir süre kaldıktan sonra, süre geçtikten sonra onu işte atıyorum mesela bir Türkçe dil etkinliği içinde farklı bir şeyle kullandığınızda çocuğun ilgisi tekrar geri geliyor (p.105).

(S18) Yani mesela ben bir şey söylesem, pek onu algılamakta problem yaşıyorlar ama müzikle daha çabuk algılıyorlar. İlk önce öğreniyorlar, ama sonra anlamlarını. Benim özellikle çalıştığım yerde sonra anlamlarını öğreniyorlar (p. 106).

(S19) Çok işe yarıyor, çocuklar mutlu oluyorlar ve çok seviyorlar. Rahatlıyorlar müzikle (p. 106).

(S20) Bitiyor mesela çalışma ve çocuğun duygusu şu: "Offf, çok güzeldi." Var mı bundan daha güzel şey? (p. 106).

(S21) Bir de çocukların kendilerini ifade edeceği alanları müzikle daha rahat bulabiliyor çocuklar. Bu kadar önemli bir araç olarak kullandığımız zaman da, eğitim aktivitelerinde yerine ulaşıyor gerçekten de her şey. Müzik gerçekten rahatlatıyor, müzik gerçekten çocuğun kendini ifade etmesi için en önemli araçlardan birisi oluyor (p. 106).

(S22) Yani buna benzer tekerleği her seferinde yeniden keşfettiğiniz etkinliklerin hepsi çocuklar için çok yaratıcı ve bilişsel olarak gelişmelerine çok yardımcı olucu (p. 106).

(S23) Sonuçta çocuğun estetik duygusunu da geliştirmek lazım, çünkü orkestra çalışmaları içerisinde de planlama var. (…) Mimarlık alanında da çok planlı, daha doğrusu hayatın her alanı planlı da. Hayata transferse bu anlamda bizim yaptığımız çalışmaların faydasını görecekler (p. 107).

(S24) Neticede bir devlet okulusunuz, belli bir bütçeniz var ve o kırıldığında bilmem ne olduğunda hani bozulduğunda onun tekrar telafi edilmesi de bayağı bir zaman alıyor. Bir senede dört beş tanesinin kırılması sizin için üzücü oluyor (p. 112).

(S25) Yani çocuğun ilgisi açısından tabi renk, düzgün renkler doğru renkler kullanılması çocuklar için çok önemli o noktada ilgilerini çekebilmesi için. Canlı renklerinin olması önemli. Ve çıkan sesin doygu ve merak uyandıracak sesler olması önemli. Kullandığında da keyif alabileceği, işte ergonomisi, tutabildiğinde tutacak kullanabileceği bir şeyse, ellerini kullanacağı ki mutlaka. Maracas tutuyorsa maracasın sapları çocuğun elinde ergonomik olarak tutabileceği bir şey olmalı. İşte ritm çubuğunun boyutu ona göre ayarlanmalı mesela. Yani yine o çocukların el boyutları göz önünde bulundurulmalı. Ondan sonra ne bileyim yani onların bi standardı vardır zaten. Hani şu anda elimizde kullandığımız aletlerin. Ama yeni geliştirilecek için de ergonomisi, rengi ve sesi (p.114-115).

(S26) Gelişimi açısından dizlerinin üzerine çok oturmaması gereken çocuklar, o kadar çok sık rastlıyorum ki ben. Dolayısıyla hani hem otursun ama ayakta da çalabileceği alternatifi olan enstrümanlar da olsun, çok isterim mesela (p. 115).

(S27) Çocuklara ne kadar doğru kullanmayı öğretirseniz öğretin, bazen dürtüsel çocuklarınız oluyor mesela, o çocuk o an bunu hatırlıyor ama aradan bir süre geçtikten sonra hatırlamıyor, kolunu şöyle koyup [enstrümanın üzerine] mesela durabiliyor ya da çok hızlı vurduğunda patlayabiliyor. Dayanıklılıkları artırılabilir çocukların [yaş] gruplarına göre. Defler de öyle yine aynı şekilde. Vurduğunda şak diye kırılan maracaslar. Plastikleri var bunların diyeceksiniz ama bunların gerçek ve iyi kalitede ürün kullanmak da önemli (p. 115).

(S28) Mesela çivili, telli... O tür ürünleri kullanmamaya özen gösteriyoruz. Çünkü çocuk alır kendine zarar verir, bir yerine batırır. Yani mümkün olduğunca zararsız olanları [seçiyoruz]. Zil seçerken bile, çalarken hani kenarları çok keskin olanlar var, onları tercih etmemeye çalışıyoruz. Hiç ummadığınız bir yerde çocuk orda kendine zarar veriyor (p. 115).

(S29) Çocuklar her şeyi ağızlarına götürdükleri için tuşları ağzına [boğazına] kaçabiliyor (p. 115).

(S30) Ağızlarına götürüyorlar, mesela 3 yaş grubunun en çok yaptığı şey. O hâlâ ağzını kullandığı için çoğu şeyi ağzına götürüyor. Zarar vermemesi hani, piyasada her şey Çin malı ama, olabildiğince en azından güvenli olması önemli bizim için. Bu tarz kriterler önemli (p. 116).

(S31) İşte 20 çocuk varsa 20 tane davul olması gerekiyor, 20 tane maracas olması gerekiyor, 20 tane ıvır zıvır ne varsa hepsinin olması gerekiyor. Okulda 20-40-60 öğrenci olduğunu düşünürseniz bunun maliyeti bir hayli fazla. Kimse de müzik eğitimi için ayırmaz diye düşünüyorum ben bilmiyorum açıkçası (p. 116).

(S32) Yani elimizdeki materyaller çok kötü duruma geçince, çocuklarla birlikte etkinlik olarak onları tamir edebiliriz düzeltebiliriz. (…) Ya da mesela bir orgun tuşlarından birisi şey olduğu zaman, çocuklarla birlikte oraya ne yapabileceğimizi konuşup, onların fikirlerini alıp daha farklı bir şey de yapılabilir. Yani çözüm üretilebilir bu konuda beraberce (p. 116).

(S33) [deri yüzeyi yırtıldıktan sonra bantlanmış bir davulu kastederek] Kullanıyoruz evet, tamir ederek kullanıyoruz yani. [plastik davulu kastederek] Bu kırılır hemen kırılır ve şey, tamir olasılığı yok. Kırıldı mı da çöpe gidiyor (p. 117).

(S34) Bizim sınıflarımızda kastanyeti ceviz kabukları, doğru ayrılmış yani bir cevizi tam ortasından doğru ayırdıktan sonra içlerini boşaltıp sonra o cevizleri ikiye katladığımız bir kağıdın [kartonun] ön [iç] yüzlerine yapıştırıyoruz (p. 121).

(S35) Daha çok var olan müzik aletlerine benzer şeyler çıkıyor. Yani ne bileyim işte kutulara, uzun kutulara şey geçiriyorsunuz lastikleri geçirerek, ya da ipleri geçirerek iki tarafından böyle gitar teli gibi (p. 122).

(S36) İçine doldurduğumuz şeyle farklı nota ve ses tonlarını yakalayabiliyorsunuz. Taş doldurduğunuzda farklı kum doldurduğunuzda farklı, nohut fasulye doldurduğunuzda farklı, mercimek doldurduğunuzda farkı ses çıkarıyor. Etrafını istediğiniz gibi boyayabiliyorsunuz, süsleyebiliyorsunuz. Bir çok maracas oluşturabiliyorsunuz (p. 124).

(S37) Ama kendi yaptıklarının kıymetini daha çok biliyorlar. “Aa öğretmenim bu benim yaptığım” falan, hani kıymetini biliyorlar birazcık daha, daha severek kullanıyorlar benimsiyorlar yani (p. 124).

(S38) Örneğin çift altı tane sıralıyoruz ya kola kutularına, çocuklar örneğin çift çift. Bir çifte eşit miktarda kuru çay, demlenmemiş çay koyuyoruz. Örneğin ikinci çifte nohut koyabiliriz, üçüncü çifte mercimek koyabiliriz, kâğıt parçaları koyabiliriz, en son daha kalın taşlar koyabiliriz. Hepsinin üzerlerini aynı kâğıtlarla kapatıyoruz ağız kısmını. Dolayısıyla bunları karışık veriyorsunuz çocuklara, bunları sallayarak neyi buluyor, sesi, aynı sesi buluyor. Hem oyun, hem de işitsel algı (p. 125).

(S39) Yapması kolay olduğu için, malzemeyi çabuk elde ediyorsunuz. Mesela çocuklara diyoruz ki evdeki boş kutularınızı getirin, onlarla oyuncak, maracas yapacağız, müzik aleti yapacağız. O zaman herkes bir şey getiriyor (p. 126).

(S40) Tabii ki burda duruyor, çok kötü durumda olunca atılıyor. İçerisinde baklagiller falan olduğu zaman böceklenme tehlikesi olduğu için atılıyor yani. Ben çok atıyorum (p. 127).

(S41) Ha ama çok dayanıklı olmayabilir bir süre sonra bu yırtılabilir (p. 127).

(S42) 3 yaş için bazı plastik malzemeler biraz daha uygun. Neden? Çocuk henüz o müzik aletini kullanmayı öğrenmeden önce plastikle deneyimlediğinde tutmayı vurmayı, vuruş hızını… Çünkü bazı çocuklar bir vuruyor deliniyor (p. 128).

(S43) [çocuk büyüdükçe] Merak uyanıyor, 3 yaşında eline alır bakar, nasıl kullanacağını anlamadığında bırakır. Daha basit ve düz olan şeyleri tercih eder. Ama yaş ilerledikçe onu keşfetmeye başlar. Alır sorar: “Ben bunu yapabilirim?”. Dener, daha merak duygusu daha değiştiği için farklılaşabilir (p. 129).