A CASE STUDY IN AN EARLY CHILDHOOD SETTING:

SCIENCE TEACHING PRACTICES AND TEACHER PERSPECTIVES

AYŞE BÜŞRA ÇEVİREN

BOĞAZİÇİ UNIVERSITY

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Ayşe Büşra Çeviren

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Abstract

Ayşe Büşra Çeviren, "A Case Study in an Early Childhood Setting: Science Teaching Practices and Teacher Perspectives"

The purpose of this study was to describe science teaching practices and teacher's perspective on science education in an early childhood classroom and draw a picture of early childhood teachers' perspectives and practices at the setting on science education through a holistic view. Considering the purpose of the study descriptive case study method was employed in the study. Data were collected through lengthy observations at the early childhood classroom, which consisted of four years old children, and in-depth interviews done with seven early childhood teachers, who had experiences with four or five years old children. The data collected through observations, informal and semi-structured interviews, documents and field notes were coded in MAXQDA 11 and the themes of the study were constructed under two main themes: teacher practices and teacher perspectives. Practices of the teachers revealed that although engagement and conclusion periods of science activities were performed through active involvement of children, implementation periods involved considerable amount of teacher control. Demonstrations, explanations, authoritative question-answer session and video presentations were found to be the predominant strategies that result in teacher control. Perspectives of teachers revealed three possible considerations for this situation: lack of understanding on science education; lack of understanding on importance and goals of science education; and lack of content knowledge on science. Moreover, considerations of teachers for qualified science practices were found as being well prepared, providing science rich environments, teachers' attitude towards science, and having children enjoy. Finally, suggestions for pre-service and in-service teacher training programs were given.

Tez Özeti

Ayşe Büşra Çeviren, “Bir Okul Öncesi Kurumunda Örnek Bir Olay İncelemesi: Fen Eğitimi ile ilgili Öğretmen Uygulamaları ve Görüşleri”

Bu araştırmanın amacı, bir okul öncesi sınıfındaki fen eğitimi ile ilgili öğretmen uygulamalarını ve görüşlerini tanımlamak ve bu okul öncesi kurumdaki fen eğitimi ile ilgili öğretmen uygulamaları ve görüşlerini bütüncül bir şeklide resmetmektir. Bu amaçla durum çalışması yaklaşımı kullanılmıştır. Veriler, dört yaş grubu okul öncesi sınıfında gerçekleştirilen uzun süreli gözlemler ve dört ve beş yaş grubu çocuklar ile çalışmış yedi okul öncesi öğretmeni ile yapılan geniş kapsamlı görüşmeler ile toplanmıştır. Gözlemler, yapılandırılmamış ve yarı yapılandırılmış görüşmeler, dokümanlar ve alan notları ile toplanan veriler MAXDQA 11 programında kodlanmış ve öğretmen uygulamaları ve öğretmen görüşleri olmak üzere iki ana tema altında temalar oluşturulmuştur. Öğretmen uygulamaları, fen etkinliklerinin ilgi çekme ve sonuç aşamalarının çocukların aktif katılımı ile gerçekleşmesine rağmen, uygulama aşamalarının önemli ölçüde öğretmen kontrolü ile gerçekleştiğini ortaya koymuştur. Demonstrasyon, açıklama, otoriter soru-cevap ve video gösterimi öğretmen kontrolüne sebep olan en belirgin stratejiler olarak tespit edilmiştir. Öğretmen görüşleri, bu durumu, öğretmenlerin fen eğitimini kavrayamamaları, fen eğitiminin önemini ve amaçlarını kavrayamamaları ve fen konusunda yeterli alan bilgisine sahip olmamaları şeklinde üç etken ile açıklamıştır. Ayrıca öğretmenlerin fen etkinliklerinde başarılı olabilmek için göz önünde bulundurdukları faktörler iyi hazırlık, fen yönünden zengin bir ortam sağlamak, öğretmenlerin fene karşı tutumu ve çocukları eğlendirmek olarak bulunmuştur. Sonuç olarak, hizmet öncesi ve hizmet içi öğretmen eğitim programları için önerilerde bulunulmuştur.

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To
a very special
mother and father

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ABBREVIATIONS

AAAS: *American Association for the Advancement of Science*

Benchmarks: *Benchmarks for Science Literacy*

DAP: *Developmentally Appropriate Practices*

EC: *Early Childhood*

ECE: *Early Childhood Education*

KDIs: *Key Developmental Indicators*

KEs: *Key Experiences*

MoE: *Ministry of Education*

NAEYC: *National Association for the Education of the Young Children*

NCSESA: *National Commission on Science Education Standards*

NGSS: *Next Generation Science Standards*

NSES: *National Science Education Standards*

NOS: *Nature of Science*

NRC: *National Research Council*

NSTA: *National Science Teachers Association*

ZPD: *Zone of Proximal Development*

CHAPTER 1

INTRODUCTION

Early childhood children are biologically ready and eager to learn about the world as they are biologically prepared to learn to walk, talk and communicate with others (Conezio & French, 2002; NRC, 2001). When the young children start to early childhood education, they bring curiosity about the world and try to find out how the world works. Although curiosity can be foster by many subjects, science is one of the most appropriate learning areas to support curiosity of children (Krogh & Slentz, 2001).

In general science refers to a body of knowledge, process of knowledge generation and a way of thinking that is gathered systematically through observation and experimentation (Krogh & Slentz, 2001). Some people view science as memorization of definitions, lists of facts, concepts, principles, and models (Worth, 2010). However, science is more than knowledge and it is a dynamic process that includes wondering, observing, experimenting, and finding out about the world (Kilmer & Hofman, 1995). Nature of science [NOS] involves both evolutionary and revolutionary changes (NSTA, 2000). Therefore, from early childhood on it is important to present science as a way of thinking and discovering the nature of things rather than providing a body of knowledge, science provides (Lind, 1996).

There are several reasons to teach science in the early years. Firstly "science is about the real world" and secondly "science develops reasoning skills" (Eshach, 2006, p. 2). Early childhood have a significant place in acquisition of scientific literacy -understanding of the nature of science and technology- (Kilmer & Hofman,

1995, p.44). Science experiences in early childhood facilitate the development of scientific concepts, science process skills, and attitudes toward science (Eshach, 2006; Lind, 1996; Lind 1998; Worth & Grollman, 2003). From a broader perspective, science in early childhood is an important area that serves as a breeding ground for lots of developmental domains, skills and attitudes (Worth, 2010).

Lifelong scientific literacy, the main goal of whole science education, begins with attitudes and values established in the early years of childhood (NRC, 1996). In the light of this emerging evidence on importance of science education in early years, science is highlighted in early childhood education and took its place among the school readiness domains, which are language development, cognition and general knowledge, social and emotional development, approaches to learning, and physical well being and motor development. Inconsistent with its importance among the school readiness domains, studies showed that at the end of the early childhood years, science readiness score of the children are significantly lower than the other readiness domains (Greenfield, Jirout, Dominguez, Grenberg, Maier, & Fuccillo, 2009). However, high-quality early childhood science programs enhance teaching and learning of science in early childhood through appropriate science content and practices (Worth and Grollman, 2003; Henniger, 2005).

Teachers are one of the most important contributors that can provide varied and rich experiences for children (Martin 2001). Early childhood teachers have a significant role in providing children with developmentally appropriate science experiences. Compatible with children's curiosity about the world around them, early childhood teachers concentrate on science in children's everyday lives. They provide experiences and materials that carry out scientific concepts and skills. While teachers

determining these experiences and materials they also select the most appropriate approach for the lesson and the children (Tomlinson & Hyson, 2009).

Purpose of the Study

The purpose of this study was to investigate and describe science teaching practices and teacher's perspective regarding science education in an early childhood classroom. In order to understand science practices and teacher's perspective on science education lengthy observations were made in a classroom that consisted of four years old children. In addition to the observations, perspectives of teachers, who have experiences with four or five years old children, were revealed by in-depth interviews. Hence, an extensive picture of science practices and teacher perspectives on science education in one early childhood setting was described.

Considering the purpose of the study, descriptive case study method was employed to understand the science practices in the selected classroom, which were described and examined through observations and informal interviews that took place during the observations. Furthermore, both the observed classroom's teacher and other teachers that work in the same context were interviewed in-depth to identify and document their perspectives on science education. The semi-structured interviews were based on teachers' perspectives on preparation and implementation processes of science teaching practices and teaching strategies. Specifically, the study focused on the following research questions:

1. How is science teaching practiced in a four years old children's classroom?
2. What are the perspectives and practices of the early childhood teachers on science education in early childhood?

Significance of the Study

The body of research in early childhood science education literature reveals the early childhood teachers' beliefs and attitudes toward science teaching, their qualifications in science teaching, and teaching strategies in early childhood science. In Turkey, most of these studies reflect the perspective through close-ended self-reports of teachers such as self-efficacy and attitude scales (Alisinanoğlu, İnan, Özbey & Uşak, 2012; Çakmak, 2012; Erden & Sönmez, 2010; Ünal & Akman, 2006; Ünal, Akman & Gelbal, 2010). At the same time, other research exits that focus on preparation and application processes of science activities, teaching strategies of teachers, which were carried out by observations and interviews (Ayvacı, Devecioğlu, & Yiğit, 2002; Çınar, 2013; Kıldan & Pektaş, 2009). However, the research involves approximately three to four week observations and fifteen to twenty minute long interviews. Additionally in these studies, quantitative features generally overshadowed the qualitative ones.

The present study, investigated science practices in early childhood through lengthy observations that covered second semester of 2012-2013 educational year and employed in-depth interviews. Different from previous studies, this study described science practices and teachers' perspectives on science education through a descriptive case study. Descriptive qualitative research in education contributes to gaining in-depth information about educational phenomena. This approach provides detailed data for what, how and why questions. Another difference is that it avoids the pitfall of relying on a single data source to gather data from self-reports of teachers via questionnaires. The multiple resources for data collection increase credibility of the research and sheds better light on investigated issues.

From Turkish context, although there is an increasing interest on science education in early childhood, there is little research on science practices and teachers' perspectives on science education in early childhood that were carried out by focused observations and in-depth interviews. From this perspective, this study contributes the research literature of Turkey. Furthermore, results of the study may potentially provide an initial understanding on the ignored aspects of science education in early childhood such as preparation and application phases of science practices and allow determining the positive and negative aspects of the science practices that take place in early childhood classrooms, which may contribute to both pre- and in-service training of teachers.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter reviews the literature about science education in early childhood within three main focuses. First, science in early childhood education is examined from the perspective of place of science in early childhood education, reasons to teach science in early childhood and young learners' scientific inquiry process. Second, importance of science teaching in early childhood is expressed correspondingly with the goals of science teaching in early childhood. Early childhood science goals from various national organizations are stated within the related aspects of importance of science teaching in early childhood: contribution to child development, development of scientific concepts, science process skills, and positive attitudes toward science. Third, science education in early childhood is examined from the perspective of early childhood teachers. Early childhood teachers' knowledge regarding science, developmentally appropriate science practices in early years, and teaching strategies are discussed. Moreover, science in early childhood education models is examined and science in Turkish Ministry of Education was also expressed. Finally, the chapter ends with related research about early childhood teachers' beliefs and attitudes toward science teaching, their qualifications in science teaching, and teaching strategies in early childhood science.

Science in Early Childhood Education

In the agenda of early childhood education, until recognizing the contribution of each subject to child development, the language arts were the primary subjects in early childhood curriculum. For a long time science has been occupied inconsiderable place and minimal attention has been given to science in early childhood education programs (Johnson, 1998). After recognizing the power of children's early thinking and learning an understanding regarding value of science was developed (Worth, 2010).

Educators have considered young children's capacities insufficient in understanding scientific concepts for years (Jones, Lake & Lin, 2008). However, recent research on young children's scientific thinking indicated that young children are much more capable of scientific thinking and understanding scientific concepts than expectations of the previous researchers and scholars (Beatty, 2004; Eshach, 2006; Jones, Lake & Lin, 2008). Therefore a need to focus on science in early childhood classroom settings that provide richer and more challenging learning environments for learning was evolved (Worth, 2010).

Besides children's capability of developing scientific thinking at early age, historians and philosophers of science, teachers and scholars in science education advocated two basic justifications to teach science in early years; firstly "science is about the real world" and secondly "science develops reasoning skills" (Eshach, 2006, p. 2). Eshach (2006) claims that these two main justifications require revision and therefore proposes six reasons interrelated to two basic justifications, why to teach science to young children:

1. Children naturally enjoy observing and thinking about nature.

2. Exposing students to science develops positive attitudes towards science.
3. Early exposure to scientific phenomena leads to better understanding of the scientific concepts studied later in a formal way.
4. The use of scientifically informed language at an early age influences the eventual development of scientific concepts.
5. Children can understand scientific concepts and reason scientifically.
6. Science is an efficient means for developing scientific thinking (p.6).

The development of justifications about children's capability of scientific thinking and understanding scientific concepts has broken down the traditional perceptions about children. Then, a new perception called 'child as a scientist' was developed. Young children are called 'innate scientist' because of their innate curiosity (Worth, 2010).

Children have natural curiosity about what things are, how they work, and related to each other. Young learners' curiosity, eagerness to learn and know, leads them to explore the world and draw conclusions from their experiences (Worth, 2010). Science experiences during early years encourage curiosity and excitement of students about the functioning of life and help them to explore answers to questions related to how the world works (Conezio & French, 2002; Jones, Lake & Lin, 2008).

On the other hand, children are not quite scientist themselves. Supportive adults who are themselves curious provide the encouragement to the children to involve in scientific inquiry (Krogh and Slentz, 2001). Children need guidance in order to transfer their curiosity into scientifically oriented issues and share them with peers. They need to practice science and involve in scientific inquiry in a way that scientists study the natural world (Worth, 2010).

National Science Education Standards [NSES] describes scientific inquiry as "diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work" (NRC, 1996, p.23). Hands-on and

minds-on science provides individuals with developing scientific inquiry beginning from early years. It encourages children to organize information and to reach their own conclusions rather than memorizing facts (Kilmer and Hofman, 1995).

The Fig. 2.1 Young children's inquiry indicates the process of young children's inquiry (Worth and Grollman, 2003). Scientific inquiry starts with exploring, wondering and raising questions. Children enter this first step by their values, features of their culture, and the context in which they were brought up. Therefore, their questions rely on these aspects. In the process of inquiry after conceptualizing questions, children explore possible explanations to those questions. Their exploration involves prediction, planning, collecting and recording data, organizing experiences, and sharing ideas (Worth & Grollman, 2003; Worth, 2010). Children learn science and discover the content of science by applying the way how science is done (Martin, 2001). Scientific inquiry in science activities and class discussions lead students to understand how scientists study the natural world (NRC, 1996). This process of children' learning highly overlaps with how scientist work. When children involve in the inquiry cycle, they practice science through passing from the same steps with scientists.

There is considerable awareness on benefits of experiences in science during the early childhood years (French, 2004). Early science experiences allow children to explore a variety of firsthand cause and effect relationships, develop scientific concepts related to life, physical and earth sciences, explore a variety of scientific equipment, learn scientific processes such as predicting, carrying out experiments, talking about results, formulating conclusions and recording scientific data (Kostelnik, Soderman & Whiren, 2004). Moreover, science experiences in early years facilitate involvement of chidlren in active discovery, development of problem-

solving skills, and increase in levels of awareness, comfort and confidence related to science (Williams, Sherwood, Rockwell and Winnett, 2010).

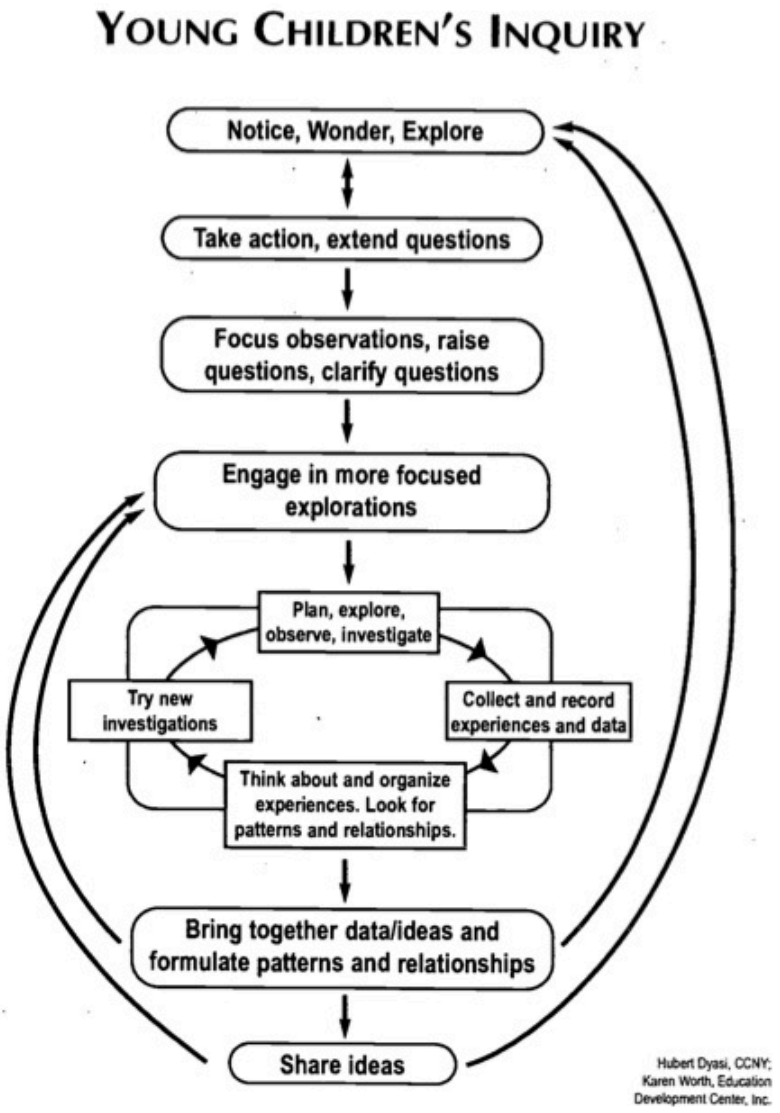

Fig. 2.1 Young children's inquiry.

These benefits of science teaching in early childhood give a rise to the importance of science education in early childhood from the view of its overall contribution to the child development, development of scientific concepts, science process skills, and positive attitudes toward science. In order to reveal the importance of science education in early childhood, various national organizations have taken positions on goals of science education in early years. Three of these organizations, the National Science Teachers Association [NSTA], the American Association for the Advancement of Science [AAAS], and the National Commission on Science Education Standards and Assessment [NCSESA], have written position statements on goals of science education. According to Martin (2001) these three position statements are similar from the view point of teaching all children, attracting children's interest in science, teaching less content and teaching more investigation skills.

The NSES (1996) highlights scope of science education as "all children," regardless of gender, racial or cultural background, or disabilities. All children should have the opportunity to develop high levels of scientific literacy through actively participating in science experiences and viewing herself as successful in this endeavor (Kilmer & Hofman, 1995; NRC, 1996). Therefore, developing scientific literacy is the basic goal of whole science education (Kilmer & Hofman, 1995; Martin, 2001).

Early childhood education has an indispensible place in development of scientific literacy, which is defined as understanding of key concepts and principles of science; and using scientific knowledge and scientific ways of thinking for

individual and social purposes (AAAS, 1990). In order to develop high levels of scientific literacy, it is essential to introduce the children with scientific inquiry in early ages (Lind, 1998). Similar to scientific inquiry, scientific literacy embraces an approach to identifying and solving problems based on logic rather than memorization (Kilmer & Hofman, 1995). Therefore, the contribution of early childhood education toward scientific literacy provides a basis for "continuing development of an interest in and an understanding of science and technology" for every child (Kilmer & Hofman, 1995, p.44). In other words, science during early childhood provides a breeding ground for scientifically literate generations.

Comprehensive studies of the associations stated above revealed various science standards to make the main goal of science education, developing scientific literacy, more precise and noticeable for early childhood education. Below in subsections the related literature about importance of science teaching in early childhood and goals of science teaching in early childhood are presented.

Contribution of Science Education to Child Development

Science in early years is important not only for developing competencies related to science but also important for providing a rich context in which children can use and develop other skills regarding working with others, small and large motor control, language and early mathematical understanding (Worth, 2010). Hence, science experiences provided in early childhood foster many skills such as perception of time, logical thinking, and perspective taking.

Krogh and Slentz (2001) and Conezio and French (2002) express importance of learning science in early years by pointing out the powerful bond between

learning science in early years and child development. All domains of development, cognitive, language, social and affective, and physical, are integrated with each other and all of them are highly related with learning science in early years (Krogh & Slentz, 2001). Therefore, by the means of early science experiences it is possible to foster child development in a holistic way.

Science process skills and skills that are categorized under developmental areas mostly support each other and go hand in hand from the perspective of child development. Many skills in cognitive domain such as seriation, classification, conservation, and perception of time are developed synchronously with learning science in early years (Krogh & Slentz, 2001). Science process skills such as observation, classifying and measuring foster the development of cognitive skills. Measuring, for instance involves seriation (Lind, 1996) and classifying skill is considered as "basic ability for logical thinking" (Jones, Lake & Lin, 2008, p. 22).

Moreover, observation and communication in science contributes to language development of children. Since children describe their observations and express their ideas through their linguistic ability, development of vocabulary and development of observation and communicating skills foster each other (Jones, Lake and Lin, 2008). According to Conezio and French (2002) science-based curriculum involves language use of both adults and children. Songs, finger-plays, poems and books in science activities supports language and literacy as well.

Science experiences in early years also support social and affective development of children. Science activities regarding environment, animals and plants foster "perspective-taking" skills and moral concerns related social and affective development (Krogh & Slentz, 2001, p. 121). In addition, science activities provide a basis for social and affective skills such as working in small group, work

independently, respect each other, appreciate and trust peers and teacher, which might be developed synchronously with communication skills (Krogh & Slentz, 2001). Addition to small groups, science experiences also provide children with becoming comfortable in large-group work and conversations. In large groups children can support each other's explorations and share new ideas (Conezio & French, 2002).

Additionally, physical development also pertains to early science. The domain of physical development requires children to have appropriate health and hygiene habits, and develop fine and gross motor control. By the means activities such as brushing teeth, taking naps, and naming body parts and conversations about their scientific basis, physical development of children can be catered (Krogh & Slentz, 2001). Furthermore, science activities that involve using tools provide children with opportunities in which they can develop fine and gross motor control.

Development of Scientific Concepts in Early Childhood

Children acquire basic concepts in early childhood years. As they grow up and develop physically, socially, and mentally, their concepts develop as well (Lind, 1996). Although Piaget and Vygotsky were both cognitive development theorists, they stated different views on how children develop and learn (Lind, 1996; Roth, Goulart & Plakisti, 2013).

Piaget suggested that children develop knowledge through interaction with the environment. According to Piaget's view development of children depends only on child's inner motivation and spontaneous discoveries. He argued that children are intellectual explorers and construct their knowledge independently. On the other

hand, Vygotsky viewed development different from Piaget and expressed both environmental and developmental forces. He believed that internal and external forces both contribute to development of knowledge. Therefore he attached more importance to adult and peer influence on children's cognitive development than Piaget (Lind, 1996).

Piaget identified four stages of cognitive growth and development: sensorimotor period (from birth to age two), preoperational period (ages two to seven), concrete operations period (ages seven to eleven), and formal operations period (ages eleven through adulthood). With respect to the periods of Piaget, early childhood education concerns with first two and first half of the third periods (Lind, 1996). According to Roth, Goulart and Plakisti (2013), although Piaget attached considerable importance on sensorimotor and concrete experiences of children, he generally emphasized on what children cannot do rather than what they can do. Additionally, he advocated that young children are not ready to learn science and understand scientific concepts.

On the other hand, Vygotsky developed the concept the of zone of proximal development (ZPD) which is the area between where child is now and where she might go with external support with regard to cognitive development. According to Vygotsky appropriate scaffolding, assistance from adults and peers, allow children understand and develop scientific concepts (Lind, 1996).

Science Experiences in Early Childhood

In order to match cognitive capacities of children at different stages of development, it is essential to meet children with appropriate experiences and appropriate science

content. Children acquire concepts through actively engaging with their environment and exploring their surroundings (Lind, 1998). Lind (1996) offers three types of learning experiences that allow the acquisition of concepts: naturalistic, informal and structured experiences. The type of the experiences differs due to whether the teacher or the child controls the choice of the activity.

'Natural Experiences' are the experiences controlled by child. Child initiates choices during the daily activities and teacher provides rich environments in which the child develops lots of experiences. 'Informal Learning Experiences' occur when adult control takes place during the naturalistic experiences. They are not pre-planned. Child chooses activity and action and when the child needs a cue or encouragement in naturalistic experiences teacher initiate the experience. 'Structured Experiences,' on the other hand, are pre-planned activities. In structured activities opposite to both naturalistic and informal learning experiences, teacher chooses the experience for the child (Lind 1996; Lind, 1998).

Science Content Areas in Early Childhood

Science content areas of early childhood science provide meaningful experiences for young learners. The ideas of the areas trigger children curiosity and children can experience the concepts of the areas directly during everyday events. There are three main science content areas in early childhood: Life Science, Physical Science, and Earth and Space Science (Martin, 2001; Worth & Grollman, 2003; Tomlinson and Hyson, 2009). Additionally the science content standards of NSES include the areas of science as inquiry, physical science, life science, earth and space science, science

and technology, science in personal and social perspective, and history and nature of science for grades K-4 (NRC, 1996).

'Life Science' for young learners involves systematic observation of plants, animals, and all living things. It focuses on observing and recording the lives of organisms and their interaction with each other and the surrounding environment (Worth & Grollman, 2003). Life sciences activities in grades K-4 aimed to provide students with developing understanding about the 'characteristics of organisms,' 'life cycles of organisms,' and 'organisms and environment' (NRC, 1996). At the mean time it provides young learners to appropriate their dependence on each other and hence the variation and diversity of organisms. While young learners observe living things they develop ideas about 'physical characteristic of living things,' 'basic needs of living things,' 'life cycles,' and 'variation and diversity' (Worth & Grollman, 2003).

'Physical Science' for young children leads them to explore objects, materials, and events of nonliving world around them. Additionally they develop awareness of 'properties of objects and materials,' 'position and motion of objects,' and 'properties and characteristics of sound and light' (Worth & Grollman, 2003). Although there are advanced and abstract topics in physical science, there are many appropriate topics for young children as long as children's developmental level is taken into account (Krogh & Slentz, 2001). Appropriate physical science activities for grades K-4 reduces the complexity of the subjects and aimed to allow children to develop understanding about 'properties of objects and materials,' 'position and motion of objects', and 'light, heat, electricity, and magnetism' (NRC, 1996).

'Earth and Space Science' involves understanding of the structure of the earth and its history, climate and meteorology, the solar system, and the universe. Topics

of earth and science regarding long time scales, unseen forces such as plate tectonics, the rock and water cycles, evolution, and the origins of the universe do not involved in the early childhood curriculum. However, children come across with direct experiences related to earth and space in daily life such as changes related to day and night, weather, and seasons. Teachers can carry out these experiences into classroom through allowing earth and space activities for grades K-4 that aimed to develop understanding of 'properties of earth materials,' 'objects in sky,' and 'changes in earth and sky' (NRC, 1996). As a result aspects of earth and space such as 'properties of earth and materials', 'weather and climate', and 'patterns of movement and change of the sun and the moon' take place in early childhood curriculum (Worth & Grollman, 2003).

Development of Science Process Skills

Young learners understand studies of scientists and do science by applying science process skills (Lind, 1996; Martin, 2001). Science process skills provide children with "processing new information through concrete experiences" (Lind, 1996, p. 46). There are two categories of process skills: basic process skills (observing, classifying, communicating, measuring, predicting, and inferring) and integrated process skills (identifying and controlling variables, formulating and testing hypotheses, interpreting data, defining operationally, experimenting, constructing models) (Jones, Lake & Lin, 2008). According to Lind (1996) and Jones, Lake and Lin (2008), because of the unsophisticated nature of young learners thinking, less attention is attached to integrated science process skills such as identifying and controlling variables and formulating and testing hypotheses. They stated that

science process skills that are appropriate for young learners are the basic science process skills such as observing, comparing, classifying, measuring, and communicating. However, this approach contradicts with the idea of Beatty (2004), Eshach (2006), Jones, Lake and Lin (2008) on children's capability of developing scientific thinking at early ages. Additionally, the scientific inquiry process, presented in the Fig. 2.1 Young children's inquiry (Worth and Grollman, 2003), provides children with opportunities to apply integrated science process skills.

Next Generation Science Standards [NGSS] also points out skills that coincide with integrated process skills. NGSS differs from prior science standards in three ways: performance, foundations, and coherence (NGSS, 2013a). NGSS has developed performance expectations rather than listing what students should know or understand. NGSS kindergarten performance expectations are "grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information" (NGSS, 2013b). These expectations of NGSS overlap with integrated science process skills as identifying and controlling variables, formulating and testing hypotheses, interpreting data, experimenting, and constructing models.

Observation is the most fundamental process skill since it provides a basis for other process skills. Young learners get information about the world around them through observation. From infancy, while young children' brains receive information they use all the senses: sight, smell, sound, touch and taste. In other words, inborn motivation toward observation involves using all of the senses (Lind, 1996; Jones, Lake & Lin, 2008). However, effective observation is not just looking. Careful observation requires looking with a purpose (Blackwell & Hohman, 1991).

Observing can be taught using plants, animals, rocks and moving objects (Martin, 2001). Kindergarten children use observation to describe patterns of plants and animals need to survive and determine the effect of sunlight on Earth's surface (NGSS, 2013). Benchmarks for Science Literacy [Benchmarks] states that in order to achieve the goals of 'scientific literacy' children, kindergarten through grade two, know that they can learn their environment through careful observations and they describe their observations accurately to form a basis for comparing process (AAAS, 1993).

The comparing process is based on process of observation. While children develop observation skills they simultaneously begin to identify the similarities and differences between objects. Children compare plants, animals, rocks and moving objects and at the mean time they learn more about them (Lind, 1996). Regarding the topic "Interdependent relationships in ecosystems: animals, plants, and their environment" stated in NGSS (2013) kindergarten children represent the relationship between the needs of different plants and animals.

Classifying begins when children organize objects into groups. In classifying objects are grouped on the basis of a common characteristic. Classifying generally begins with collection of objects. Therefore, through leading children to collect rocks, shells, seeds, or leaves, adults can encourage children to sort objects into groups as well (Jones, Lake & Lin, 2008; Lind, 1996). According to Jones, Lake and Lin (2008) since classifying ability does not develop naturally for young children, it is important to provide children with sorting activities that leads to understanding of classification.

The skill of measuring involves quantification of observations. It requires assigning numbers or values to objects or events (Jones, Lake & Lin, 2008).

According to the ‘science inquiry’ domain of Benchmarks, children from kindergarten to age two know that tools such as thermometers, magnifiers or rulers give more information than observation about things than unaided observations (AAAS, 1993). Measuring involves not only standard units such as numbers, distances, time, volume, area, length, temperature but also involves nonstandard units such as “shakes of salt”, “handful of rice” or “couple of beans” (Lind, 1996, p. 49).

Communication is the way that scientist share their findings with other people. The communication process involves sharing information orally, in written form or different forms as pictures, maps, and models (Lind 1996). Similarly through communication children express their ideas and thoughts and reflect on what they do (Jones, Lake & Lin, 2008). In the topic “Interdependent relationships in ecosystems: animals, plants, and their environment” stated in NGSS (2013) kindergarten children communicate solutions that will reduce the impacts of humans on land, water, and air and regarding the topic ‘Weather and Climate’ they share their observations of local weather conditions.

Early science experiences allow children a rich environment in which they use the process skills stated above. Nevertheless, these skills are not unique for science experiences only. Children can develop these skills in many of the learning areas. Children can observe, compare, classify and measure objects and communicate with others in other early childhood activities such as playing with blocks, water, sand, and manipulative materials and during dramatic play, cooking, and outdoor activities (Lind, 1996). Therefore, it is not possible to restrict development of science process skills with science experiences.

Development of Positive Attitudes toward Science

Early science experiences provide children with direct experiences with materials and events that are essential in later years (Worth & Grollman, 2003). Therefore, it fosters the development of a range of skills such as critical thinking, problem solving, and hypothesizing (O'Hara, 2008). These experiences establish a basis for later science learning and scientifically literate societies. At the mean time they also facilitate development of positive attitudes toward science.

Providing children with science activities fosters motivation and natural interest of children. In addition to interest and motivation, it might also arise positive attitudes toward science (Eshach, 2006). As well as in all subjects, teachers are models and facilitators for science education (Kilmer & Hofman, 1995). Early childhood teachers have important role in providing children with science practices and facilitating development of positive attitudes toward science. While teaching science, early childhood teachers can model how scientists study the natural world, the characteristics of scientists, and positive attitudes toward science. According to Wolfinger (1994) mentioned in Henniger (2005) in scientific investigations early childhood teachers teachers can model "objectivity, willingness to suspend judgment, skepticism, respect for environment, positive approach to failure" for young children in order to contribute to development of positive attitudes toward science (p. 363).

According to Copple and Bredekamp (2009) being an excellent early childhood teacher means: “being intentional”, “creating a caring community of learners”, “teaching to enhance development and learning”, “planning curriculum to achieve important goals”, “assessing children’s development and learning”, and “establishing reciprocal relationships with families” (p. 33-45). At the Fig. 2.2 Components of excellent teacher, each point of the star represents one essential part of the responsibilities of early childhood teachers and early childhood programs for enhancing children’s learning and development (Copple & Bredekamp, 2009, p. 35).

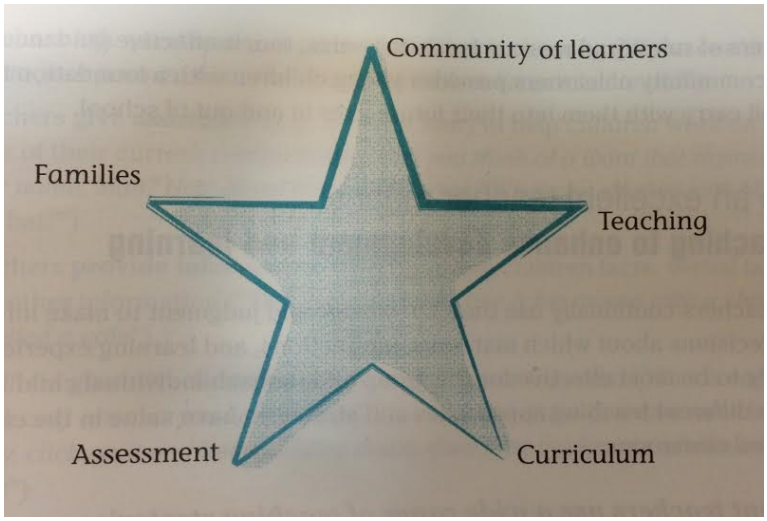

Fig. 2.2 Components of excellent teacher.

The core of being an excellent early childhood teacher, however, is developmentally appropriate practices [DAP] (Coople & Bredekamp, 2009). According to NAEYC (2009) developmentally appropriate programs provide a safe and nurturing environment that promotes the development of each child while

considering the needs and preferences of families. These program practices, namely DAP, are based on three core considerations:

1. What is known about child development and learning
2. What is known about the strengths, interests, and needs of each individual child in the group
3. Knowledge of the social and cultural context in which children live.

Furthermore, effective early childhood teachers know that both what they teach and how they teach matter in educating young children (Copple & Bredekamp, 2009). It is important for early childhood teachers to be aware of their role in science teaching as well. Teachers have a number of significant roles in science teaching as creating a science-rich environment, engaging children in science exploration, and focusing and deepening children's experiences and thinking (Chalufour & Worth, 2003). While accomplishing these responsibilities, it is necessary for teachers to be aware of teaching strategies and scientific content knowledge.

Teaching Strategies in Early Childhood Science Teaching

NRC (1994) mentioned in Kilmer and Hofman (1995) indicates that what people learn is greatly influenced by how they are taught. According to Coople and Bredekamp (2009) excellent teachers use a wide range of teaching strategies. Therefore, in planning and practicing activities early childhood teachers can use variety of teaching strategies such as field trip observations, analogy, concept maps, demonstration, experimentation, dramatization, observations, making collections (Uyanık Balat & Önkol, 2011; Alisinanoğlu, Özbey, & Kahveci, 2011) in order to carry our developmentally appropriate science practices in early childhood.

Science teaching requires teachers to provide scientific context. Therefore, all teaching strategies aimed to providing scientific context for children. Teachers provide children with scientific context by giving place to NOS and scientific inquiry (NRC, 1996). As previously mentioned, children learn and do science by applying science process skills. However, the process of science cannot be achieved by just applying the science process skills. According to Harlen (1999), science process skills are only scientific if they are used and applied in the context of science. Otherwise, context-free environments do not enable children to use science process skills 'scientifically' and will not serve to bring up scientifically literate society (Lederman, 1999).

Early childhood teachers can bring the scientific topics into the classroom through developmentally appropriate science content and practices (Henniger, 2005). The main components of DAP for doing science are based on children's curiosity and willingness to explore the things around them. Basically while DAP for doing science focus on constructing children's own conclusions, developmentally inappropriate practices in science focus on correct answers and memorization. Table 2.1. Developmentally Appropriate and Inappropriate Science Practices for Children Ages Three through Eight, summarizes the aspects of the two practices which are identified by Bredekamp and Copple (1997, p. 62).

Teaching strategies regarding teacher and learner contribution to the learning change on expository-discovery continuum. There are three points in the continuum: expository methodology, guided inquiry methodology, and free discovery methodology. As one moves from expository to free discovery, the degree of which teacher dominates the learning decreases. On the other hand, from expository to free

discovery to the degree to which children direct their own learning increases (Martin, 2001).

Table 2.1. Developmentally Appropriate and Inappropriate Science Practices for Children Ages Three through Eight

Developmentally Appropriate Science Practices for Children Ages Three through Eight	Developmentally Inappropriate Science Practices for Children Ages Three through Eight
Actively participating Handling materials Controlling their own actions	Memorizing a lot of facts Watching the teacher do most of the demonstrating and handling of objects
Investigating familiar phenomenon	Studying content with no link to their knowledge or experience
Reflecting on teachers' open-ended questions	Being restricted by closed, single-right-answer questioning or being told what to expect
Observing the results of their own actions	Lacking opportunities to observe the results of their own actions
Experiencing both planned and spontaneous opportunities	Experiencing science only as teacher-planned activities
Investigating and working individually or in small groups	Participating in science activities only in large group
Investigating the range of basic concepts	Learning about only one or two concepts
Exploring a variety of content from life, earth, and physical sciences	Learning about limited content
Having their knowledge and skills assessed in multiple ways	Having their knowledge and skills assessed only by written tests

In order to develop skills of scientific inquiry it is essential for children to have adult guidance (Worth & Grollman, 2003). In addition to provide children with context of science it is important for early childhood teachers to facilitate children's investigations through guidance (Worth, 2010). The process of inquiry continues with guidance of teachers. Through attaching more importance on both children's and teacher's questions, the process becomes deeper and engage children in more focused explorations (Worth, 2010; Worth and Grollman, 2003).

In order to lead children to exploratory thinking it is curial for early childhood teachers to ask divergent questions rather than convergent questions. Divergent questions are open-ended questions and foster curiosity of children and process of inquiry. On the other hand, convergent questions focus on single or correct answers and can be used when single and right answers are required (Krogh & Slentz, 2001). Lind (1996) offers early childhood teachers to pose questions to children while applying basic science process skills, observing, compraring, classifying, measuring, communicating, which can be classified under divergent questions (see Table 2.2. Questions to Facilitate Process Skills).

Table 2.2. Questions to Facilitate Process Skills

Process Skills	Questions that can be Facilitate the Process Skills
Observing	"Tell me what you see," "How would you describe the object" (p.48)
Comparing	"How are these alike," " How are these different" (p.48)
Classifying	"Put together all of the animals that belong together," (p. 49)
Measuring	"How might you measure this object," "How could you find out" (p. 49)
Communicating	"What did you see" "Draw a picture of what you see" (p. 49)

How Much Science Does The Early Childhood Teacher Need to Know?

For many years, scientist, science educators and other professional have deal with the question "How much science does the early childhood teacher need to know?". Due to the continuously changing scientific information, there is no correct or universal

answer to the question. However, there is a universal agreement on the issue that knowing "how to inquire, how to find things out, and how to investigate scientific questions" is essential for children. In order to provide children with these conditions, teachers should know how to inquire in science. Although it is helpful for teachers to know some basic scientific concepts and principles of science, knowing how to inquire in science is more crucial than enormous store of scientific knowledge (Martin, 2001, p. 3-8).

Pre-existing attitudes and beliefs of early childhood teachers influence their learning in training and professional. Early childhood teachers with positive self-efficacy belief regarding science teaching, tend to teaching and developing science concepts (Maier, Greenfield, & Bulotsky-Shearer, 2013). According to Henniger (2005), the topics in science, life science, physical science and earth science, may seem inappropriate for young children. Additionally, as in the case of Dickinson et. al. (1997) stated in Martin (2001) early childhood teachers may refrain from teaching these topics since they fell they do not know enough science. Early childhood teachers think that physical science is complex both for them and children; and therefore physical science is neglected in early childhood classrooms (Worth & Grollman, 2003). However, early childhood teachers do not have to have wide-range of scientific knowledge (Martin, 2001). What is significant than amount of knowledge is the teacher be open, enthusiastic, and willing to wonder 'What happens if…?' questions (Kilmer & Hofman, 1995).

Science in Early Childhood Education Models

In this section major approaches to early childhood education were examined from the viewpoint of their brief historical development and the science that takes place. First the models, originated from United Stated, High Scope, Head Start, and The Creative Curriculum are explained. Then the models, originated from Europe, Reggio Emilia and Montessori are expressed.

High Scope Model

High Scope model of early childhood education was developed by David P. Weikart and his colleagues in 1962 in order to use in the High Scope Perry School Project and serve at risk children from poor neighborhoods in Ypsilanti, Michigan (Hohmann & Weikart, 2002). It was originally developed as an early intervention program and based on a constructivist learning perspective; children actively construct their knowledge of the world by experiences and interactions with materials and people (Follari, 2007).

High Scope model is founded on five main principles. The Fig. 2.3 Wheel of learning, illustrates these principles: Active learning, Adult-child interaction, Learning environment, Daily routine, and Assessment. Active learning allows young learners to construct their knowledge and it depends on positive adult-child interactions. High Scope program attaches importance on active learning environment that includes specific interest areas and appropriate materials. In this child-friendly learning environment, active learning is supported by daily routine. The consistent daily routine includes plan-do-review process and small and large-

group times. Plan-do-review process allows children to state their intentions, carry them out and then reflect on what they have done. Finally, assessment aspect of the model internalizes a team-based child assessment (Hohmann & Weikart, 2002, p.6).

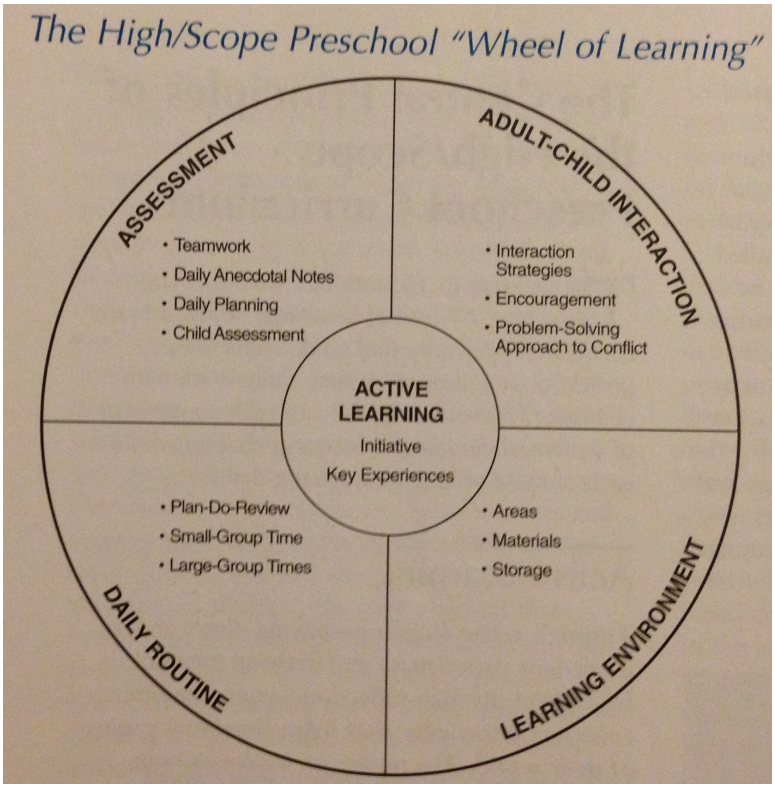

Fig. 2.3 Wheel of learning.

High Scope program includes fifty-eight key experiences [KEs] that identify cognitive, social, and physical development of children aged two and half to five (Hohmann & Weikart, 2002). High Scope (2000) includes these KEs under ten domains: Creative Representation; Language and Literacy; Initiative and Social Relations; Movement; Music; Classification; Seriation; Number; Space; and Time. However, in High Scope (2010) the key developmental indicators [KDIs], formerly KEs, rearranged under eight domains: Approaches to Learning; Social and Emotional Development; Physical Development and Health, Language, Literacy, and

Communication; Mathematics; Creative Arts; Science and Technology; and Social Studies. As a result of the alignment, some of KDIs of different domains are placed under the Science and Technology, which has subdomains as observing, classifying, experimenting, predicting, drawing conclusions, communicating ideas, natural and physical world, and tools and technology (see Table 2.3. Alignment of High Scope KIDs).

Table 2.3. Alignment of High Scope KIDs

Key Developmental Indicator (formerly Key Experience)	Former KE Content Area	New KDI Content Area
Recognizing objects by sight, sound, touch, taste, and smell	Creative Representation	Science and Technology *Classification*
Exploring and describing similarities, differences, and the attributes of things	Classification	Science and Technology *Classification*
Distinguishing and describing shapes	Classification	Science and Technology *Classification*
Sorting and matching	Classification	Science and Technology *Classification*
Using and describing something in several ways	Classification	Science and Technology *Classification*
Holding more than one attribute in mind at a time	Classification	Science and Technology *Classification*
Distinguishing between “some” and “all”	Classification	Science and Technology *Classification*
Describing characteristics something does not possess or what class it does not belong to	Classification	Science and Technology *Classification*
Starting and stopping an action on signal	Time	Science and Technology *Time*
Experiencing and describing rates of movement	Time	Science and Technology *Time*
Experiencing and comparing time intervals	Time	Science and Technology *Time*
Anticipating, remembering, and describing sequences of events	Time	Science and Technology *Time*

In High Scope approach, science both takes place through science centers and daily routine. In preschool, children seek information about how the world works. The children's ways of gathering information about their world are identified in High Scope key experiences, which are parallel with basic science processes (Post, 1996). Blackwell and Hohman (1991) proposes six groups of KEs for science learning that are "observing;" "classifying and ordering materials;" "measuring, testing and analyzing;" "observing, predicting, and controlling change;" "designing, building fabricating, and modifying structures or materials;" and "reporting and interpreting data and results" (p.8-9).

Early childhood teachers involved in High Scope approach perceive science as an active process rather than a passive one (Hohmann & Weikart, 2002). In order to enhance children's science learning Post (1996) expresses three suggestion for teachers: creating an environment that encourages exploration, creating problem-solving situations, and using active learning strategists while interacting with children.

The Head Start Model

Head Start is the most extensive federal early childhood program in United States. From its beginnings at 1965 to 2009 it had served more than twenty-seven million children. The Head Start Program encompasses objectives focused on the development and learning outcomes of children in low-income families. The program views the child development domains interconnected and it deals with the "whole child" (Roopnarine & Johnson, 2012, p. 61-74).

The Head Start Child Development and Learning Framework has issued in December 2010. It consists of eleven general domains: "Language Development, English Language Development (for dual language learners), Literacy Knowledge and Skills, Mathematics Knowledge and Skills, Science Knowledge and Skills, Creative Arts Expression, Physical Development and Health, Social and Emotional Development, Approaches to Learning, and Logic and Reasoning" (Roopnarine & Johnson, 2012, p. 64-65).

According to Roopnarine & Johnson (2012) the domain science knowledge and skills includes "scientific skills and method, conceptual knowledge of the natural and physical world" (p. 65). In this respect, as NRC (2001) states ScienceStart! was developed to foster children's curiosity and enthusiasm for learning the world around them. The consistently sequenced science activities of ScienceStart! exhibits the following characteristic:

1. It focuses on aspects of the everyday world that are familiar, meaningful, and apparent to young children.
2. It is coherent.
3. It is integrated.
4. It is open-ended.
5. It explicitly models and teaches a scientific approach to problem solving.
6. It is language-rich.
7. It uses science activities to involve parents in recognizing and fostering their children's intellectual development (NRC, 2001, p. 209-211).

The Creative Curriculum

The root of Creative Curriculum corresponds to the early years of the Head Start Program. It was developed in order to meet the need of preschool teachers for written curriculum (Roopnarine & Johnson, 2012). The Creative Curriculum provides early childhood teachers with "decision-making framework" which consists of five

categories of knowledge (see Fig. 2.4 Decision-making framework of the creative curriculum). In early childhood years, these five categories of knowledge are applied to ten interest areas, group times and daily routines (Dodge, Colker, & Heroman, 2002, p.75).

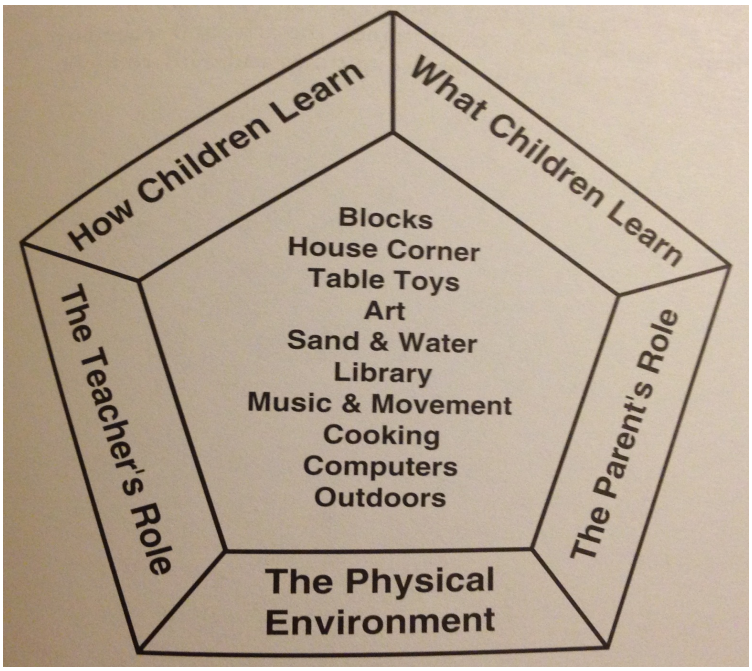

Fig. 2.4 Decision-making framework of the creative curriculum.

The content of the Creative Curriculum is consists of literacy, mathematics, science, social studies, the arts, and technology. In order to promote learning through interest areas, Dodge, Colker, and Heroman (2002) offers examples of ways to address content areas in each of the ten interest areas, group times and daily routines. Table 2.4. Ways to Address Science in Interest Areas, indicates the examples to address science in the ten interest areas, group times and daily routines (p.77-79).

Table 2.4. Ways to Address Science in Interest Areas

Science	
Interest Areas	Example Ways to Address the Content
Blocks	-Talk with children about size, weight, and balance. -Encourage children to experiment momentum using ramps, balls, and marbles.
House Corners	-Introduce props such as a stethoscope or binoculars. -Model hygiene skills by washing "babies" or dishes.
Table Toys	-Talk about balance and weight as children use table blocks. -Sort, classify, and graph nature items such as rocks, leaves, twigs, and shells.
Art	-Describe the properties of materials as they interact (wet, dry, gooey sticky). - Use water and brushes for outdoor painting so children can explore evaporation.
Sand and Water	-Make bubble solution and provide different kinds of bubble-blowing tools. -Put out magnifying glasses and sifter so children can examine different kinds of sand.
Library	-Include books about pets, plants, bodies, water, inventions, etc. -Provide a variety of objects for experimentation with floating and sinking.
Music/Movement	-Set out bottles with varied amounts of water so children can investigate the sounds they produce. -Use a tape recorder to record children's voices; play back for children to identify.
Cooking	-Encourage children to taste, smell, touch, listen, and observe at each step of the cooking process. -Discuss how heating and freezing changes substance.
Computers	-Have children observe cause and effect by hitting a key or dragging a mouse. -Allow children to observe as you connect computers components.
Outdoors	-Take pictures of a tree the children see every day and discuss how it changes during the year. -Have children feel their heartbeat after running or exercising.
Group Times	-Talk about the weather and the signs of seasons changing. -Conduct simple experiments together.
Daily Routines	-Take turns feeding the classroom pet or watering the plants and talk about why we do this. -Have a child check the weather and talk about what kind of clothing to wear outdoors.

Reggio Emilia Model

Reggio Emilia approach was developed by Loris Malaguzzi and the group of competent educators around him (Gandini, 2004). It was originated in Italy in Emilia-Romagna from where it was named. The city of Reggio Emilia is a wealthy region and famous for early childhood classrooms in the world (Roopnarine & Johnson, 2012).

Many features of these Reggio Emilia schools have attracted attention of educators. According to Gestwicki (2007) more than 15,000 people visited to study these schools since 1981. The images presented by the children at the exhibit called 'The Hundred Language of Children' shed a light on the capacity of children and how traditional practices overvalued children's capacities to express their understanding of the world (Gestwicki, 2007). In this respect in order to express their understanding, Reggio approach leads children to make symbolic representations of their ideas thorough painting, drawing, dance, shadow theatre, sculpture, discussion, music, and dramatic play (Follari, 2007).

The high quality experiences in Reggio Emilia provided for young learners are based on a set of fundamentals. Cadwell (2003) distilled the fundamentals into a list of nine essential elements with their explanations. Thornton and Brunton (2007) expressed these elements under 'the key values of Reggio Emilia,' which are:

1. a powerful image of child- it views children as strong, confident and competent;
2. relationships where children, 'teachers' and parents are equally important;
3. children's creativity- it emphasises the importance of the environment in supporting children's development, play and learning;
4. understanding how children learn, as individuals and in groups- it does this through setting aside time for long-term projects and reflective practices (p. 3).

Reggio Emilia views the environment as a third teacher (Gestwicki, 2007). Every corner of every space has a potential to engage children; therefore has a value (Cadwell 2003). One of the principles in creating an environment that acts as a third teacher is bringing the outdoors in. This principle fosters children's awareness of the natural, physical and social environments in which they live (Fraser & Gestwicki, 2002). As a result, it prepares a basis for investigation and wonder in science. While they are learning their environment they do science as well.

In Reggio approach creativity is a part of all areas of learning. It is about having ideas, using imagination and solving problems (Thornton & Brunton, 2007). In order to foster creativity there are variety of materials in separate rooms called ateliers where children have opportunities to explore and become experts with materials and construct their ideas (Hendrick, 2004; Schwall, 2004). Although those processes in the atelier attributed to art activities they lead children to use science process skills as well. As Loris Malagguzzi (1998) mentioned in Schwall (2004) the atelier provides to develop relationships among materials, experiences, ideas, theories, emotions, new understanding and multiple ways of communicating.

In Reggio classrooms children actively collaborate with adults to construct their understanding of their world. Early childhood teachers and children do not follow a formal curriculum. Children's questions and ideas construct a basis for developing children's learning. Children and early childhood teachers explore ideas and build their knowledge and understanding together (Thornton & Brunton, 2007). The core of the curriculum is the projects that are developed by children's interest. These projects might grow from teachers' planned experiences or spontaneous events in the classroom (Getswicki, 2007). There are also science projects conducted in Reggio Emilia preschools such as "Light in the Room," "Everything has a Shadow,

Except Ants," "Garden," "Long Jump," "the Water Wheel Project," and "Fountains: The Amusement Park for Birds" (Inan, 2007, p.81). During the projects early childhood teachers guide children's explorations and support their natural curiosity about their world (Follari, 2007).

Furthermore, the atelier provides early childhood teachers and atelierista, special staff person in each atelier; actively participate in observation, documentation, and interpretation (Hendrick, 2004; Schwall, 2004). Documentation of children's work includes transcriptions of children's dialogues, photographs of the activities, and children's representation of their ideas. Reflecting on observations and interpretations provides teachers with understanding children better, evaluating own work, exchanging ideas with educators (Gandini, 2004) and hence reflect on their teaching (Gestwicki, 2007). Due to this ongoing process, Reggio Emilia Approach is attributed as a long-term educational research project (Thornton & Brunton, 2007).

Montessori Model

Maria Montessori, who lived from 1870 to 1952, graduated from medicine from the University of Rome. Soon after graduating, she developed an idea that mental deficiency was more of an educational than medical problem. Then, Montessori turned her studies to the education of the children. After working with children for twenty years, Montessori bring her observations together in the form of theories about development and learning (Gettman, 1987).

The components of the Montessori approach are the materials and activities. Montessori approach is known for its didactic, sensorial, and conceptual materials. Didactic materials are made from wood and lead children to self-correction. While

sensorial materials allow children to classify by impression and widen their sensory perceptions; conceptual materials provide children with introducing reading, writing, mathematics, and social studies (Gestwicki, 2007). Montessori organized her various activities into five subjects: Practical Activities, Sensorial Activities, Language Activities, Mathematic Activities, and Culture Activities. Under the Culture Activities Montessori mentions physical science, history, geography, anthropology, and biology (Gettman, 1987).

Montessori approach recognizes the importance of encouraging curiosity and interest for learning (Gestwicki, 2007). Montessori environments provide children with scientific learning opportunities. In these environments children develop interest about natural world, develop interest in scientific topics and communicate about science.

The fundamental principles of Montessori approach are child's 'absorbent mind', which is defined as the unique learning capacity of young child, and 'prepared environment', which meets all the child's developmental needs. Montessori model provides children with a specifically prepared work place that improves children's individual development, social relation and harmony with nature in a holistic way (Büyüktaşkapu 2012; Gettman, 1987). Additionally Montessori environments recognize the importance of encouraging curiosity and interest for learning. Therefore, Montessori approach provides children with scientific learning opportunities and allows children to develop interest about natural world, interest in scientific topics and communicate about science (Rinke, Gimbel, & Haskell, 2013).

According to Montessori (1912) the method for providing children's harmony with nature is setting the child at "agricultural labour, guiding him to the cultivation of plants and animals, and so to the intelligent contemplation of nature" (p. 155).

The first principle of this process is that “the child is initiated into observation of the phenomena of the life” (p.156). Through observing early childhood teacher, the child appreciates the plants and animals. While children’s interest and observation grow step by step, their care for the living creatures also grow. Second, “the child is initiated into foresight by way of auto-education” (p. 157). When the child knows that the life of plants and animals are depend on her care, as watering and feeding, she begins to feel a mission in life. Without the intervention of the early childhood teacher, it creates a mysterious correspondence between child and the living creatures and hence an auto-education.

Third, “the children are initiated into the virtue of patience and into confident expectation, which is a form a faith and of philosophy of life”. When the children, put a seed into the ground and wait for growth and transformation of flower and fruit they acquire “a peaceful equilibrium of conscience” (Montessori, 1912, p. 159). Fourth, “the children are inspired with a feeling for nature” (p.159). Cultivation of living things develops a feeling of nature. When children placed a seed in the soil and watered it periodically, and then it has planted a blossomed flower it seems almost as if nature were answering with her gifts. Fifth, “the child follows the natural way of development of the human race” (p.160). Man discovered the secret of the soil and obtained the reward of civilization hence passed to the artificial state. Similarly the child must follow the same path in order to become a civilized man.

Turkish Ministry of Education Program

In Turkey, early childhood education is optional and it serves for children from thirty-six to seventy-two months. The curriculum is prepared by Ministry of Education [MoE]. The main aims of early childhood education advocated by Turkish MoE are to:

1. encourage students' cognitive, social and affective/ emotional and physical development and to gain appropriate habits
2. prepare them to primary school
3. create an environment in which bring up children from disadvantage conditions and families
4. allow children to speak Turkish accurately and properly (MEB, 2012).

Early childhood program of Turkey has core principles: it is child-centered; it is flexible; subjects are tools not the aim; it is play-centered; exploration; learning centers are important; large and small groups are balanced; development of curiosity is in the foreground; using daily experiences is encouraged; universal and social values are included; provide teacher freedom; assessment is multiple perspective; family education and participation is important; adaptations for children with special needs are included; and counseling services are important (MEB, 2012).

According to MEB (2012) well-designed learning environments encourage children's active leaning and development of problem solving skills. In early childhood classes there are five learning centers: block, books, music, science, and dramatic play. When there are no enough places for all the corners, the existing corners can be used for more than one purpose. MEB (2012) states ten types of early childhood activities, which are Turkish, art, drama, music, gymnastic, play, science, mathematics, preparation for reading-writing, and field trips. Although teachers prepare small and large group activities for children, small group and individual activities are encouraged in which can children learn on their own.

Science in Turkish Ministry of Education Program

The science activities in the program foster curiosity of children and lead them to questioning, observing, researching, and discovering. Science activities also enhance using science process skills and generate awareness of the environment. Furthermore, the program attaches importance on the effect of teachers' positive attitudes towards environment on attitudes of children towards environment (MEB, 2012a).

There are no standards for science activities in early childhood program. The science activities are prepared based on the objectives of developmental areas. In the "Activity Book" there exists seven suggested science activities out of forty-one activities for different age groups of children. These science activities, sometimes combined with other activity types, mostly include objectives from cognitive development. Table 2.5. Science Activities in MoE Early Childhood Activity Book, indicates the science activities and the corresponding objective that are stated in Activity Book of MoE (MEB, 2012a; MEB, 2012b).

Table 2.5. Science Activities in MoE Early Childhood Activity Book

Science Activity	Age Group (Months)	Objectives
What is inside of the balloons?	48-60	Cognitive: 1. Attaches attention to object/condition/event 2. Makes prediction related to object/condition/event 5. Observes the objects
Tracking ships	48-72	Cognitive: 5. Observes the objects

		Language: 7. Comprehends what s/he listens/watches 8. Expresses what s/he listens/watches in multiple ways
Smell and find	48-60	Cognitive: 1. Attaches attention to object/condition/event 2. Makes prediction related to object/condition/event 5. Observes the objects 6. Criticizes objects according to characteristics 20. Prepares object charts Social and Affective: 3. Express himself/herself through creative ways
Touch to the water and soap	48-60	Cognitive: 1. Attaches attention to object/condition/event 5. Observes the objects 8. Compares the characteristics of objects
Length of my shadow	60-72	Cognitive: 2. Makes prediction related to object/condition/event 5. Observes the objects 8. Compares the characteristics of objects 11. Measures the objects
Drawing chart	60-72	Cognitive: 1. Attaches attention to object/condition/event 10. Applies the directions related with location Language: 10. Reads visual materials Social and Affective: 15. Trusts in himself/herself
What is there inside the soil?	48-72	Cognitive: 1. Attaches attention to object/condition/event 11. Measures the objects Language: 8. Expresses what s/he listens/watches in multiple ways Motor: 4. Performs movements that require usage of fine motors

Additionally, MEB (2012a) suggests examples of activities that support science education in early childhood such as: walking in nature; observing nature, living and nonliving things in nature; informing toward value and protection of things; doing discoveries and inventions; preparation of food in the kitchen; doing collection; poster preparation of seasons or weather forecast; examining books and journals; taking photos, examining photos, watching documentaries, identifying and using basic tools such as magnet, magnifier, scrip; examining natural and unnatural things; and hosting guest that are experts in the related areas. Moreover, instructional techniques such as experimentation, concept maps and analogy also take part in science activities in early childhood.

Related Research on Early Childhood Teachers and Science Education

Related research studies shed light on previous studies about early childhood teachers' beliefs and attitudes toward science teaching, early childhood teachers' qualifications in science teaching, and teaching strategies in early childhood science.

Teacher Beliefs and Attitudes Towards Science Education

Regarding beliefs towards science teaching, Ekinci Vural and Hamrucu (2008) conducted a study to find out whether or not there was a significance difference between self-efficacy beliefs of freshmen and junior preschool teacher candidates. Self-efficiency beliefs of 140 preschool teachers' were examined by "Pre-Service Elementary Teachers Self-Efficiency Beliefs Scale" and opinions of the teacher candidates and the results of the scale were found parallel. The results of the study

indicated that self-efficacy belief levels of junior preschool teacher candidates were significantly higher than freshmen preschool teacher candidates. Since teacher candidates take Preschool Science Education Course at second class, the self-efficiency difference attributed to having the course or not.

According to Ayvacı, Devecioğlu and Yiğit (2002) it is necessary for early childhood teachers to have qualifications regarding teaching science in an efficient way. In the study in order to investigate the skills and attitudes of early childhood teachers regarding science activities, fifteen early childhood teachers' opinions were examined through thirteen open-ended questions and supported by observations of science activities through observation forms. According to the interviews, all of the teachers used traditional instructional methods in science activities and they all indicated importance of science in early years. Furthermore, the study indicated the contradiction between teachers' opinions and applications. While most of the teachers pointed out students' interest as priority in decision of materials and applications, it was found that teachers decide the materials according to accessibility. Although it was founded that most of the teachers did not perform preparation and application phases of the science activities properly, the criterions for preparation and application were not mentioned.

The study of Ünal, Akman and Gelbal (2010) bring about a basis for quantitative data collection methods for the subsequent research on early childhood teacher attitudes towards science. In the study the "Early Childhood Teachers' Attitudes towards Science Teaching Scale (ECTASTS)" was adapted into Turkish, which was originally modified from pre-service elementary teachers to early childhood teachers by Hyung-Sook-Cho et al. in 2003. The scale originally consists of four dimensions, "Comfort-discomfort," "Classroom preparation," "Managing

hands-on science," and "Developmental appropriateness," was reduced to two dimensions at the end of the study. All twenty-two items were distributes to the first two dimensions and these first two dimensions were renamed as "Self-development" and "Self-efficiency" respectively.

Ünal and Akman (2006) revealed quantitative data on teacher attitudes towards science. They gathered the data from 160 preschool teachers through the same scale mentioned in the previous study, ECTASTS. The results revealed that teachers with higher educational level and in-service training have positive attitudes towards science teaching. The impact of educational level on positive attitude explained as undergraduate and graduates' opportunity to take applied science course and two-year undergraduates' inadequate education regarding applied science courses. However, they did ask teacher that whether the courses were theretical or application based.

The study of Çakmak (2012) was conducted through the same instrument, ECTASTS. However, the scale was translated from the researcher and after the translation the original twenty-two items reduced to seventeen items. Through the ECTASTS and Science Concepts Test, developed by the researcher, the relationship between 231 pre-service preschool teachers' attitudes towards science teaching and their comprehension levels of science concepts were examined. According to the results, there was a statistically significant relationship between pre-service preschools teachers' attitudes towards science teaching and scores of Science Concepts Test.

On the other hand, the study of Erden and Sönmez (2011) conducted through Çakmak (2012) version of ECTASTS was revealed different results compared to Ünal and Akman (2006) regarding preschool teachers' attitudes towards science

teaching. Erden and Sönmez (2011) tried to find out the potential determinants of both the attitudes towards science teaching and the frequency of the science activities. The study indicated that although educational level has no significant impact on attitude toward science teaching, it has significant effect on frequency of science activities. According to the results, teachers with higher educational levels perform science activities more frequently and they use different methods. Furthermore, there was a significant but weak relationship between teacher attitudes and frequency of activities. It was concluded that teacher characteristics (years of teaching and educational level) have negligible effect on both attitudes and frequency and it was pointed out that school type plays major role on affecting the attitude and frequency. According to the results, teachers at private schools have higher positive attitude towards science teaching and more frequently performed science activities in their classroom compared to teachers at public schools. Private schools' facilities as supplying materials and equipment, policy regarding in-service training programs for their teachers and lack of job guarantee indicated as explanations for the situation.

Kıldan and Pektaş (2009) conducted interviews with fifty-two preschool and identified their views on teaching the subjects related to science and nature in early childhood years in terms of four main titles. First, regarding preschool science education teachers indicated that objectives and goals are enough and current curriculum supports teaching the subjects related to science and nature terms of content. Second, in terms of students' science process skills most of the teachers expressed that the subjects related to science and nature in the preschool curriculum promote attitudes among children such as curiosity, open- mindedness and skepticism. Although the question and the answers were related to scientific thinking

and scientific attitude they were interpreted as science process skills. Third, related to the physical conditions most of the teachers pointed out that physical conditions and equipment of the classes are not sufficient to teach subjects related to science and nature. Finally, regarding teacher role they stated that in-service training for teaching those subjects are required.

Teacher Qualifications in Science Education

Özbey and Alisinanoğlu (2010) mentioned the necessity of instruments that measure the competency of teachers in specific areas. For this purpose they develop an instrument called "Preschool Teachers' Competencies in Science Activities Scale" in order to determine the adequacy of preschool teachers in science activities. The items of the scale were developed in the light of the related literature. The scale consists of four factors; "Materials and Methods used by the Teacher," "Knowledge Level of the Teacher Concerning Application," "General Knowledge Level of the Teacher Concerning Science Activities," and "Teacher Behaviors During Applications". 232 teachers were participated at the reliability and validity studies of the scale. At the end, twenty-nine items remained in the final form of the scale and Cronbach Alpha Internal Consistency of the scale was found 0.82.

Alisinanoğlu, İnan, Özbey, and Uşak (2012) used the same survey developed in the previous study, although it was mentioned as "Early Childhood Teachers' Qualifications in Science Activities Scale" in this research. Early childhood teacher candidates' qualifications and attitudes were determined through the scale and eight open-ended questions respectively. According to the results, qualification levels of teacher candidates regarding planning and carrying out science activities were not

significantly depend on teachers' high schools, universities and their science course grades. Teacher candidates were found unqualified only in "Knowledge Level of the Teacher Concerning Application" factor among the four factors of the scale. Furthermore, teacher candidates mentioned that their undergraduate courses and books involving science activities were insufficient.

Regarding the science knowledge of early childhood teachers, the study of Garbett (2013) examined the link between preschool student teachers' beliefs on their subject matter knowledge in science and their actual knowledge. Fifty-seven student teachers were asked to rank their confidence and competence in applying subject knowledge in early childhood settings. In order to attain their actual competence in science, they were asked to answer science knowledge test, which consisted of seventy-three multiple-questions. At the end of the test they were wanted to predict the number of correct answers in order to measure the perceived competence. The results of the study indicated that student teachers have poor knowledge in science. Furthermore, there is a weak relationship between perceived competence and actual competence of student teachers since most of them predicted the number of correct answers mistakenly.

Another than science knowledge of early childhood teachers, the empirical research of Andersson and Gullberg (2012) identified competences that preschool teachers need to conduct science activities in the classroom. The study was a part of a teacher professional development project on science and gender. In order to identify the competences an example from this project, floating-sinking experiment, was used. The study underlined important competences for preschool teachers in science activities other than just having subject matter knowledge. The study identified four skills that preschool teachers utilize in science activities, which are

"paying attention to and using children's previous experiences," "capturing unexpected things that happen at the moment they occur," "asking questions that challenge the children and that stimulate further investigation," and "situated presence, that is, remaining in the situation and listening to the children and their explanations."

Batı, Ertürk, and Kaptan (2010) and İnan (2010) were focused on science process skills of preschool teachers. While Bati, Ertürk, and Kaptan (2010) investigated in-service preschool teachers' awareness level of science process skills low, İnan (2010) was conducted the research with pre-service preschool teachers. İnan (2010) examined thirty-three senior pre-service preschool teachers' content knowledge and pedagogical content knowledge on science process skills. In the study, participants were wanted to draw a classroom setting in which preschoolers can grasp, gain, and use science process skills. Pre-service preschool teachers showed 40% achievement in drawing all science process skills and they most frequently (90%) give place to 'observation' skill in their drawings. At the second part of the study, in order to reveal pedagogical content knowledge of teacher candidates, "What do you do to improve your students' Scientific Process Skills?" was asked for each skill separately. The results indicated that, all of the teacher candidates use activities to give observation, prediction, measuring/computing, comparison and communicating skills to chidlren. Since these skills were same with science process skills used by more than 40% of the participants in the first part, a similarity between content knowledge and pedagogical content knowledge on science process skills of preschool teacher candidates was expressed.

The study Karaer and Kösterelioğlu (2005) was determined the strategies used by preschool teachers in science activities in Amasya and Sinop, Turkey. The data, gathered from eighty-four preschool teachers, indicated that both teachers in Amasya and Sinop used concept maps least frequently. According to the study, whereas teachers in Amasya most frequently used models, simple and harmless experiments and they used grouping method least frequently; teachers in Sinop most frequently used simple and harmless experiments, play, dramatization and they used models least frequently.

Similarly Karamustafaoğlu and Kandaz (2006) explored the eaching strategies used by fifteen preschool teachers in science activities. Additionally the study revealed the problems faced by teacher during application phases of the activities. Data collected from questionnaires and interviews, both constructed by researchers, indicated that preschool teachers gave place mostly to explanation, dramatization, models and experimentation in science activities. Furthermore, mostly expressed problems during the actives were classroom management problems due to crowded classes and lack of laboratory to carry out the activities.

Çınar (2013) examined the teaching strategies used in science activities through observations and interviews. Four-week observations of three teachers' applications and interviews with fifteen teachers built up the data source of the research. According to the results of the study, preschool teachers gave place to kitchen activities, experiments, showing video and drama more frequently. However, it was mentioned that preschool teachers did not use strategies as using models, field trips, doing discovery-innovation, collection and hosting professionals. Furthermore,

according to the research preschool teachers generally gave place to the concepts related to human body and nature in the science activities.

Kallery and Psillos (2007) explored classroom practices in science qualitatively and the study revealed the gap between recommended and implemented science activities. Totally forty-four science activities of eleven teachers were analyzed qualitatively by three domains and their sub-domains; "Activity Organization: place of activity, instructional materials," "Teaching Methodology: teaching activities, handling of instructional materials, handling of children's ideas, use of science process skills, teachers' questions, interaction," and "Classroom Management: discipline rules, teachers' feedback." The most predominant teaching strategy that resulted in passive attendance were listed as "the teacher reads illustrated books to the children," "the teachers transmits scientific or other information to the children," "the teacher answers her own questions," "the teachers demonstrates pictures or objects during instruction," "the teacher carries out demonstration experiments," and "the teacher averts children's initiatives to manipulate or experiment with materials."

Kavalari, Kakana, and Chistidou (2012) identified preschool teachers' teaching strategies regarding two science concepts (sinking/floating and evaporation) and they examined the impact of content knowledge on teaching strategies. The data regarding teaching trategies were collected through semi-structured interviews done by twenty preschool teachers. The results indicated that preschool teachers choose empirical approach more than contemporary approach as teaching strategy in teaching the two concepts. Content knowledge of the teachers was examined through a questionnaire and it was found that there was no significant relationship between content knowledge and teaching strategies. Other results of the study pointed out that, whereas science education courses in university did not help preschool teachers in

science concepts, personal inquiry and exchange of ideas among colleagues help them most.

An experimental study conducted by Hong and Diamond (2012) identified efficiency of two approaches; responsive teaching (RT) and combination of responsive teaching and explicit instruction (RT+EI) in facilitating children's learning about science concepts and vocabulary related to objects' floating and sinking and scientific problem-solving skills. The results of the study exhibited important effects of instructional approaches on children's learning of science concepts. Children in intervention groups (RT or RT+EI) learned science concepts and vocabulary better than the children in control group. Furthermore, the children in RT+EI group learned more science concepts, vocabulary and scientific problem solving skills than children in either the RT or control groups. The overall results of the study indicated that combination of implicit and explicit teaching strategies might be more efficient in teaching new concepts and vocabulary than implicit strategies alone.

CHAPTER 3

METHOD

Research Perceptive

In order to develop a deeper understanding regarding science education in early childhood, more detailed descriptions of context and practices are needed. Therefore, it is very crucial to conduct qualitative research that employs thick description on early childhood science practices and teacher perspectives. Qualitative studies on early childhood science education exhibit variety of issues related to science education in early childhood through in-depth data.

The current research was a qualitative study with the strategy of descriptive case study method. Merriam (1998) defines case study as "intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit" (p.xiii). Cases studies explore a case or multiple cases through in-depth data collection and multiple data sources over time (Creswell, 1998). Case studies arise from 'how' and 'why' questions and provides researcher to maintain the holistic and meaningful characteristics of real-life events (Yin, 2003).

According to Yin (2003), based on the purpose cases studies can be exploratory, explanatory, and descriptive. As the current study, a descriptive case study offers "a detailed account of the phenomenon under study" (Merriam, 1998, p.38) and in other words explains and describes the phenomenon and real-life context in which it occurred (Yin, 2003). According to Merriam (1998), when there is little research in an area of education it is useful to conduct descriptive studies.

They provide information about the area rather than developing theoretical assumptions. Since the description of the case is needed before hypothesizing and theory testing, descriptive studies establish a database for future researches, which involve hypotheses and theories.

In the light of these aspects, the current descriptive case study was conducted to gain an in-depth understanding of science education in early years, which is an educational area with little detailed research. More specifically, the study described science education in early childhood setting through in-depth study of practices in four years old children's classroom and overall context including teachers' practices and perspectives. The following sections of the chapter describe the case selection, data collection, and data analysis processes of the study and indicate the role of the researcher and the quality of the data.

Case Selection

In order to clarify and make sense of the case selection it is important to be informed about background and interest development of the researcher. That is why I begin with description of my background and how I developed interest in this area. Such an explanation will put the research in meaningful context for the readers of this research.

I am a Master's degree student in Primary Education Program in Boğaziçi University. I graduated from Primary Science Education and worked as a science teacher in a private school. During my experiences with first, second, and sixth graders, I have realized differences between younger and older age groups regarding modeling and shaping positive attitudes towards science. As a result, I have

developed an interest about science education in early years. After one year teaching experience, I started to work as a research assistant in early childhood education department of a non-profit university. My informal observations related with science education in early childhood teacher education program directed my interest to a more specific area, science practices of early childhood teachers.

In order to get accustomed to the area, one of my committee members provided opportunity for me to do observations at a laboratory school of a higher education institution. The director of the institution suggested me an early childhood classroom, consists of four years old children, in which I could observe rich and good patterns of teacher practices. Observations in this classroom provided me with a basis for both early childhood education and science in early childhood. Furthermore, the focused observations in this EC classroom of the institution were established a foundation for the current study in terms of research setting, sampling, and participants.

Research Setting

The study involved in the same laboratory school of the higher education institution, where the focused observations were carried out. The early childhood setting, the whole research site of the current study, was located at the main campus of the institution. The educational program of early childhood settingwas based on High Scope Model. As a part of this lab school, the four years old children's classroom in which focused observations were carried out was selected purposefully. Observations at this early childhood classroom provided rich context in order to understand practices and perspectives of teachers on science education in early childhood.

Sampling

Selecting the same early childhood classroom was corresponded to "judgment sampling" that is a type of purposeful sampling. In purposeful sampling researcher choose a sample from which she can learn the most (Merriam, 1998). In judgment sampling in order to answer research questions, the researcher selects the most productive sample (Marshall, 1996). The framework of variables of judgment sampling includes variables as reciprocally good established relations and data rich informant. Since the director was offered the early childhood classroom for rich teaching practices and I got acquainted with the teacher, the considerations about data richness and well-established relation with informant were provided, respectively. Additionally, the well-established relation provided a decrease in the amount of time needed for various research steps (Glesne, 2006). Obtaining descriptive information about the research setting and the informant did not take too much time. Hence data collection proceeded smoothly.

Through listening to the voice records of science practices and reviewing the field notes, analysis of the initial data gathered from the selected classroom was done. Then, an effort to illustrate a larger picture of science practices and teacher perspectives on science education in this early childhood setting was evolved. Therefore, the focus of the study was expanded and the sampling strategy was changed from judgment to theoretical (see Fig. 3.1 Sampling process). In theoretical sampling, relevant sample leads the researcher to select new sample and hence next person, next document and so on. Therefore, an ongoing sample selection proceeds during data collection (Merriam, 1998). In this respect, relations with the director

and the other teachers, who had experiences with four or five years old children, were established in order to carry out in-depth interviews with them.

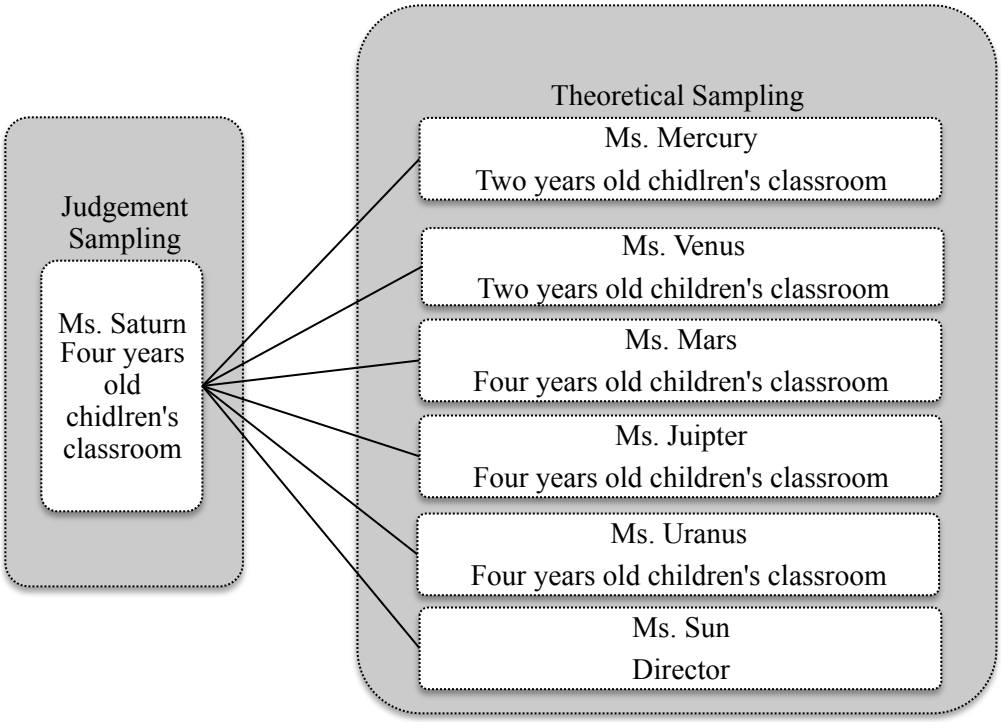

Fig. 3.1 Sampling process.

Participants

There were totally seven participants in the study; the teacher of purposefully selected classroom, theoretically selected two teachers of four years old children's classrooms, one teacher of five years old children's classrooms, two teachers of two years old children's classroom who had experiences with four and five years old children, and the director. During the observations, the first observed science activity in the selected classroom was on the solar system. In order to provide confidentiality, teachers were named by the concepts belong to the solar system.

Data Collection

Yin (2003) mentions six sources that are the evidence for case studies; documents, archival records, interviews, direct observation, participant-observation, and physical artifacts (p. 83). In order to describe practices and perspectives of teachers on science education in early childhood, data of the current study was collected through observations, interviews, documents, and field notes.

Observations

Observations at the purposefully selected early childhood classroom were one of the main data collection sources of the current study. Observations take place in the natural settings. Therefore, they provide first hand data related to research interest (Merriam, 1998). Since observations are reported by eyes and senses of the researcher, observation method can be perceived as an invaluable way of collecting data (Yin, 2011). However, in order to get rid of self-reported nature of observations, it is helpful for researchers to distinguish research observations from routine observations (Merriam, 1998).

Observation, as a data collection tool, requires researcher to decide where, what and when to observe (Creswell, 1998; Yin, 2011). In addition, in order to use observation as a research tool it is crucial to do systematic observations and write down about them or mechanically record them in a systematic way (Merriam, 1998). In the current study, characteristics of participants such as non-verbal behavior regarding science; the interactions between teachers, teachers and children; science practices; and physical surroundings such as visual cues, objects, and resources were

observed (Merriam, 1998; Yin, 2011). Moreover, observations were recorded systematically through writing about them into the field notes right after the observations. Interactions and activities were also recorded by audio recorder in order to prevent loss of data.

From the methodological perspective, the observation method of the study involved both direct observations and participant-observations. As Creswell (1998) recommended, observations were done as an outsider initially and over the time they were carried out as an insider. Direct observations and participant observations were done while the researcher role shifted from observer to participant observer, respectively. The position of the researcher is explained in more detailed in the further sections.

Direct observations in the study were rooted from the process of focused observations that have done before the current study. According to Yin (2003), a field visit to research site provides opportunity for direct observations. As a field trip my focused observation provided me with direct observations in which I took passive observer role. Similarly in the current study direct observations regarding science practices in the selected classroom were done during class work hours, which were planned activities and took place during large group times of the daily routine. While observing these science practices, observations were recorded by audio recorder and notes were taken. Furthermore, procedures and products of activities were captured by digital camera, since taking photos at the case study site makes observations valuable.

Additionally, participant-observation was other technique of observation in which the researcher participates in the events (Yin, 2003). Except planned activities, the researcher was an insider and therefore, gained access to the events related to

science practices that were generally a part of other type of practices. Similar to direct observations, notes were taken and communications were audio recorded during participant-observations.

Interviews

Interviews are essential data sources in cases studies (Yin, 2003). In the current case study, interviewing was the other main data tool. Interviews are purposeful and guided conversations which are done to get information from others (Bogdan, 2007). Merriam (1998) classifies interviews due to their structure as highly structured, semi-structured and unstructured. The study was involved both unstructured and semi-structured interviews.

During the observations in the selected classroom unstructured interviews, also called informal interviews, were done with the teacher. Preparation stages of the science activities, the process of decision of the activity, and comments on application of the activities were interviewed in a conversation manner by open-ended questions. These informal interviews were audio recorded within the consent of the teacher. Comments on the interviews were written down as field notes and the audio records were transcribed after the interviews.

Interviewing provides researchers with opportunity to collect data when it is not possible to "observe behavior, feelings, or how people interpret the world around them" (Merriam, 1998, p.72). Since it is not possible to observe science practices of other teachers at the meantime, semi-structured interviews were carried out with the teachers. Through in-depth interviews, their perspectives and practices on science

education were obtained. Hence the story of science education in the overall context was completed.

The semi-structured interviews were consists of nineteen questions, which were constructed during the research (Appendix A). After the initial data analysis, three patterns of the study were explored: Preparation period of science activities, implementation period of science activities, teaching strategies in science activities, perspectives of teachers on science and science practices. The patterns were overlapped by the first and forth dimensions of the 'Preschool Teachers' Competencies In Science Activities Scale' (Özbey & Alisinanoğlu, 2010): The materials and strategies used by the teacher, Knowledge level of the teacher regarding application, General knowledge level of teacher regarding science activities, teacher attitudes during science activity applications. In the light of the initial data analysis and the stated dimensions of the scale, interview questions were constructed.

The semi-structured interviews were conducted one by one in quite classroom settings with the seven participants. Each of the interviews of the seven participants took approximately sixty minutes. Six out of seven interviews were audio recorded; one was not as the participant desired not to be recorded. The teacher answered the questions slowly and let me to write down her answers. Right after the interviews, interviews were detailed by taking reflective notes.

Documents

Documents are the materials as photographs, videos, films, memos, letters, diaries, clinical cases records, and memorabilia that are complementary data sources for the

participant observation and interviewing. Documents can be categorized as personal, official, and popular culture documents (Bogdan, 2007). In the study, as supplementary information official documents were collected. When it was not possible to collect documents, photos of these materials were taken.

Official documents are produced by organizations, groups or companies to keep records (Bogdan, 2007). As official documents curriculum and bulletins in the early childhood setting were collected during observations and interviews. In addition research-based and children excluded researcher-produced photographs were taken during the observations. Books in the classroom library, the posters and boards in the classroom, outputs of the activities were captured by a digital camera.

Field notes

Field notes represent what the researcher sees, hears, experiences and thinks while collecting and reflecting on the data in a qualitative study (Bogdan, 2007). During the research, a reflective journal was formed and field notes were recorded. Detailed field notes were recorded immediately afterwards of the each observation and interview. Comments on what happed after the end of each observation and interview were wittien into the journal. They included reflections on my learning and methodological issues of the study, which is also called ‘observer’s comments’ (Bogdan, 2007).

The journal included both ‘descriptive filed notes’ and ‘reflective field notes’. It provided recording description of activities, physical setting, and dialogues. Additionally, it provided reflective filed notes that included my comments and

feelings about observations and reflections on analysis, method and ethical issues as well (Bogdan, 2007).

Data Collection Process

The data collection process was performed between March 14, 2013 and July 31, 2013. Since science activities were implemented in large group times of the daily routine, observations were focused on the large group times. For the second semester, two days a week student teachers did implementations in the classroom of Ms. Saturn. Therefore, attendance to the setting was based on participating in implementations of the classroom teacher rather than student teachers.

Through participating in large group time activities of classroom teacher, totally 105 hours observation was made. In addition, interviews with seven teachers, each lasting about sixteen minutes, were carried out on the last weeks of July. It provided two benefits. First, the questions were shaped in accordance with the observations. Second, detailed and comprehensive explanations were gathered from the teachers due the flexible educational program on July.

Data Analysis

Data analysis is the process of searching and arranging the data in a systematic way. It involves working with the data, organizing the data, breaking the data into units, coding the units and finally synthesizing the codes and search for patterns (Bogdan,

2007). The process of data analysis was started during the study proceeds. Audio records of first part of observations were transcribed selectively. After having the approval from the advisor, the inrelevant practices, such as wearing coats before going to garden, cleaning up the classroom, lining up before activities were excluded and did not transcribed.

There was not a kind of science activity in the curriculum of the setting. Therefore, the decision regarding whether an activity was a science practice or not was made by considering the aim of the activities, focused concepts at the activities and explanations at the bulletins. Sometimes there were unplanned experiences as natural experiences and informal experiences, which involved concepts belonging to science. For example, while children playing at the garden they came across with a turtle. Ms. Saturn held the turtle and they talked about it only for two minutes.

> Ms. Saturn: Is the shell of the turtle soft?
> Berk: It's hard.
> (Ms. Saturn left the turtle on the ground)
> Ms. Saturn: Just watch around without touching. Let it free and see how it will move.
> (Children watched the turtle and some of them wanted to touch)
> Ms. Saturn: Just watch it distantly let's see how it moves and don't scare it.
> (Turtle tried to pass under the wire)
> Emre: It does not fit there.
> Ms. Saturn: Look it tried to exit. Its head passed but how about its shell?
> Aysel: No. Since it is big.
> Ms. Saturn: Isn't it? Let me take it to out side before we make it scared (from filed notes of July 15, 2013)[1].

[1] Bayan Satürn: Kabuğu yumuşak mı kaplumbağanın?
Berk: Sert.
(Bayan Satürn kaplumbağayı yere bıraktı)
Bayan Satürn: Ellemeyin, uzaktan izleyin. Rahat bırakın, bakalım ne yapacak izleyin.
(Çocuklar izlediler, dokunmak isteyenler oldu)
Bayan Satürn: Biz uzaktan izleyelim bakalım ne yapacak. Ellemeyin böyle uzaktan bakın, korkutmayın onu.
(Kaplumbağa telin altından geçmeye çalıştı)
Emre: Sığmıyor.
Bayan Satürn: Bakın çıkmaya çalıştı, kafası geçti ama kabuğu geçebildi mi?
Aysel: Hayır, çünkü büyük.
Bayan Satürn: Değil mi? Hadi ben onu dışarı bırakayım artık, korkmasın.

Although Ms. Saturn considered this experience as a science activity, such practices were not taken into account during the data analysis. Since these activities were not pre-planned, they resemble to natural experinces and informal learning experiences. However, such experiences mostly performed only for attracting interest of children and did not fit to natural experinces or informal learning experiences completely. In such experiences, for example, children did not initiate or choose activities as in the natural experinces and the infromal learning experiences. Moreover, the teacher did not provide opportunities for children in which they have lots of experiences (Lind, 1996; Lind, 1998). Unfortunately, most of the time the teacher missed opportunities to convert these experinences into science practices. Therefore, such pratices were excluded during the analysis. Regarding the purpose of the study, in order to describe preparation and implementation periods of science practices and the teaching strategies, the planned activities on science education during the large group times and any other experiences related to those science activities were selected and transcribed.

All the interviews and selected observations were transcribed and saved into the format of Microsoft Word text. Additionally field notes were transferred to soft copy in Microsoft Word. The visual data was also transformed into computer documents. Finally, in order to organize and analyze the data, the whole data was imported into the qualitative data analysis software MAXQDA 11. As the data were read, issue-relevant meanings were emerged such as certain words, phrases and patterns of behavior. Through these repetitions, patterns were established. Words and phrases, called coding categories, were written down to represent the patterns. Hence a coding system was developed. Correspondences between the categories were

searched and themes were developed according to the categories (Bogdan, 2007; Creswell, 1998). During the development process of the themes, tables and concept maps of the codes were built up. The reduction and rearrangement of the codes were carried out through discussions with the advisor. The open codes were renamed by more abstract codes and similar codes were rearranged under new codes. Then categories and themes were developed respectively. The Fig. 3.2 Development of themes, for example, illustrates how the theme called “Implementation” was developed.

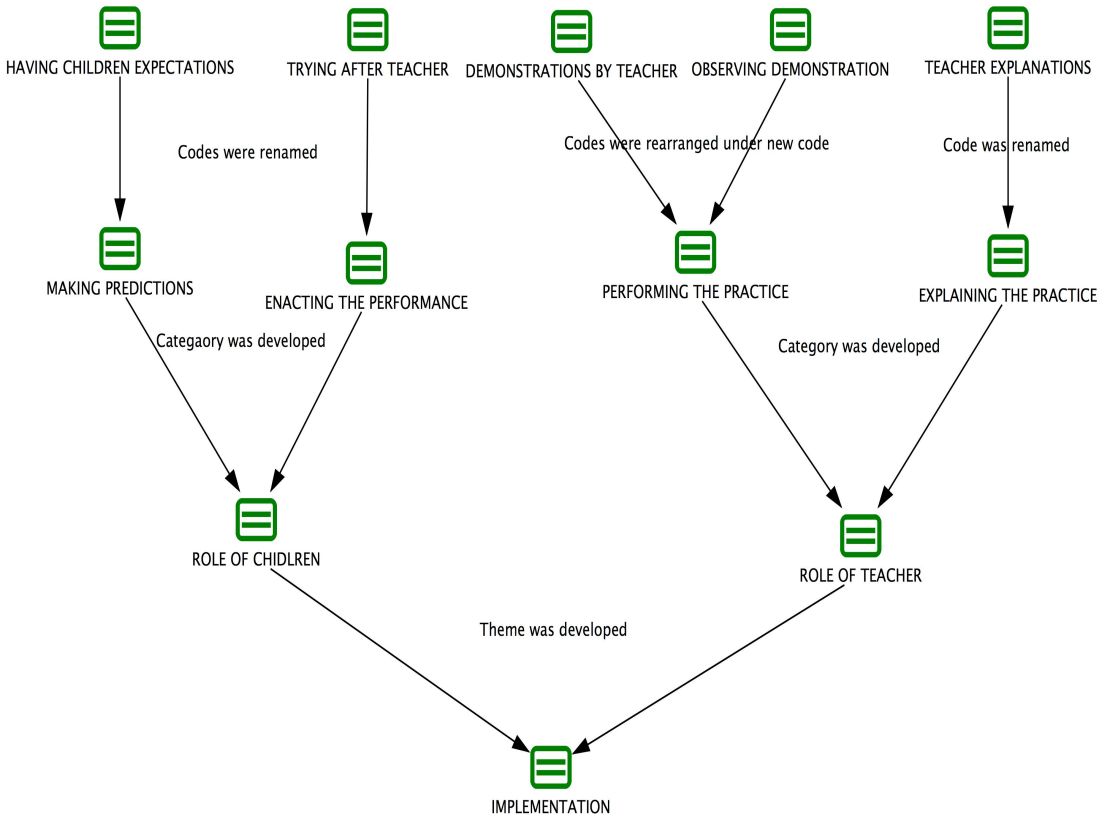

Fig. 3.2 Development of themes.

Finally, eight main themes were developed. Three of the themes were described perspectives of early childhood teachers on science education (contribution of science education, science in the curriculum, teachers success in early childhood

education science). The other five themes were described practices of early childhood teachers on science education (preparation, engagement, implementation, conclusion, teaching strategies). Then the possible relations among the themes were searched to illustrate the picture of science education at the setting.

The Role of the Researcher

During the research my main role as a researcher was participant observer. The participant-observation has a range from mostly observation to mostly participation (Glesne, 2006). In order to achieve the primary goal of the research, collecting data, it is significant to balance participation and observation. In some cases too much participation may cause loss of intention (Bogdan, 2007). For example, excessive participation may cause researcher to get involve and active with the subjects too much. As a result the attention may shift from relevant issues to irrelevant ones.

The situation of the researcher along the participant-observation continuum depends on the context of the study (Bogdan, 2007; Glesne, 2006; Yin 2003). Although my main role was participant, it was changed in order to examine both planned activities and science practices that are generally integrated to other types of practices. In order to gain data from planned science practices, as a participant-observer I approached to the observation point of the continuum. As a result, I aimed to gain data from events that were not manipulated. On the other hand, in order to examine the science practices integrated to other practices, I approach to the participant point at the continuum. Actually, the informal interviews besides the

formal ones facilitated my access to the events. Additionally, this provided me with an insider view and to catch the hidden science practices in the overall context.

Quality of the Research

Issues regarding subjectivity generally appear in qualitative research, since the concern of the qualitative research, or naturalistic research, is observed in its natural setting (Moschkovich &Brenner, 2000). Moschkovich & Brenner (2000) indicated both traditional and naturalistic terms of quality and stated strategies to enhance the quality through combining the approaches of Erlandson, Harris, Skipper & Allen (1993), Firestone (1993), LeCompte & Preissle (1993), and Lincoln and Guba (1985). In Table 3.1. Quality of the Research, these standards and the strategies in the current study were indicated (Moschkovich &Brenner, 2000, p. 479).

The interval validity deals with how research findings match reality (Merriam, 1998). Internal validity at traditional research corresponds to credibility at qualitative research (Moschkovich &Brenner, 2000). In order to enhance credibility of the study prolonged engagement, persistent observations, and triangulation methods were used. Prolonged engagement was continued until the fewer new types of data were being collected. Thorough persistent observations, adequate depth was in science practices were provided. The triangulation method was accomplished through multiple data collection methods as observations, interviews, documents, and field notes (Creswell, 1998).

External validity refers to the extent to which the findings of one study can be applied to other situations (Merriam, 1998). External validity at traditional research refers to transferability in qualitative studies (Moschkovich &Brenner, 2000).

Although generalizability is an inappropriate goal for qualitative studies it is possible to enhance it. In order to enhance transferability, rich and thick descriptions were provided. In addition, the same classroom, in which the focus observations were carried out, was purposefully chosen at the current study to reach informative sources.

Table 3.1. Quality of the Research

Dimensions of Quality	Traditional Term	Naturalistic Term	Sample Strategies	Strategies in Current Study
Truth value	Internal validity	Credibility	Prolonged engagement Persistent observations Triangulation Member checking	Prolonged engagement Persistent observations Triangulation
Applicability	External validity Generalizability	Transferability Analytical generalizability	Thick descriptions Purposeful sampling	Thick descriptions Purposeful sampling
Consistency	Reliability	Dependability	Multisite designs Critical case selection Audit trail Multiple researchers Participant research assistants Recording Devices	Audit trail Recording Devices
Neutrality	Objectivity	Conformability	Audit trail Researcher's role defined	Audit trail Researcher's role defined

Reliability deals with to the extent to which research findings can be replicated (Merriam, 1998). Reliability in traditional research corresponds to dependability in qualitative research (Moschkovich &Brenner, 2000). In order to support dependability, audit trail and recording devices were used. The observations were recorded through using a voice record device and taking filed notes. Therefore reliability of the data was checked reciprocally. Finally, objectivity in traditional research refers to conformability in qualitative studies (Moschkovich &Brenner, 2000). In order to enhance objectivity, again audit trail and complete definition of researcher's role was provided.

In qualitative research in order to make the validity and reliability certain, it is necessary to conduct the research in an ethical manner (Merriam, 1998). Ethical issues were taken into consideration in all parts of the data collection and data analysis. During the data collection period, the participants were provided with information to make informed decision about participating in the study. They were able to withdraw of the study at any point and interviews were done with volunteer teachers. Informed consent of each teacher regarding observations, interviewing and voice record were provided (Glesne, 2006). Finally, the privacy of the teachers was assured in the data analysis and personal information was not revealed (Creswell, 1998).

CHAPTER 4

FINDINGS

The purpose of this case study was to describe science practices in the selected classroom and draw a picture of perspectives and practices of early childhood [EC] teachers on science education in early childhood education [ECE]. There were two research questions: “How is science teaching practiced in a four year old classroom?” and “What are the perspectives and practices of early childhood teachers about science education in early childhood?” In order to represent the answers to the research questions the chapter is divided into three parts.

The first part is called “The Setting” in which the EC setting is described through the taken field notes, the collected documents, and the interviews done with teachers during the research. It includes information about teachers, curriculum, educational plans, bulletins, and daily routine of the research setting.

The second part is called “Teacher Practices on Science Education” which covers the findings that were gathered from observations, informal interviews and semi-structured interviews. The main themes of teacher practices are preparation, engagement, implementation, conclusion, and teaching strategies.

The third part is called “Teacher Perspectives on Science Education in ECE” which consists of the findings that were gained from semi-structured interviews. The three main themes of teacher perspectives are contribution of science, science in the curriculum, and teacher success in ECE science.

The Setting

The laboratory school of the higher education institution was established in 1976. It provides day care for the children ages between one and five on workdays from 08:30am to 5:30pm throughout the year, except August. The EC setting serves for both academic and administrative staff of the higher institution. The quota for the children of academic and administrative staff at the institution was half and half (from interview with Ms. Sun on July 29, 2013).

For the educational year 2012-2013, there were thirteen teachers, ten caregivers one director, and one secretary and 118 children. There were one male and twelve female teachers at the setting. Nine teachers at the setting were graduated form high school and four of them were graduated from university (from website of the setting, March 26, 2013). The Fig. 4.1 Numbers of teachers, indicated below presents the numbers of teachers for each age group.

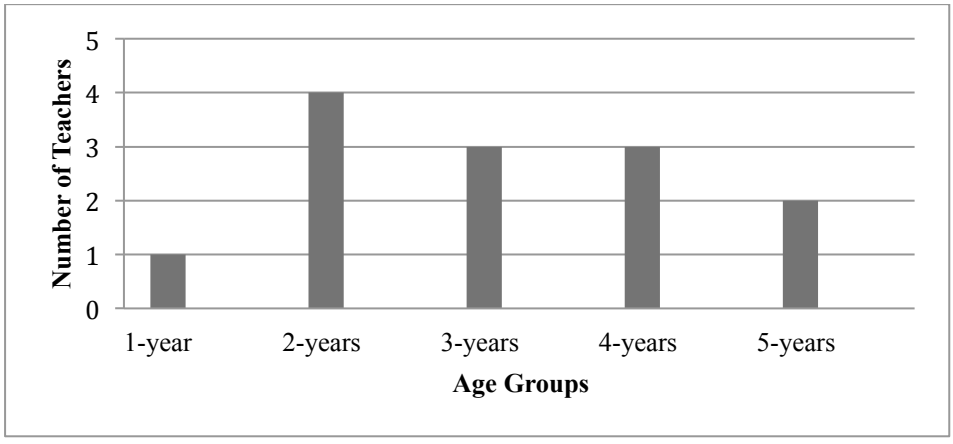

Fig. 4.1 Number of teachers.

The participants of the current study were the director and the teachers who have worked with four or five years old children. Details about the participants that were gained during the interviews were indicated at Table 4.1. Participants.

Table 4.1. Participants

Participants	Title/ Current Age Group	Gender	Graduation/ Area	Years of Previous Experience	Years of Experience at the Setting	Total Years of Experience
Ms. Sun	Director	F	High School	0	20	20
Ms. Mercury	Teacher/ Two years old	F	Vocational High School/ Child Development	2	8	10
Ms. Venus	Teacher/ Two years old	F	Vocational High School/ Child Development	8	3	11
Ms. Mars	Teacher/ Four years old	F	Vocational High School/ Child Development	0	9	9
Ms. Jupiter	Teacher/ Four years old	F	University (Distant training)/ ECE	0	1	1
Ms. Saturn	Teacher/ Four years old	F	Vocational High School / Child Development	5	6	11
Ms. Uranus	Teacher/ Five years old	F	University/ ECE	3	1	4

There were two committees that were responsible from the administration of the setting. The executive community was consisted of academic staff of college of

education, a delegate of parents and the director of the setting. The educational committee was consisted of academic staff from the college of education. Head of these two committees were decision makers of teacher selection to the setting. However, teachers assigned to the setting through MoE for two years. There were five teachers who assigned to the setting via MoE. Ms. Sun stated that when the setting did not have a right to choice the teacher, assigned teachers might have problems due to comprehensive educational model of the setting.

> The Researcher: How does teacher hiring procedure works in the setting?
> Ms. Sun: Candidates apply to be a teacher in the setting. Heads of Executive Committee and Educational Committee evaluates the applicants. If an applicant passes the evaluation, they asked to prepare a microteaching and according to that committees conclude the procedure.
> The Researcher: Does Ministry of Education assign teachers?
> Ms. Sun: It is for the last two years. This is disadvantageous for us because we apply High Scope; let's say active learning not only High Scope because we have variety of applications. For instance, after teachers observe orff they may think that some aspects of orff could be applied in their classes. Identically teacher may fancy the project works of Reggio Emilia and they could also apply it in their classes. In this institute it is our goal and basis to make it possible for children to use their five senses, express their own while mastering their language through active learning with right choice of materials. At that point teachers that are assigned from Ministry of Education could lack and it could be hard for them to keep up with (from interview with Ms. Sun on July 29, 2013)[2].

The education program of the EC setting was generated from High Scope Model. The setting used High Scope 2000, which included ten domains, and fifty-eight key experiences (Appendix B). The educational committee prepared the framework of

[2] Aratırmacı: Kurumunuza öğretmen alımınız nasıl oluyor?
Bayan Güneş: Öğretmenlik için başvurular oluyor. Yürütme Kurulu başkanımız, Eğitim komisyonu başkanlarımız başvuruları değerlendirmeye alıyor. Değerlendirmede seçilen kişiler uygulama için bir hazırlık yapıyor ve uygulamaya göre karar veriliyor.
Araştırmacı: Milli Eğitim'den atama ile gelen oluyor mu?
Bayan Güneş: Son iki yıldır Milli Eğitim'den atama geliyor. Bu biraz dezavantaj çünkü biz High Scope uyguluyoruz, yani daha çok etkin öğrenme diyeyim öyle sadece High Scope uyguluyoruz demeyelim, bir çok şey uyguluyoruz. Orff'a gidiyorsunuz, orff'un bir şeyi hoşunuza gidiyor ve geliyorsunuz ve çocuklara sunuyorsunuz veya Reggio Emilia'nın proje çalışmaları hoşunuza gidiyor gelip çocuklarla yapıyorsunuz. Burada etkin öğrenme, çocuğun beş duyusunu kullanması, kendini ifade etmesi, materyal seçimi ve bu arada dili doğru kullaması veya ifade etmesine fırsat vermek gibi amacımız ve temellerimiz var. Bu noktada biraz ayak uydurmaları zor oluyor.

the yearly educational program. They decided weekly themes and KEs for each theme. If there was not any suggestion at the end of the year, the themes and the experiences repeated each year. Table 4.2. Weekly Themes indicated the weekly themes of the second semester of 2012-2013 educational year, when the current study was conducted (from field notes of March 28, 2013).

Table 4.2. Weekly Themes

Months	Weekly Themes
March	Light and Shadow
	Space and Sky
	Natural Events
	Spring
April	Kinds of Trees
	Wooden Objects
	Animals Live in Trees
	Countries
May	Science and Experiments
	Arts
	Seeds and Flowers
	Project (Recycle)
	Paint and Colors
June	Summer
	Garden Games
	Sports
	Costumes
July	Colors
	Emotions
	Water Games
	Garden Games

During the interviews with teachers, all of the teachers advocated that it was an advantage to have an educational plan that was based on weekly themes. Five of the seven teachers pointed out that weekly themes enable teachers to change and shift topics due to children's needs, classroom atmosphere, and unexpected events.

Ms. Mercury stated that when children could not concentrate on the topic, it was possible to shift the topics to the next day.

> The Researcher: How do you evaluate weekly themes in the curriculum that you have mentioned?
> Ms. Mercury: I have an example from this year. That day children were rattling, they could not able to be adapted, some of them were ill and some of them resisted to listen, I decided to pass that topic. However, the next day the moment that I felt they were ready I gather them together and start my class with combining each day's topics, which I think is logical (from interview with Ms. Mercury on July 29, 2013)[3].

Moreover, four of the teachers indicated that weekly themes reinforce learning of children. While Ms. Saturn was expressing the contribution of weekly themes to permanent learning of children, she pointed out the importance to having sorted themes due to their relevancy.

> The Researcher: How do you evaluate enacting a curriculum that consists of weekly themes?
> Ms. Saturn: In my opinion it would be hard if a topic lasts for one month. On the other hand, having weekly themes has a better and reinforcing impact for both children and us. Moreover, our themes are also correlated with each other, forests and wooden objects for instance. Through such correlated themes we can link much more things and this is more reinforcing. However, right after mathematics theme if we have irrelevant theme such as arts theme then it could cause discrepancies. If we have correlated themes consecutively then we have the chance to create a continuum and creating this continuum helps children to enjoy more and facilitates learning (from interview with Ms. Saturn on July 30, 2013)[4].

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[3] Araştırmacı: Müfredatınızda haftalık temalar var dediniz bunu nasıl değerlendiriyorsunuz?
Bayan Merkür: Mesela şöyle oluyor, bunu bu sene yaşadım. Çocuklar çok hareketliler, adapte olamıyorlar, konuyu anlatmak istiyorum, toparlanamıyorlar, hasta olanlar var, dinlemeyenler işte, o gün o konuyu işlemedim. Ama bir sonraki günde tamamen onların da rahat olduklarını hissettiğim an hep beraber toplanıp bir önceki konuyla o günkü konuyu bağdaştırıp ikisini birlikte vermenin mantıklı olduğunu düşünüyorum.

[4] Araştırmacı: Peki, müfredatınızda haftalık temalar var. Böyle bir müfredat kullanmayı nasıl değerlendiriyorsunuz?
Bayan Satürn: Bence bir ay boyunca bir konu olması belki biraz zor olabilir. Ama haftalık olması çocuklar açısından da bizim açımızdan da biraz daha iyi oluyor pekiştirici oluyor. Ama şöyle de bir şey var, genelde hazırladığımız konular birbirini takip eden konular olabiliyor mesela orman, ağaç türünden yapılan malzemeler. Birbirini takip eden konular olduğunda daha çok bağlantı kurarak bir şeyler yapabiliyoruz ve biraz daha pekiştirici oluyor. Ama matematik yaparken bir anda arkasına sanatı koyarsak çok bağdaşmayan şeyler oldu mu belki kopukluk olabiliyor. Ama birbirini takip eden konuları koyduğumuzda ister istemez o bir süreç

Teachers prepared and shared daily plans during the teacher meetings. The monthly-distributed programs included common weekly themes and key experiences common for all age groups (Appendix C). Since teachers modified these common themes and key experiences according to their group, they preferred to cooperate with same age group teachers to prepare educational plans. During the interviews, all of the teachers stated that they prepare daily plans and determine the activities by their same age group colleagues. Ms. Saturn stated that she cooperated with other four year old classroom teachers and they prepared daily plans of a week in an order.

> The Researcher: How do you prepare your daily plans for your predetermined weekly themes and topics?
> Ms. Saturn: To tell the truth we share each day of a week. We discuss among colleagues with the same age group such as "we are having the topic flood on Monday class" (from interview with Ms. Saturn on July 30, 2013)[5].

In order to make the parents informed about the news and educational activities, monthly bulletins were distributed to the parents. The bulletins included news from the setting, photos of activities, and a table of educational plan (Appendix D). The columns of the table included summary of key experiences; weekly themes and examples of activities; and planned trips, theatres and experiments, respectively.

A nine-hour day in the setting was based on the daily routine of High Scope Model. The main aspects of a day in the setting were breakfast, gymnastics, large group time, plan-do-review process, garden time, launch, rest/sleep time, snack time,

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oluşturuyorsunuz. O süreci takip ettiğinizde çocuğun daha da hoşuna gidiyor, kalıcı bir şeyler oluyor çocuklarda.

[5] Araştırmacı: Belirlenmiş haftalık temalarınız için günlük planlarınızı nasıl yapıyorusnuz?
Bayan Satürn: Açıkçası biz haftanın beş gününü paylaşıyoruz. Grup arkadaşlarımızla konuşuyoruz, mesela pazartesi günü çocuklara seli vereceğiz diyoruz.

and small group time. The time periods and content were differed due to age groups. At Appendix E, there is the timetable of daily routine for four years old children.

At the purposefully selected classroom, consisted of four years old children, there were one teacher and nine children; three girls and six boys. There were portable two tables and eleven chairs that were suitably designed for children. For the rest/sleep time portable beds for each child were provided in the classroom. The walls of the classroom were covered with works of children and posters related to many contexts such as letters, seasons, and classroom rules.

Breakfast took place between 09:00am and 09:30am. During the breakfast Ms. Saturn played music of exhibition that they were going to present. At the end of the breakfast each child took her plate and glass to the kitchen. After cleaning time, they did gymnastics for ten minutes. During the gymnastic exercise Ms. Saturn showed some figures, then she gave chance children to do whichever figure they want.

> 09.00am: Breakfast was started and during the breakfast songs played in the background. Ms. Saturn picked the songs that they were going to dance at the year-end program and children accompanied.
> 09.30am: Breakfast was completed and each child took her plate and glass to kitchen. The rest left from breakfast cleaned by caregiver. Children who put their staff to the kitchen go to bathroom to proceed to the cleaning time.
> 09.40am: Children who completed cleaning time came back to the classroom and they began to do gymnastics. Accompanied by the music Ms. Saturn demonstrated some gymnastics figures and then let children to dance however they want. Gymnastics continues for ten minutes (from field notes of April 11, 2013)[6].

Large group time started at 09:40am and took fifteen to twenty minutes. At large groups activities were done together with all children. For the second semester, there

[6] Saat 09:00: Kahvaltı başladı. Kahvaltı boyunca arka fonda müzikler çaldı.
Ms. Satürn sene sonunda dans edecekleri müzikleri açtı. Çocuklar da eşlik etti.
Saat 09:30: Kahvaltı bitti. Her çocuk kendi tabak ve bardağını mutfağa götürdü. Geri kalanını yardımcı teyzeler topluyor. Mutfaktan çıkan çocuklar temizlik zamanı için lavaboya gitti.
Saat 09:40: Temizlik zamanını tamamlayan çocuklar sınıfa döndü ve jimnastik başladı. Müzik eşliğinde önce Bayan Satürn bazı figürler gösterdi daha sonra herkesin istediği gibi dans etmesini sağladı. Jimnastik yaklaşık 10 dakika sürüdü.

was a problem at Internet connection of the computer at Ms. Satrun's class. Therefore, when Ms. Saturn was going to show a video from web they moved to one of the neighbor classes. After they sit around the computer, Ms. Saturn looked for visuals related with the weekly theme. They talked on the topic through the visuals and information at the website. At the end, they recall the stated aspects through question and answer sessions. Afterwards, Ms. Saturn wanted children to imagine on being the object or owning the object at the topic. After each child explained her imagination, Ms. Saturn expressed her imagination as well. Then, she asked children their plan for work time. Each child stated her plan by indicating with whom to play and which corner to play.

> 09.40am: After gymnastics, large group activity began. Since there was no internet connection in the classroom we moved to the next classroom. We gather around the computer and watched a video on koalas. Ms. Saturn found some pictures from web and showed them to the class and discussed on them.
> She found a website from which she made explanations to children together with the information that she learned from that website (their nourishment, living environment, sleeping, weight and height). At the end of the activity she made children to repeat the information through question and answer session.
> 09.50am: Ms. Saturn asked each child "what color will you be if you were a koala." After the imagination session each student explained her plan for work time.
> 09.55am: They moved back to classroom for the work time (from field notes of April 17, 2013)[7].

At the work time from 10:00 am to 11:00am, children achieved their plans by playing with selected friend and corners. If they wanted to change their plans, the corner or peer, they made Ms. Saturn informed about the changes. There

[7] Saat 09.40: Jimnastik bittikten sonra büyük grup zamanı başladı.
Sınıfta internet olmadığı için yan sınıfa geçtik. Bilgisayar etrafında toplandık. İnternetten kısa bir koala videosu izledik. Bayan Satürn internetten resimler buldu, gösterdi ve üzerine konuştuk.
Koalalarla ilgili bir web sitesi buldu ve daha çok oradan edindiği bilgilerle çocuklarla konuştu (ne yer, nerede yaşar, uyku, boy, kilo). Etkinliğin sonunda bütün bilgileri soru-cevap ile tekrar ettiler.
Saat 09.50: Bayan Satürn her birine 'Sen bir koala olsan ne renk olurdun' diye sordu. Hayallerinin ardından herkes çalışma saati için planlamasını anlattı.
Saat 09:55: Çalışma zamanı için sınıfa geçildi

were five corners that children might spend their work time: art, silent, playing house, block, and book corners (see Fig. 4.2 Corners at the classroom).

Fig. 4.2 Corners at the classroom.

At the art corner, they do art activities such as drawing pictures. The silent corner provided children to play with both individual and group games. At the playing house corner they did dramatic play by various objects and costumes. At the block corner children developed objects and built up stories for them. Children generally engaged in book corner before sleep/rest time. Some of the books in the library were belong to the class and some of them were to the teacher and children. At the end of the year, teachers removed their books to their new classrooms. In Ms. Saturn's classroom there were totally

142 books. The classroom itself had seventy-two books, in which seventeen of them were science context based. In addition, Ms. Saturn had seventy books, in which nine of them were science context based.

> I looked for the amount and content of the books at the book corner. Ms. separated the books that will be removed to her new classroom. I asked Ms. Saturn how they use these books.
> Each classroom has their own books and who come to that classroom next year could use them. Moreover there are books that brought by the teacher and children. When they move to another classroom the teachers carry those books to the new classroom.
> Totally there are 142 books in the classroom. Seventy-two of those books were belong to the classroom: forty-five of them are short stories and seventeen of the rest have scientific content. Ms. Saturn owned seventy of the books: thirty-two of her books were short stories and nine of the rest have scientific content (from field notes of July 25, 2013)[8].

During the work time, Ms. Saturn did preparation for small group activity, or called for children to complete their missing activities. At the mean time she followed up the children, had conversations on their work and helped them to solve problems whenever needed. In addition she talked on the lesson plans of student teachers.

> During work time the student teacher told Ms. Saturn the activity that she planned. In the same time Ms. Saturn was working on children's t-shirt activity.
> Student Teacher: I thought they focused on the animals live in the trees whole week. That's why I will ask questions about animals to them from the sources I have. For example which one eats other or which one live in the forest and I will let them make a puzzle. My work would be an evaluation part of the topic.
> The Researcher: Is the today's activity first one on the weekly theme?
> Ms. Saturn: Yesterday when I was not here student teachers conducted the activity along the door.
> (Ms. Saturn drew setters on the figures at everyone's t-shirt)

[8] Kitap köşesindeki kitap sayına ve içeriklerine baktım.
Bayan Satürn yeni sınıfına gidecek kitapları ayırmıştı. Bu kitapları nasıl kullandıklarını sordum.
Her sınıfın sabit kitapları var ve gelecek sene o sınıfa gelen onları kullanabiliyor. Bir de kendisini ve sınıfındaki çocukların getirdikleri var. Sınıf değişikliğinde öğretmenler bunları taşıyor.
Sınıfta toplam 142 kitap var. Sınıfın kendisinde 72 kitap var; 45 tanesi mini hikaye, 17 tanesi bilim içerikli. Bayan Satürn'ün 70 kitabı var; 32 tane mini, ince hikaye kitabı var. Kalan 38 kitabın 9 tanesi bilim içerikli.

> Ms. Saturn: Let me draw setters of the t-shirts avoid from being wiped out.
> Student Teacher: Did children or you do these drawings?
> Ms. Saturn: I drew and children get over them. Now, I drew the setters with black (from field notes of April 17, 2013)[9].

At the end of working time Ms. Saturn made children informed that they were going outside to the garden after ten minutes and wanted them to clean up the toys and materials they used at work time. From 11:00am to 12:00am children played at the garden. There were two playgrounds, one was for younger groups and one was for older groups. While children freely playing at the garden, at the mean time teachers played with children or talked to each other. However, they always carefully followed up the children.

After they came back to class, they had cleaning time and lunch. Then, they played with games at the silent corner either worked on drawing lines, finding similarities and differences through a book called ÇEP. Afterwards children took a book from the book corner and rest on their beds until the snack time at 03:00pm. During the rest/sleep time, Ms. Saturn had a break and the caregiver stood at the class.

At 03:30pm they had small group time for twenty to thirty minutes. Compared to large group time, individual activities were conducted at the small group time. Therefore, children involved in activities in which they

[9] Çalışma zamanında stajyer öğretmen Bayan Satürn'e planladığı etkiliği anlattı, Bayan Satürn çocukların tişört çalışmalarıyla ilgileniyordu.
Stajyer Öğretmen: Bütün hafta ağaçta yaşayan hayvanlara odaklandılar diye düşündüm. O yüzden hayvanlarla ilgili kaynak var elimde oradan karışık hayvanlarla ilgili sorular soracağım mesela hangisi hangisini yer, hangisi ormanda yaşar gibi. Puzzle yaptıracağım. Benimki değerlendirme gibi olacak.
Araştırmacı: Bugünkü etkinlik haftalık temanın ilk etkinliği miydi?
Bayan Satürn: Dün ben yokken stajyer öğretmenler kapıdaki etkinliği yaptı.
(Bayan Satürn herkesin tişörtünün üstündeki şekillerden montör geçiyor)
Ms. Saturn: Şu montörlerini geçeyim de yıkadıklarında gitmesin.
Stajyer Öğretmen: Siz mi çizdiniz çocuklar mı çizdi bunları?
Ms. Saturn: Ben çizdim onlar üstünden geçti. Şimdi ben montörlerini geçiyorum siyahla.

achieve the determined key experiences individually. At the end of the small group activity children played at the classroom or garden and waited for their parents to pick them up.

The products of children formed at both large and small groups presented at exhibition done at the end of May. Ms. Saturn kept the outputs of the activities until the exhibition. After the exhibition she gave back the products to each child.

> Student teacher implemented an activity on origami. Ms. Saturn involved in the activity and sometimes guided the student teacher.
> Student Teacher: Could you please write your names on the dogs?
> Ms. Saturn: My dog's name is Lucky.
> (Ms. Saturn led children to give a name to the dogs rather than writing their names)
> Emre: I did not decide my dog's name yet.
> Ms. Saturn: Are you going to take them away? Could we put our dogs on a board like this?
> Student Teacher: No, I will leave them here.
> Children: Could we take them to home?
> Ms. Saturn: You could take them after the exhibition.
> Ms. Saturn: Children get tried of exhibition (to the student teacher and me).
> Student Teacher: Let's paste like this.
> Ms. Saturn: Yes, we will first paste examples of yours and then theirs. After the exhibition I will give them (from field notes of May 7, 2013)[10].

At the beginning of June both exhibition and student teachers' implementations finished. Therefore, the density of the educational program of June and July

[10] Stajyer öğretmen origami ile ilgili etkinlik yaptı. Bayan Satürn stajyer öğretmenin yaptığı etkinliğe dahil oldu ve bazen onu yönlendirdi.
Stajyer Öğretmen: Köpeklerinizin üstüne isimlerinizi yazabilir misiniz?
Ms. Saturn: Benim köpeğimin adı Şanslı.
(Bayan Satürn çocukları kendi isimlerini yazmak yerine isim vermeye yönlendirdi)
Emre: Ben daha adına karar vermedim.
Ms. Saturn: Bu yaptıklarını geri götürecek misin? Bir de şöyle kartona yapıştıralım mı?
Stajyer Öğretmen: Yok burada kalacak.
Children: Eve götürebilir miyiz?
Ms. Saturn: Sergiden sonra götürebilirsiniz.
Ms. Saturn: Çocuklara iyice gına geldi sergi sergi diye (stajyer öğretmene ve bana doğru).
Stajyer Öğretmen: Böyle yapıştıralım.
Ms. Saturn: Evet once senin yaptığın örnekleri sonra onların yaptıklarını yapıştırırız. Sergiden sonra ben onlara veririm.

decreases. Children could bring their toys from home for free play and they spent more time at garden.

> Ms. Saturn: In July, regarding the activities we mostly go out to garden and have breakfast, read a book, play games and let children free. Since it is too hot and children get bored, we go out to garden as possible as we can in July. We are flexible on the program, for example we did just one activity each day. Even if we write activities to the plans, we do one of these activities. In July we set up pool, play water games, and do painting at the garden (from field notes of May 15, 2013)[11].

On July, the number of children at each class decreases, except Ms. Saturn's class. While three of four children continued to come to the setting at each class on July, at least six of the nine children continued to come to the setting in Ms. Saturn's class. Due to the decrease in the number of children, neighborhood classes were combined in one classroom at breakfast times, work times, and launch times. Teachers started to collect the materials on the boards and at the classes after the exhibition on June. At the last week of July, before the break, they completely finished the collection of the materials in to boxes. Then, reparations at the classes were done at the break on August.

Teacher Practices on Science Education in ECE

Science teaching practices of the seven EC teachers at the setting are represented in five sections. The first section is called "Preparation" where the components of preparation of science activities are described. In the second section, called "Engagement," the techniques for engaging children into science practices are

[11] Ms. Saturn: Temmuz ayında şöyle oluyor etkinlik anlamında bahçeyi kullanıyoruz, kahvaltıyı bahçede yapıyoruz, bir kitap okuyoruz, bir oyun oynuyoruz, çocukları serbest bırakıyoruz. Çünkü temmuz çok sıcak oluyor ve çocuklar çok sıkılıyor, mümkün oldukça bahçeyi kullanıyoruz bu dönem. Daha esnetiyoruz. Mesela her güne bir etkinlik anca yapıyoruz. Yine planda yazıyoruz ama sadece bir etkinliği yapıyoruz. Temmuzda su oyunları oynuyoruz, havuz açıyoruz bahçede havuz kuruyoruz, bahçede boya yapıyoruz.

indicated. In the third section, called “Implementation,” aspects of implementation of science practices in ECE are presented. In the following section called “Conclusion,” how teachers conclude the science activities is expressed. Finally at the last section, called “Teaching Strategies,” the strategies are explained that were used by EC teachers in the science practices. A summary of science practices of teachers in ECE is indicated at Fig. 4.3 Teacher practices.

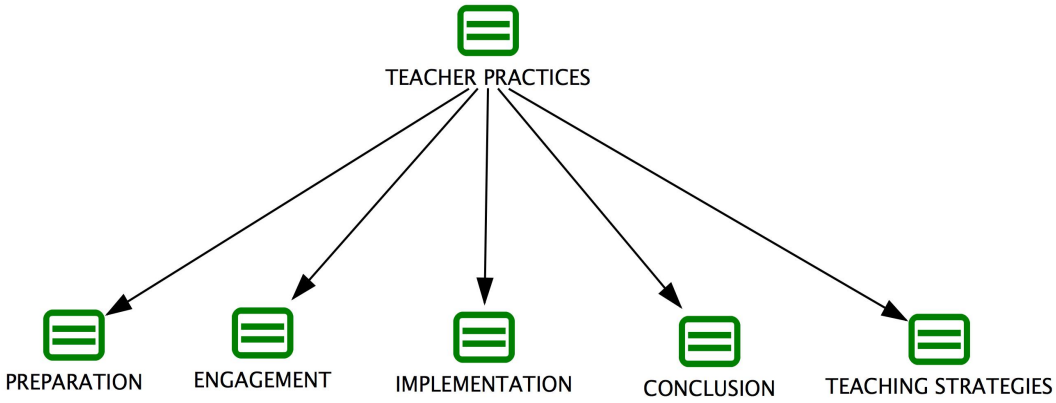

Fig. 4.3 Teacher practices.

Preparation

Preparation period presented in this section involves features on how EC teachers prepare science practices. Teachers indicated three stages for their preparation. Teachers took considerations for deciding an activity, made use of resources, and supplyied educational materials, before implementing science practices in ECE (see Fig. 4.4 Preparation).

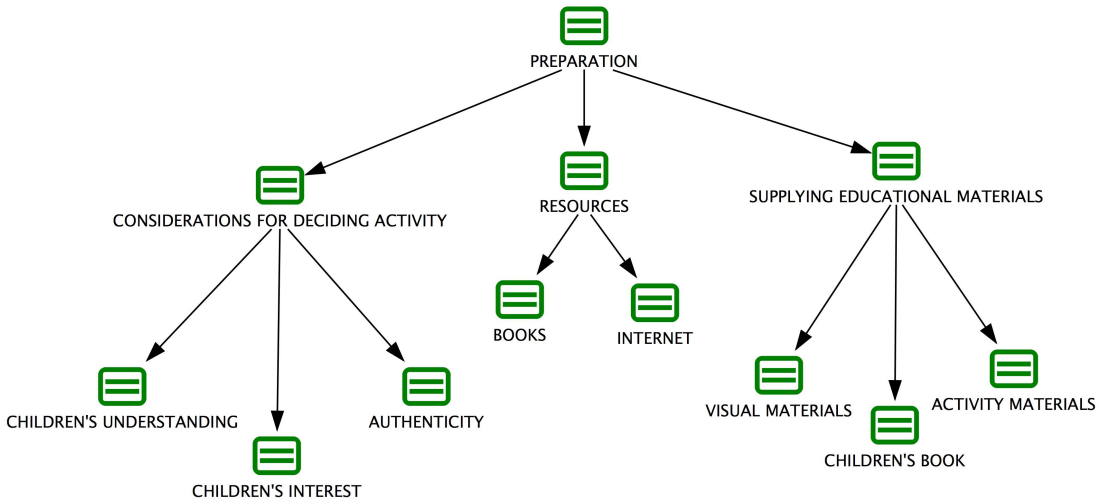

Fig. 4.4 Preparation.

Considerations for Deciding an Activity

During the interviews with the seven teachers, they indicated three considerations for deciding on a science activity. These are children's understanding, children's interest, and authenticity of the activity (see Fig. 4.5 Considerations for deciding activity).

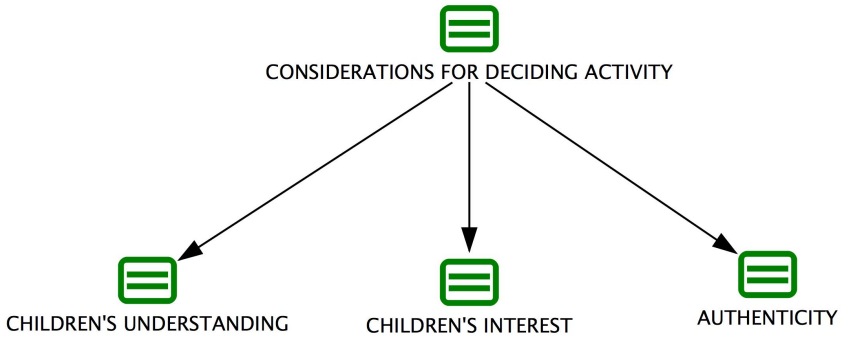

Fig. 4.5 Considerations for deciding activity.

Children's Understanding. All of the seven teachers stated developmental characteristics of the children as an important factor while deciding on a science activity. They pointed out relevancy of the activity to the age and understanding of

the children. Ms. Mars stated that even if they were born in same year there might be differences between understandings of children due to different birth months.

> Ms. Mars: There are points that I give specific attention on those which are children's needs, appropriateness to their age, from which aspects they could be strained. Since we got children aged from one month to twelve months in our groups considering the activity it could be difficult. Thus we give particular attention to those in science activities (from interview with Ms. Mars on July 17, 2013)[12].

Ms. Mars explained that while deciding on a science activity, she attached importance on appropriateness of the activity to the needs and age of children. She took different developmental characteristics of children born in different months into account and thought on possible difficulties. In addition, Ms. Sun explained how teachers prepare science activities on same weekly theme but for different age groups.

> The Researcher: How do the teachers decide on the science activities with predetermined themes?
> Ms. Sun: Deciding the activity is related with teachers' decision.
> The Researcher: How does a teacher decide on an activity if she committed to have science activity?
> Ms. Sun: It depends on children's age group and their developmental skills. In small age groups for example, on Monday they have animals living in trees, next day animals with beak and the other day animals with tails.
> The Researcher: According to which issues teachers decide on science activities?
> Ms. Sun: According to children's developmental skills and their age. Occasionally the activity on animals living in trees differs between age group two and age group five. In age group two the activity is shallower. It could be done on Monday for instance having a parrot suit or singing with a parrot puppet and on Tuesday having mask of squirrel together with a related say. On the other hand in age group five it would deeper with aspects such as making observations and doing research. Once we had a trip to Emirgan related with the topic, where we saw squirrels and crows. Everybody took notes and some of them also took some pictures (from interview with Ms. Sun on July 29, 2013)[13].

[12] Bayan Mars: Çocukların ihtiyacı, o yaşa göre uygun mu değil mi, zorlanabilirler mi, ne açıdan zorlanırlar gibi dikkat ettiğim noktalar var. Bizim yaş gruplarımızda 1.aydan 12.aya kadar çocuklar var. Sınıfı düşündüğünüz zaman zor gelebilir, her şeyi düşünmek zorunda kalıyorsunuz. O yüzden bunları özellikle dikkate alıyoruz fen etkinliklerinde.

[13] Araştırmacı: Belirli haftalık konular var, öğretmenler o konuda yapacağı bir fen etkinliğine nasıl karar veriyorlar?

Ms. Sun stated that teachers prepared different activities for different age groups for the same weekly themes. Similarly, teachers considered age, understanding, and developmental characteristics differences of children to decide on a science activity. For example, for younger groups they selected simple science activities that were rich in visuals, puppets, and songs. On the other hand, she indicated that regarding the same themes teachers chose science activities for older groups that included more complex skills as observation and research.

Children's Interest. In addition, four teachers pointed out that they decide on a science activity according to interests of children. Teachers paid attention on to choose science activities that attract attention of children. They indicated that such science activities contribute to enjoyment of children and hence memorability of the task. Ms. Mercury stated that she chose science activity according to both children's interest and her interest. However, she founded focusing on interest of children much better.

> The Researcher: Let's say you are going to perfom a science activity, how do you decide it?
> Ms. Mercury: I prefer to have the activity accordingly with the theme or I choose the topic which children curious about. I have a classroom rule that having science activity at least once a week or I ask children to whether they would like to utilize their free time with an activity, which could be spontaneously developed.
> The Researcher: Could the activity be decided at that moment?

> Bayan Güneş: Etkinlik kararı öğretmene bağlı.
> Araştırmacı: Öğretmenler bir fen etkinliğini yapmaya neye göre karar veriyorlar?
> Bayan Güneş: Çocuğun yaş grubuna ve çocuğun gelişim özelliklerine göre düşünüyorlar. Küçüklerde daha çok resimlerle mesela Pazartesi ağaçta yaşayan hayvanlar, sonraki gün gagalı olanlar, diğer gün kuyruklu olanlar gibi.
> Araştırmacı: Nelere göre karar veriyorlar?
> Bayan Güneş: Çocuğun gelişim özelliklerine, yaşına göre. Bir beş yaşındaki ağaçta yaşayan hayvanlarla iki yaşın ağaçta yaşayan hayvanlar planı farklı oluyor. İki yaşta daha çok yüzeysel değiniliyor, mesela Pazartesi bir tane papağanın kostümüyle veya kuklasıyla gelmek şarkı söylemek, salı günü bir sincabın maskesini takıp gelmek tekerleme söylemek gibi yapılabilir. Ama beş yaşındaki daha çok gözlem ve araştırma ile geçiyor. O konuyla ilgili bir gezimiz olmuştu Emirgan'a gitmiştik, sincapları gördük, kargaları gördük. Herkes kendine not aldı, resim çekenler oldu.

> Ms. Mercury: Of course.
> The Researcher: Is it because of your interest or children's interest?
> Ms. Mercury: Primarily it is children's interest then mine could be. However, it would be better to focus on children's interest at first sight (from interview with Ms. Mercury on July 15, 2013)[14].

Ms. Mercury explained that when she was going to implement a science activity she takes into consideration the weekly theme or the topic that children were wondered about. She indicated that as a rule she carried out at least one science activity in a month in her class. During the activities they had experiences on interests of children. Therefore, science activities did not belong to weekly themes all the time. In addition, sometimes activities might focus on interest of the teachers. However, she mostly preferred to select activities with respect to interest of the children.

Similarly, Ms. Sun considered interest of children and stated that she implemented science activities with respect to the questions raised by the children. She gave an example of the activity on how the rain is formed.

> The Researcher: How do you decide on activities such as the cloud activity?
> Ms. Sun: For the cloud activity if children keep asking me about formation of rain, even though I read books on the topic to them or created a song related with the topic, then there is something missing and I should implement an experiment. As I mentioned before I may simply bring ice to younger class on the other hand I might dye ice at middle class and for older group I perfomed an activity accordingly to their understanding. After preparing the materials, I said to children that one of them had a question on how rain forms and ask them whether they are still wondering (from interview with Ms. Sun on July 29, 2013)[15].

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[14] Araştırmacı: Bir fen etkinliği yapacaksınız diyelim, nasıl karar verirsiniz?
Bayan Merkür: Konunun üzerinden giderim yada o anki çocukların merak ettiği bir şeyi alırım. Benim sınıf kurallarımda ayda en az bir kere deney yapmak var ya da çocuklar bugün boş bir zamanımız var sizinle bir şey deneyelim mi ister misiniz deyip anlık gelişen etkinliklerler de olabiliyor.
Araştırmacı: O günkü bir şey de olabilir mi bu?
Bayan Merkür: Tabi ki.
Araştırmacı: Sizin dikkatinizi çeken mi yoksa çocukların mı?
Bayan Merkür: Önce çocukların tabi ki sonra benim de olabilir bu. Ama daha çok çocukların üzerinden daha iyi olur diye düşünüyorum.

[15] The Researcher: Mesela o bulutlarla ilgili etkinliği seçmeye nasıl karar veriyorsunuz?
Ms. Sun: Eğer konuyla ilgili kitap okumuşsam, konuyla ilgili şarkı oluşturmuşsam ve çocuk yağmur nasıl oluyor diye devamlı soruyorsa bir tane de eksik bir şey var, deney yapmam gerekiyor. Dediğim gibi küçük yaş grubuna sadece buz getiriyorum, bir orta yaş grubuna

In this excerpt, Ms. Sun stated that she carried out different practices as reading a book and singing a song on weather forecast. In order to complete the task she performed experiments. Through emphasizing 'science activity' as 'experiment,' she stated science activities as a component of the topic and a technique to answer the questions of children. She indicated that while she implemented science activities in the light of the questions raised by children, she reminded the questions of the children at the beginning of the activity. Therefore she emphasized the relation between the selected science activity and interest of the children.

Authenticity. Another consideration of teachers while selecting a science activity was authenticity. Four teachers indicated that they paid attention to select science activities that were different than children's previous practices.

Ms. Mars stated that since teachers mostly continue with the same group of children until children leave the setting, they are aware of children's knowledge. If they did not work with the group before, they shared information about children to recognize the level of their knowledge. They decided science activities through taking account the idea of what children know. Hence, teachers attached importance to select science activities different than previous years.

> The Researcher: How do you decide on a science activity?
> Ms. Mars: Since each year I have the same group and same applies for other teachers or we got information from each otrher, we have information about children previously. Together with the teachers, we decide according to children's knowledge. Since each year we got the same theme observing children we thought on what could be different for children and we try to select different activities for children (from interview with Ms. Mars on Juy 17, 2013)[16].

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buzları renklendiriyorum, bir büyük gruba da anlayacağı bir etkinlik yapıyorum. Malzemelerini hazırladıktan sonra çocuğa 'çocuklar geçen gün birinizin sorusu vardı yağmur nasıl oluyor diye, hala merak eden var mı' diyorum.

[16] Araştırmacı: Fen etkinliği yapmaya nasıl karar veriyoriyorsunuz?

Ms. Mars stated that she worked with same group of children as most of the teachers. Therefore, the teacher was aware of how much children know about the selected topic. While deciding on a science activity, she thought on whether children practice it or not. Although the weekly themes repeated each year, Ms. Mars pointed out that they chose science activities on the topics to which children were not familiar with. Regarding the repeated weekly themes, Ms. Venus indicated how repeating same topics negatively affect attention span of children. Therefore, she advocated carrying out science activities from which children could learn different things.

> The Researcher: What do you do during the preparation period of science activities?
> Ms. Venus: I need to decide on what will be my focus in that activity because it is my primary concern. I need to decide on what my aim is for that specific day and at the end of the day what each child should learn from that activity.
> The Researcher: What are the factors affecting your decisions?
> Ms. Venus: It makes sense if I focus on new subjects that make children to develop new and different ideas. Repeating the same subject without any new additions, results in decrease in concentration of children and failure of that activity. Moreover, it causes defects for both children and teachers. Therefore I try to implement science activities that could both attract their attention and make children to find out something new through that science activity (from interview with Ms. Venus on July 15, 2013)[17].

Bayan Mars: Benim devam ettiğim grup olduğu için, diğer öğretmenlerin de genel olarak öyle devam etmiş oluyor ya da etmese de genel olarak bilgilerini daha önceden biliyoruz, birbirimizden öğreniyoruz. Öğretmenlerle birlikte çocukların durumuna göre karar veriyoruz. Her sene genel olarak aynı konularımız oluyor. Çocukları gözlemleyerek farklı ne olabilir diye düşünüyoruz ve çocukların bilmediği konuları daha çok seçiyoruz.

[17] The Researcher: Bir fen etkinliğinin hazırlık aşamasında neler yaparsınız?
Ms. Venüs: Ne vermek istediğim önemli o yüzden onu belirlemem gerekiyor. Gün içerisinde o günkü amacım ne, o gün sonrasında çocuğun ne öğrenmesini bekliyorum ona karar vermem gerekiyor.
The Researcher: Ona karar vermedeki etkenler neler?
Ms. Venüs: Çocuğun zaten bildiği bir şey değil de ondan farklı düşünceler oluşturabilecek bir şeye değinmek daha mantıklı geliyor. Var olanı sürekli anlatmak çocukların dikkat süresini kısaltmamıza neden oluyor ve o etkinliğin başarısızlıkla sonuçlanmasına neden oluyor. Hem çocuklar için olumsuz etkiler bırakıyor hem öğretmen için de olumsuz etkiler bırakıyor. O yüzden onların dikkatin çekecek, hem o alanda farklı bir şeyleri görebilmelerini sağlayacak fen etkinlikleri uygulamaya çalışıyorum.

Ms. Venus explained that while deciding on a science activity, firstly she considered about what to teach. After stating the aim she selected a science activity by which children learn different tasks. She indicated that the repeated tasks resulted in a decrease in attention span of children. Therefore, repeated tasks ended up with failure and affected both teachers and children negatively. In order to overcome this issue, Ms. Venus suggested conducting science activities that provide children to learn new tasks.

Resources

When teachers were asked about their preparation period of science activities, they indicated two resources to decide an activity. Teachers made use of books and the Internet to reach and decide on science activities, respectively (see Fig. 4.6 Resources).

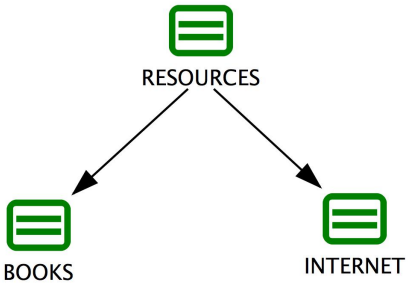

Fig. 4.6 Resources.

Books. All of the seven teachers indicated that they use books to search and decide the science activities. They indicated different types of books as old experiment books from educational years, activity books that include science activities, and library book. Ms. Mercury stated most of these types in her answer to the question related with resources.

> The Researcher: Do you have any resources for activities?
> Ms. Mercury: I certainly have books to avoid getting over the same thing again and again. There are books from education years such as child development and science activity books and also I use books from the library. We can facilitate them by simplifying for the age groups (from interview with Ms. Mercury on July 15, 2013)[18].

Ms. Mercury explained that she used her old child development and experiment books, her own books and library books to decide a science activity. She indicated that she did research from these resources in order not to repeat same things. In addition she suggested simplifying the activities in library books to prepare science activities.

Ms. Saturn indicated that she used both books and the Internet during the preparation period of science activities. Additionally she emphasized that she read all the steps of science activities from the beginning to the end.

> The Researcher: Do you have any resources for science activities?
> Ms. Saturn: I use two experiment books of TÜBITAK. I use the Internet also. Sometimes I perfomed the activities that I was taught during my education.
> […]
> Ms. Saturn: In fact I read the sections of the experiment books that stated clues for the activities. In the end I might miss some information about the activity. As possible as I can I read the activity until the end (from interview with Ms. Saturn on July 30, 2013)[19].

Ms. Saturn expressed that one of her resources to decide on a science activity was experiment books. She pointed out that she lacked knowledge on science activities. Therefore she attached importance to read the all steps of the activity from beginning

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[18] Araştırmacı: Fen etkinlikleri için kullandığınız kaynaklar var mı?
Bayan Merkür: Mutlaka kitaplara bakıyorum hep aynı şeyler üzerinden gitmeyeyim diye. Eski çocuk gelişimi kitapları, deney kitapları ya da okulun kütüphanesinden kullandığım kitaplar var. Yaş grubuna indirgeyip bunlardan yaralanabiliriz.

[19] Araştırmacı: Fen etkinlikleri için kullandığınız kaynaklar var mı?
Bayan Satürn: TÜBİTAK'ın iki tane deney kitapbını kullanıyorum. Ayrıca internetten bakıyorum ya da bizim önceden öğrendiğimiz okulda bildiklerimiz onları yapıyoruz.
[…]
Bayan Satürn: Açıkçası ben deney kitaplarından etkinlik için ip uçlarının yer aldığı bölümleri de okuyorum. Sonuçta bilmediğim, atladığım bir çok şey olabilir. Ben mümkün olduğunca oradan sonuna kadar okumaya gayret ediyorum.

to the end. She also read clues related with the activity from the books in order to compensate her lack of knowledge.

On the other hand, Ms. Jupiter complained that books were insufficient to make EC teachers inform about science activities. She found the explanations of the activities vague. In addition she pointed out that there was not detailed information on the steps and explanations regarding the conclusion of the science activities in the books.

> Ms. Jupiter: I use books as resources. However, books lack the detailed information that we need and they are mostly superficial. In those instances we need to do research. Books can be more detailed. For example in the electrification activity it says, blow up two balloons then rub them with cloth then when you get them close electricity will be formed. However, there is no information on that clothes should be in different types. There is no information about the causes at the end of all activities. They are indicated only in some major activities.
> The Researcher: Are the books indicating the causes of activities?
> Ms. Jupiter: Not in every activity of course so I need to research from the Internet in which there is lots of unnecessary information.
> The Researcher: What could be done to improve those missing points?
> Ms. Jupiter: The content of the books could be prepared by experts who are competent both in science education and preschool education. In that way by avoiding unnecessary information it could be easier to have the reasons, results, details and the tricks that we need to give special focus.
> The Researcher: Could it be enough to have information just to answer children's questions?
> Ms. Jupiter: Exactly it is our basic problem (Smiling) (from interview with Ms. Jupiter 25, on July)[20].

[20] Bayan Jüpiter: Kaynak olarak kitaplardan yararlanıyorum. Ama orada bizi gerçekten bilgilendirecek ayrıntılı bilgiler olmuyor, çok üstünkörü oluyor. O zaman araştırmak gerekiyor. Daha ayrıntılı yazılabilir. Mesela elektirklenme ile ilgili etkinlikte iki balonu şişirin, üstüne kumaş sürtün, birbirine yaklaştırdığınızda elektrik oluşacak diyor ama mesela bu iki kumaşın farklı türlerde olacağı yazmıyor. Hepsinin sonunda açıklama sebepleri yazmıyor. Sadece belli başlı etkinliklerde yazıyor.
Araştırmacı: Peki kitaplarda olayın sebepleri yazıyor mu?
Bayan Jüpiter: Hepsinde değil. İnternetten araştırmak gerekiyor. Orada da çok gereksiz çok bilgi var.
Araştrımacı: Dediğiniz eksik noktalarla ilgili neler yapılabilir?
Araştırmacı: Hem fen eğitiminde hem okul öncesi eğitiminde uzman olan kişiler kitapların içeriğini hazırlamalı. Böylelikle gereksiz ayrıntıya girmeden nedenini, sonucunu, ayrıntıları, özellikle dikkat etmemiz gereken püf noktalara ulaşabiliriz.
Araştırmacı: Belki çocukların sorularına cevap sağlayacak kadar mı?
Bayan Jüpiter: Aynen öyle, en temel sorun o zaten (gülerek).

Ms. Jupiter stated that there was superficial information on science activities in the books. Books were lacking explaining the steps, conclusions and cause and effect relations. When the cause and effect relations did not indicated in the books, she searched it from the Internet. She did not prefer to do research on details of science activities from the Internet because of excessive and unnecessary information at the Internet. Therefore, she suggested having ECE context based books on science education, which are written by experts in both ECE and science education. However, she indicated a limitation about the information in these suggested books. She emphasized that there will be reasons, results, and tips for implementation but not long explanations. She expressed that books should point out the fundamental aspects of the science activities in order to achieve one of the important problem of EC teachers in science education that sufficiently answering the questions of children.

Internet. While all of the seven teachers indicated books as their resources for deciding science activities, four of them stated the Internet as another resource. The four teachers stated the Internet right after books during their explanations. For example Ms. Uranus expressed that she searched science activities from the Internet and pointed out that how it was an easier way than searching from books.

> The Researcher: What are the other resources that you use for science activities except books?
> Ms. Uranus: In fact we use internet which could be easy to access at any time thanks to which you don't need to get in touch with books frequently. If you can access to the internet at any time then you may find whatever you need (from interview with Ms. Uranus on July 22, 2013)[21].

[21] Araştırmacı: Fen etkinlikleri için kitaplar dışında kullandığınız hangi kaynaklar var?

Ms. Uranus stated that other than books she searched science activities from Internet. She emphasized that if she had internet connection, she could reach whatever information she wants. She perceived using the Internet as a quick way to search and find science activities than books. From her perspective, as a result of easily access to science activities from the Internet, teachers did not utilize from books as much as the Internet.

Supplying Educational Materials

Before teachers implement a science activity, the third step of the preparation period was supplying educational materials. Teachers at the setting indicated three types of educational materials: visuals materials, children's books, and activity materials (see Fig. 4.7 Supplying educational materials).

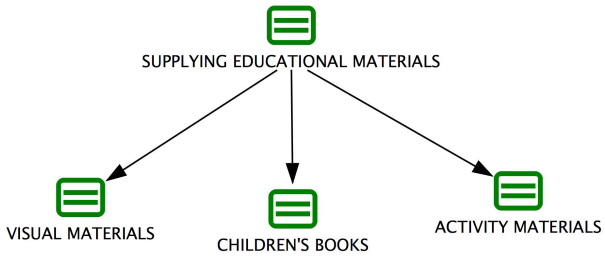

Fig. 4.7 Supplying educational materials.

Visual Materials. Five of the seven teachers indicated that they used videos as visual materials during the science activities. All of these five teachers stated that they prepared the videos before the activities. However, explanations of some teachers implied that they were not well prepared regarding videos because of the problems at

Bayan Uranüs: Veya interneti kullanıyoruz zaten internet elinin altında olduğu sürece kitapla çok fazla haşır neşir olmuyorsun açıkçası. Elinin altında olduktan sonra, her şeyi yaz çıkıyor zaten.

Internet connection in some classes. For example, Ms. Mars stated that she supplied visuals previous day of the activity.

> The Researcher: What do you do before the activity?
> Ms. Mars: For example I made a research on where sunflowers are grown and in which months. Then I prepared books and videos for the chıildren.
> The Researcher: Will you prepare the video before the activity?
> Ms. Mars: Exactly, I prepare materials accordingly with that week's theme during the weekend or the night before. If it would be a video I prepare it the night before. To get ready I prepare videos related with that week's theme, which makes me more comfortable (from interview with Ms. Mars on July 17, 2013)[22].

Ms. Mars explained that after she decided on the science activity and got information about the topic, she prepared educational materials of the activity. She stated that she prepared videos related with the weekly theme at the previous day of the activity. In addition, she indicated that she felt comfortable when she prepared videos before the activity.

On the other hand, Ms. Uranus stated that she did not prepare the videos all the time because of the Internet connection availability in her class. Therefore, she searched videos from the web at the class. In addition, she recorded the website address when she found the videos at the previous day of the activity.

> The Researcher: Do you prepare videos before the activity?
> Ms. Uranus: I have some videos already. However, I do not have videos on all of the topics. In that case I search it from the Internet however, if the situation emerges spontaneously then searching from the Internet is not the efficient way because of the unfiltered information in the Internet. So I may say it would be better to have and record the website of the videos before the activity.
> The Researcher: Can you manage to do this?
> Ms. Uranus: I mostly do the preparation at home since I got the Internet connection at home. First I consider about the video on which I need to

[22] Araştırmacı: Etkinliğe başlamadan önce neler yapıyorsunuz?
Bayan Mars: Daha önceden mesela ben ay çekirdeğinin hangi aylarda yetiştirildiği, hangi bölgede yetiştirildiği hakkında bilgi edindim. Daha sonra kitap hazırladım çocuklara, videolar hazırladım.
Araştırmacı: Videoyu öncesinde hazır ediyor musunuz?
Bayan Mars: Tabi o haftanın konusu neyse ya hafta sonu ya da o akşam hazırlamaya çalışıyorum. Eğer video göstereceksem video hazırlıyorum akşamdan. Güne hazırlıklı gitmek adına o haftayla ilgili videolar hazırlıyorum, daha rahat oluyorum.

> be careful with the appropriateness of the content with children's age.
> The Researcher: To what you give special attention while preparing videos?
> Ms. Uranus: I put attention on avoiding that video to affect children deeply in negative ways. For example, in an earthquake video there may scenes like something fall on children that could make children feel sad and affect them. Since Internet has a wide range, there will be irrelevant things. As a result I download the videos if it is possible or record the website, I have a chance to open it here.
> However, all classes did not have Internet connection. Therefore, it would be wise to have videos before the class (from interview with Ms. Uranus on July 22, 2013)[23].

Ms. Uranus explained that Internet connection in her class provided her flexibility while preparing videos related with science activities. Although she had Internet connection at home she searched videos during the class time. However, she indicated that searching from web and finding appropriate videos for children at the class time was a hard work. She paid attention to select videos that do not have negative effects on children. In order to present videos those were appropriate for children, she tried to download the videos or record the website link. However, some classes did not have Internet connection at all. Therefore, she suggested downloading the videos before coming to class. For example, the case of Ms. Saturn indicated preparation of teachers regarding visuals who had not Internet connection in the class.

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[23] Araştırmacı: Videoları hazır ediyor musunuz öncesinden?
Bayan Uranüs: Hazır videolarım var tabi biraz. Ama her konuda yok. İnternetin varsa direkt yazınca buluyorsun. Ama bazen o anda gelişiyor o zaman hemen bulmak da kolay değil internette bir sürü bilgi var. Tabi önceden hazırlamak ve hangi sitede hangi video var onu yazıp kaydetmek daha iyi.
Araştırmacı: Böyle yapabiliyor musunuz?
Bayan Uranüs: Ben onu daha çok evde yapıyorum. Evde internetim var. Evde mesela plana şu deneyi aldım. Önce içeriğin çocukların yaşına uygun olması açısından videoya dikkat ediyorum.
Araştırmacı: Videoyu seçerken nelere dikkat ediyorsunuz?
Bayan Uranüs: Onları olumsuz yönde etkileyecek bir şeyler olmaması için dikkat ediyorum. Mesela depremle ilgili video izliyorsun, orada çocuğun birinin üstüne bir şey düşüyor. Orada bir acıtasyon olabilir, çocuklar orada etkilenebilirler. Başka şeyler olabiliyor, araya başka şeyler girebiliyor. İnternet geniş bir şey olduğu için alakasız şeyler de olabiliyor. Oyüzden ya indirebiliyorsam indiriyorum, indiremiyorsam da sitenin adını alıyorum burada açma şansım var. Ama her sınıfta internet yok. O zaman videoları öncesinden indireceksin.

> The Researcher: How do you prepare the visuals and videos?
> Ms. Saturn: For visuals this year was a little problematic for me because of there was no internet connection in my class. Thus I went to other classes, which have internet connection, to be got prepared. I searched and presented video at the other class as possible as I can. On the other hand I could write down the address of the website, download it at home or the main building and present it to the class.
> The Researcher: Do you watch the videos before you show it in the class?
> Ms. Saturn: Yes I watch it before the class as possible as I can to avoid something to show that could scare children (from interviews with Ms. Saturn on July 30, 2013)[24].

Ms. Saturn stated that it was a difficult year since she did not have Internet connection in her class. She explained that she downloaded videos at the main building or showed videos at other classes that have Internet connection. Similar to Ms. Uranus she emphasized that they recorded the website address of the videos or downloaded video at home as much as possible.

Children's Books. Two teachers stated that they prepare a reading book related with the weekly themes before science activities. Ms. Mars indicated that she found a relevant book to the weekly theme from the library.

> Ms. Mars: […] We find the books related with the weekly theme from the library in the setting. During that week we keep those books in the classroom. Then we change books with other age groups so I make ready the books for the next themes (from interview with Ms. Mars on July 17, 2013)[25].

[24] The Researcher: Görsel ve videoları nasıl hazırlıyorsunuz?
Ms. Saturn: Görsellerle ilgili bu sene benim için biraz zor oldu çünkü benim sınıfımda internet bağlantısı yok. Oyüzden interneti olan sınıflara gidip hazırlanmam gerekti. Yan sınıflarda mümkün olduğunca bulup bulup çocuklara izlettim. Ama önceden adresini bir kenara yazıyorum, evde ya da ana binada indiriyorum ve sınıfta gösteriyorum.
The Researcher: Videoları önceden izliyor musunuz?
Ms. Saturn: Evet, çocukları kokutacak, endişelendirecek bir şey olmaması için mümkün olduğunca izlemeye gayret ediyorum.

[25] Bayan Mars: […] Sonra o haftanın konusuna göre kurumun kütüphanesinden kitaplar buluyoruz. O hafta sınıfımızda duruyor kitaplarımız. Daha sonra diğer yaşlarla değiştiriyoruz kitapları. Böylece bir sonraki konu için kitapları hazır ediyorum.

Ms. Mars expressed that she searched reading books related to the activities. Before the activity she provided reading books from the library of the setting as a part of science activities. She held them during the week and afterwards shared them with other teachers. Similarly, Ms. Saturn indicated the period of supplying reading books and emphasized the cooperation between teachers while providing these books.

> The Researcher: You mentioned before reading book or showing a video along with an activity, how do you prepare these materials?
> Ms. Saturn: We find them together with our colleagues who have the same age group. We prepare books before which could be in our class or in library or if I don't have it in my class then I borrow it from my colleague's class and vice versa.
> The Researcher: Do you get the books or videos that you will use in class before?
> Ms. Saturn: It happens as I have that subject on Monday and if have book to read on that subject I borrow it from my colleague. After the activity I read the book. Since in some cases we could not have multiple copies of the same book after I completed my activity I give back to her and she also reads the book at the same day or on the next day, so we share it (from interviews with Ms. Saturn on July 30, 2013)[26].

Ms. Saturn explained that they decided and utilized relevant reading books to the activities through cooperating with colleagues working with same age groups. While they were preparing educational plans they decided the reading books. These books might be at their or colleagues' classroom library. At the latter situations, they borrowed the books from other classes. Since there might not be the same reading books at each class, teachers shared the read books in their library after they read them.

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[26] Araştırmacı: Kitap okuma ve video göstermeden bahsettiniz bunların hazırlığını nasıl yapıyorsunuz?
Bayan Satürn: Planı yazarken grup arkadaşlarımızla buluyoruz onları. Kitabı hazırlıyoruz önceden, ya sınıflarımızda oluyor ya kütüphanede oluyor. Benim sınıfımda yoksa da aşağıdaki öğretmen arkadaşımın sınıfından ödünç alıyorum ya da onlar benden alıyor.
Araştırmacı: Kullanacağınız kitapları ya da videoları öncesinden bulunduruyor musunuz?
Bayan Satürn: Mesela şöyle oluyor, Pazartesi ben o konuyu işledim kitap okuyacaksam, ben o kitabı arkadaşımdan alıyorum. Etkinliğimi yaptıktan sonra kitabımı okuyorum. Aynı kitaptan üç dört tane olmayabiliyor elimizde. Etkinliği yaptıktan sonra ona geri veriyorum, o da benim kullandığım gün ya da ertesi gün okuyor o şekilde paylaşıyoruz.

Activity Materials. Another two teachers stated that they prepared activity materials before they implemented science activities. For example, Ms. Mercury stated that she paid attention to supply the activity materials before implementing a science activity.

> The Researcher: When you decide on a science activity what would you do?
> Ms. Mercury: First of all I prepare the materials and bring them to the class. I give special care to be complete when I gather children around me for an activity (from interview with Ms. Mercury on July 15, 2013)[27].

Ms. Mercury pointed out that she attached importance to supply the activity material in full before gathering children to start the activity. Similarly, Ms. Uranus indicated the importance of supplying activity materials in preparation period. Additionally she emphasized preparing activity materials without children.

> The Researcher: When you decide on a science activity what would you do?
> Ms. Uranus: Firstly I did preparation of course.
> The Researcher: Could you go over an example?
> Ms. Uranus: I need to have preparation. For the volcano experiment for instance I need to be prepared for the materials to prevent confusion. Preparation is important for both your own time and the time of the activity because at that time when you need a material you may not have in your class. For example you should assure that you have the sand, the pot, water and the other materials while children are playing. Since my class is big enough children play together and I could have the chance to get materials prepared.
> […]
> The Researcher: What are the points that you give attention on?
> Ms. Uranus: While preparing you should not be in sight of children. If you need to do your preparation in the class then you should let children to play outside or when they are not in the class.
> The Researcher: From which aspects?
> Ms. Uranus: For example they could continuously come and disturb you.
> The Researcher: Then it should be done previously maybe one day before?
> Ms. Uranus: Yes compulsorily we prepare it before, the previous day or when children were playing for instance. I do preparation while children

[27] Araştırmacı: Bir fen etkinliği yapmaya karar verdiniz, karar verdiğinizde neler yaparsınız?
Bayan Merkür: Önce mutlaka malzemeleri alır, sınıfa getiririm. Çocukları toparladığımda herşeyin tam olmasına dikkat ederim.

> are pIaying. If children have sleeping time then we also use that time to prepare the activity (from interview with Ms. Uranus on July 22, 2013)[28].

Ms. Uranus stated that she provided the activity materials before implementating science activities. She indicated that it is important to prepare the materials before the activity to avoid wasting time during the activity. Moreover, she pointed out that she prepared activity materials while children were playing. She advocated that when children saw the preparation period of the materials, they might prevent preparation process from proceeding smoothly. Therefore, she suggested preparing activity materials at the previous day of the activity, during children's playtime or sleep time. However, the children in her class did not sleep. As she indicated she preferred to prepare activity materials in playtime rather than the previous day.

Engagement

Engagement period of science practices involves aspects regarding how teachers engage children into science activities in ECE. Teachers at the setting involved children in the science activities through exposing children to new information,

[28] Araştrımacı: Bir fen etkinliği yapmaya karar verdiğinizde neler yaparsınız?
Bayan Uranüs: Tabi öncelikle hazırlık yaparım.
Araştırmacı: Bir örnek üzerinden gidebilir misiniz?
Bayan Uranüs: Hazırlığını yapman lazım. Mesela yanardağ deneyi yapacaksam malzemelerine hazırlıklı olman lazım ki o anda karışıklık olmasın. Hazırlık hem senin zamanın açısından da süre açısından da önemli çünkü o sıra ihtiyacın olan materyal sınıfta olmayabilir. Çocuklar bir oyun oynarken mesela kumu, kabı, suyu ve diğer materyalleri ayarlaman. Biz büyük grup olduğumuz için çocuklar kendi içlerinde oyun oynayabiliyorlar. Onlar kendi içlerinde oyun oynarken ben de burada hazırlık yapabiliyorum
[…]
Araştırmacı: Dikkat ettiğiniz noktalar neler?
Bayan Uranüs: Hazırlık yaparken çocukların gözünün önünde yapmaman lazım. Sınıfta yapacaksan da çocukları sınıftan çıkartmak lazım ya da onlar sınıfta değilken hazırlaman lazım.
Araştırmacı: Ne açıdan?
Bayan Uranüs: Çünkü sürekli yanına gelip seni engelleyebiliyorlar.
Araştırmacı: O zaman belki bir gün öncesinden hazırlık yapılmalı?
Bayan Uranüs: Evet ya bir gün öncesinden ya da çocuklar oyun oynarken. Ben hazırlığı çocuklar oyun oynarken yapıyorum. Uyku saatleri varsa uyku saatindeyken de hazırlık yapıyoruz.

activating prior knowledge, preparing materials, and identifying materials. How teachers attracted attention of children during these cases are indicated in detailed at the below sections (see Fig. 4.8 Engagement).

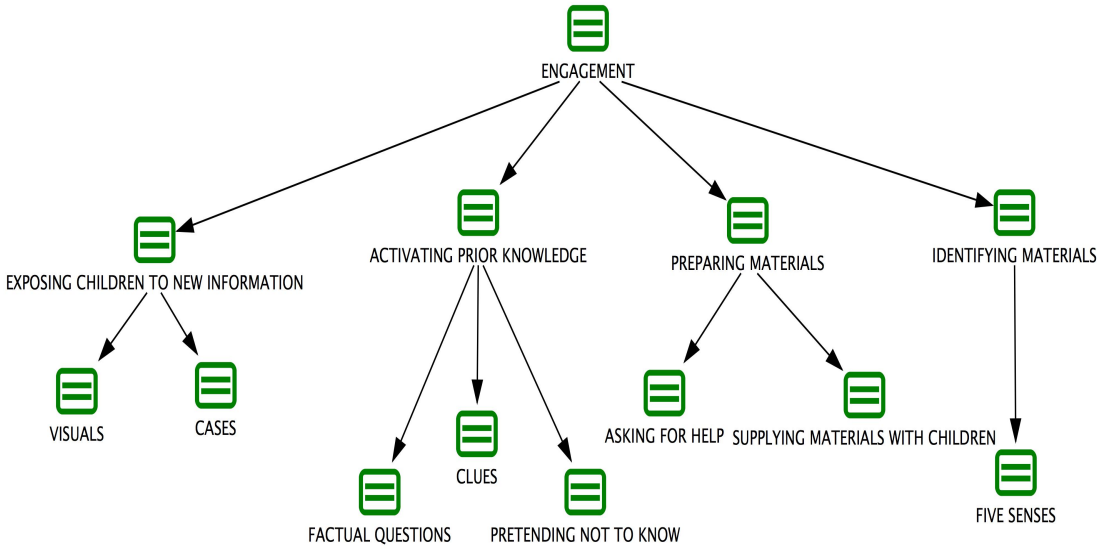

Fig. 4.8 Engagement.

Exposing Children to New Information

At the beginning of the science activities teachers gave information on the topic in order to engage children in the activity. They shared information on the topic through indicating cases or presenting visuals on the topic.

Cases. Teachers gave information on the topic of science activities through cases. For example, Ms. Saturn explained that when she implemented a science practice on flood, she indicated news on flood.

> Ms. Saturn: Yesterday our subject was flood and I gave examples from the news. I told children that while I was watching news on the TV I heard about flood and I wondered about it very much. Then I asked children whether they ever heard about flood. After that I told them about the news. Then I explained flood to them as when it rains a lot too much water accumulated in the dams and since the channels choked water overflows then floods happens. Lastly I prepared a set up and I get a big cup and put human and animal figures and a small cup of water inside it.

> This small cup resemeled the dam. When I put more water in it, it got over and I explained that it reached to the homes and people […] (from field notes of March 21, 2013)[29].

In this excerpt, Ms. Saturn explained that she began the activity by indicating a case on flood. She attracted attention of children by mentioning the news on flood. After she asked them whether they heard about floods, she gave information on the topic through explaining the news.

Visuals. In order to involve children into the activity, teachers showed visuals and at the mean time gave information about the topic of science activity. For example, in planting activity Ms. Saturn gave information on four o'clock flower by showing visuals on the flower.

> Ms. Saturn: Finish you game and gather around me please.
> (Children gathered around the computer)
> Ms. Saturn: Do you know this flower? (She showed the four o'clock flower from the computer)
> Children: It is a rose.
> Ms. Saturn: Do you think it is rose?
> Children: Yes it is a rose.
> Ms. Saturn: Alright, then let's have a look for a picture of rose. Look this is a rose. Let's compare this flower with the former one. (She opened the four o'clock flower picture again)
> Ms. Saturn: Do you still think they are the same flower?
> Children: …
> Ms. Saturn: They are different right? Rose is different than the former one. This flower is called the four o'clock flower. This flower blossoms in the evening and in the morning it fades out (she showed photos from the Internet). Now could you please tell me what is the name of this flower?
> Children: …
> Ms. Saturn: It is called the four o'clock flower.
> Ms. Saturn: This piece belongs to this flower what could it be?
> Emre: Its seed.

[29] Bayan Satürn: Dün konumuz seldi, haberlerden örnek verdim. Ben geçenlerde televizyonu izlerken sel diye bir şey duydum, bu ne ben çok merak ettim, diye çocuklara anlattım. Sel nedir, bilen var mı diye sordum. Daha sonra haberleri anlattım. Çok fazla yağmur yağınca barajlarda çok fazla su birikiyor ve barajlar doluyor, kanallar tıkandığı için de sular dışarı taşıyor diye anlattım. Daha sonra şöyle bir şey hazırladım; büyük bir kap aldım. İçine insanlar, hayvanlar koydum, bir de içine su dolu bir kap daha koydum. O küçük kap baraj oldu. Ona biraz daha fazla su doldurdukça taştı ve etraftaki evlere insanlara kadar ulaştı şeklinde anlattım […]

> Ms. Saturn: Yes it is seed of the four o'clock flower. And what are these I am holding in my hands.
> Emre: Seeds.
> Ms. Saturn: Seeds of what?
> Emre: Flower seeds.
> Ms. Saturn: Which flower is that?
> Emre: The four o'clock flower.
> Ms. Saturn: Yes they are four o'clock flower seeds (from field notes of July 17, 2013)[30].

In this excerpt, Ms. Saturn showed photos of four o'clock flower and checked knowledge of children about the flower (Fig, 4.9 Visuals). Since some children resembled it to rose, Ms. Saturn showed both photos of rose and four o'clock flower in order to differentiate them. Then she explained aspects of four o'clock flower through the visuals, she searched from the web. After she attracted attention of children by giving information on the flower, she showed seeds of the flower and she prepared children for the implementation period.

[30] Bayan Satürn: Oynadıklarınızı toplayın ve yanıma gelin lütfen.
(Çocuklar bilgisayarın etrafında toplandılar)
Bayan Satürn: Bu ne çiçeği bilen var mı (Bilgisayardan akşam sefası resmi gösterdi)?
Çocuklar: Gül.
Bayan Satürn: Gül mü sizce?
Bayan Satürn: Gül.
Bayan Satürn: Gül, peki o zaman bir de güle bakalım. Bakın gül bu. Bir de deminki çiçekle karşılaştıralım (Akşam sefası resmi açtı).
Bayan Satürn: Aynı mıymış?
Çocuklar:...
Bayan Satürn: Farklı değil mi, gül daha farklı. Bu çiçeğin adı akşam sefası. Bu çiçek akşamları açar, sabah kapanır (Internetten resimlerini gösterdi). Bu çiçeğin adı neymiş?
Çocuklar: ...
Bayan Satürn: Akşam sefası.
Bayan Satürn: Şu neyi olabilir çiçeğin?
Emre: Tohumu.
Bayan Satürn: Evet bu çiçeğin tohumu. Peki, sizce benim bu elimdekiler ne olabilir?
Emre: Tohum.
Bayan Satürn: Neyin tohumu olabilir?
Emre: Çiçek.
Bayan Satürn: Ne çiçeği olabilir?
Çocuklar: Akşam sefası.
Bayan Satürn: Akşam sefası.

Fig. 4.9 Visuals.

Activating Prior Knowledge

Before the implementation period of the science activities, teachers recalled previous science practices and experiences of children. In order to engage children in the activities, teachers activated prior knowledge of children through asking factual questions, giving clues, and pretending not to know.

Factual Questions. Teachers used factual questions to recall previously mentioned tasks at the beginning of the science activities. Ms. Saturn, for example, asked children questions on germination before they water and observe their plants.

> Ms. Saturn: What we have planted in to our flowerpots?
> Children: Flowers.
> Ms. Saturn: Yes flowers and they have what?
> Emre: They have seeds.
> Ms. Saturn: Seeds okay. Can we guess it from a seed the kind of flower or the color of flower?

Ahmet: Green
Alper: Green.
Ms. Saturn: Its leaves are green.
Emre: It is white.
Ms. Saturn: As you can see it is hard for us to guess the color of flower from seeds.
Serkan: It is yellow.
Ms. Saturn: Yes they could be colorful.
Emre: It is blue.
Ms. Saturn: What do they need to germinate and grow?
(They went next to flowerpots)
Ahmet: They need water.
Ms. Saturn: You are right they need water. What else they need after they get over the surface?
Ahmet: The sun.
Ms. Saturn: Yes they need the sun.
Ms. Saturn: What else do they need?
Serkan: Air.
Ahmet: They need rain.
Ms. Saturn: Yes they need it to rain to be watered.
Berk: Also they need plenty of shadow.
Ms. Saturn: You are right. If they exposed to too much sun what will happen to them?
Berk: They will die.
Ms. Saturn: Its leaves would burn and it would be bad right? (from field notes of May 9, 2013)[31].

[31] Bayan Satürn: Arkadaşlar saksılarımıza ne ekmiştik?
Children: Çiçek.
Bayan Satürn: Çiçek. Onların neleri vardı?
Emre: Tohum.
Bayan Satürn: Tohumlar. Peki, tohumdan nasıl bir bitki ya da ne renk olduğunu tahmin edebiliyor muyuz?
Ahmet: Yeşil.
Alper: Yeşil.
Bayan Satürn: Yaprakları yeşil.
Emre: Beyaz.
Bayan Satürn: Değil mi farklı çiçeklerin ne renk olduğunu tahmin edemiyoruz.
Serkan: Sarı.
Bayan Satürn: Evet rengarenk olabilir.
Emre: Mavi.
Bayan Satürn: Peki bunların büyüyüp çimlenebilmesi için neye ihtiyacı vardı?
(Saksıların yanına gidiyorlar)
Ahmet: Su.
Bayan Satürn: Değil mi tohumların suya ihtiyacı var. Daha sonra peki, toprağın üstünden çıktıktan sonra neye ihtiyacı oluyor?
Ahmet: Güneş.
Bayan Satürn: Evet güneş.
Bayan Satürn: Başka neye ihtiyacı var?
Serkan: Hava.
Bayan Satürn: Havaya, başka neye ihtiyacı var?
Ahmet: Yağmur.
Bayan Satürn: Yağmur, sulanmaya ihtiyacı var değil mi?
Berk: Bir de bolca gölgeye.
Bayan Satürn: Değil mi aşırı güneş olursa ne olur?

In this excerpt, an example science practice in Ms. Saturn's class was begun with recalling previous tasks. She asked questions on germination to the children before each child watered and observed her plants. The teacher posed factual questions on components of germination. After each answer, she gave feedback to the answers of the children. Ms. Saturn gave short feedbacks through repeating the correct answers or sometimes did more detailed explanations after the answers of the children.

Clues. While teachers were asking questions to recall the previous tasks, they gave clues to reinforce the recalling process. For example, at the next day of the activity on koalas Ms. Saturn gave clues to facilitate the recollection process of the information on the topic.

> Ms. Saturn: Our weekly theme, for this week as you remember, animals that live in trees. Do you have any idea on which animals live in trees? For example, we acknowledge an animal yesterday.
> Children: Koala.
> Ms. Saturn: Yes koala. Let's see how much you remember. How many hours does a koala sleep in a day?
> Emre: Fourteen.
> Alper: Twenty-four hours.
> Ms. Saturn: No
> Serkan: Eighteen.
> Ms. Saturn: Serkan gave the correct answer. Koals sleep about eighteen to twenty hours in a day.
> Ms. Saturn: With what the koalas nourished with?
> Children: Leaves.
> Ms. Saturn: They eat leaves of which tree?
> Emre: They eat mint.
> Ms. Saturn: This word begins with "E" Euca..
> Children: Eucala…
> Ms. Saturn: Eucalyp…
> Emre: …tus
> Ms. Saturn: Yes it is eucalyptus.
> Ms. Saturn: Do they drink water?
> Children: Yes.
> Berk: Yes but very rare.
> Ms. Saturn: Very rare because that trees' leaves contain plentiful of water. That's why koalas drink water rarely.

Berk: Ölürler.
Bayan Satürn: Yanar yaprakları, kötü olur değil mi?

Ms. Saturn: How about the place they live?
Serkan: They live in African forests.
Berk: African forests.
Elif: There are koalas in my father's home country.
Ms. Saturn: Yes they live Australia.
Ms. Saturn: Alright. Where does the koalas live? They live in seas, in air or live in what?
Children: They live in trees.
Ms. Saturn: How do they live in trees (Just like hugging to the tree)?
Children: They are hugging to trees (from field notes of April18, 2013)[32].

Ms. Saturn recalled that they got information about koalas at the previous day. She asked direct questions to children on characteristics of koala. When she asked the name of the tree that koalas were nourished with its leaves, children could not remember it. She gave clues about pronunciation of "eucalyptus". In addition at the end of the excerpt, she asked where koalas live. In order to have the answer that koalas live in trees and hug them, she gave clues through role-playing and acted as

[32] Bayan Satürn: Bu haftaki konumuz ağaçta yaşayan hayvanlar değil mi? Sizce ağaçta hangi hayvanlar yaşar? Hatta dün bir hayvan tanımıştık.
Çocuklar: Koala.
Bayan Satürn: Evet, koala. Bakalım hatırlıyor musunuz, koala günde kaç saat uyurdu?
Emre: Ondört.
Alper: Yrmidört.
Bayan Satürn: Hayır.
Serkan: Onsekiz.
Bayan Satürn: Serkan doğru bildi onsekiz ile yirmi saat arası uyuyormuş koalalar.
Bayan Satürn: Peki koalalar ne yiyordu?
Çocuklar: Yaprak.
Bayan Satürn: Tamam da hangi ağacın yaprağıydı o?
Emre: Nane.
Bayan Satürn: O ile başlıyor. Oka…
Çocuklar: Okala.
Bayan Satürn: Okalip…
Emre: …tüs
Bayan Satürn: Evet, okaliptüs.
Bayan Satürn: Peki, koalalar su içiyor muydu?
Children: Evet.
Berk: Evet ama çok nadir.
Bayan Satürn: Çok nadir. Çünkü o ağacın yapraklarında çok fazla su olduğu için değil mi koalalar çok nadir su içiyorlardı.
Bayan Satürn: Peki, koalalar nerede yaşıyor arkadaşlar?
Serkan: Afrika ormanları.
Berk: Afrika ormanlarında.
Elif: Benim babamın memleketinde koalalar var.
Bayan Satürn: Evet, Avusturalya'da yaşıyor koalalar.
Bayan Satürn: Peki koalalar denizde mi yaşıyor, havada mı yaşıyor, neyin üstünde?
Çocuklar: Ağaçta.
Bayan Satürn: Evet. Ağaca nasıl yapıyorlar, böyle değil mi (sarılma hareketiyle)?
Çocuklar: Ağaca sarılıyorlar.

hugging.

Pretending not to Know. During the recalling process, one of the strategies of the teachers was pretending not to know the topic. For example, before the implementation period of the activity on koalas Ms. Saturn checked previous knowledge of the children on koala.

> After the gymnastic time, Ms. Saturn suddenly asked about the koalas.
> Ms. Saturn: Does any of you know about koalas?
> Children: Me.
> Ms. Saturn: What is koala?
> Berk: They live in trees.
> Ms. Saturn: What do they do?
> Serkan: They hug trees.
> Ms. Saturn: Wow do they hug trees?
> Children: They also eat their leaves.
> Ms. Saturn: Wow do koalas eat leaves? What about the place they live?
> Alper: They live in Australia.
> Ms. Saturn: Really? I thought they live in our classroom.
> Children: They live in Australia (from field notes of July 17, 2013)[33].

In the excerpt, Ms. Saturn got attention of children on the topic by suddenly asking a question on koala that whether they knew koala. Then, she asked questions on characteristics of koala. After children's answers, Ms. Saturn pretended not to know these characteristics. She gave feedback to answers of children and repeated the correct answers in a surprised manner. As a result, she easily kept attention of children and engaged them in the topic.

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[33] Jimnastik saati bittince Ms. Saturn bir anda koalayı tanıyan var mı diye sordu.
Bayan Satürn: Koalayı tanıyan var mı?
Çocuklar: Ben.
Bayan Satürn: Koala nedir?
Berk: Ağaçlarda yaşar.
Bayan Satürn: Ne yapar?
Serkan: Ağaçlara sarılır.
Bayan Satürn: Aaa koala ağaçlara mı sarılıyor?
Çocuklar: Evet bir de yaprak yiyor.
Bayan Satürn: Aaa koala yaprak mi yiyor? Peki, acaba koala hangi ülkede yaşıyor?
Alper: Avusturalya'da.
Bayan Satürn: Gerçekten mi? Sınıfımızda yaşıyor diye biliyordum.
Çocuklar: Avusturalya'da yaşıyor

Preparing Materials

During the engagement period of science activities, teachers prepared the activity materials with children. Teachers involved children in preparation of materials through asking for help and supplying materials with children.

Asking for Help. Before the implementation period of science activities, teachers engaged children in the activity through asking children whether they wanted to help for preparing materials of the activity. Ms. Saturn indicated that she tried to involve children in activity to make them enjoy. Therefore, she asked children whether they wanted to help her to prepare the activity materials.

> The Researcher: What do you do at implementation period of a science activity?
> Ms. Saturn: I always try to involve children in the preparation or implementation of the activity because they get more interested, enthusiastic and happy when they involve in any activity.
> The Researcher: Could you please give an example?
> Ms. Saturn: Of course. For example, for the volcano activity first we roll a thick object with aluminum folio. Before we start the activity during the preparation period I ask children whether any of them wants to help me preparing the materials. If some of them volunteer to help me then the rest generally also joins. I prefer this way because if I ask them to leave their game and try to conduct an activity they usually resist leaving their play. However, if I ask one of them to help me usually that child accepts to help me. After that others also asks for me to help and surely I accept them to make it easy to engage them. Then they begin to follow steps for experiment through which we begin the activity in the same time. Then I ask them about how we prepare the set up and al of them gather around the activity spontaneously […] (from interview with Ms. Saturn on July 30, 2013)[34].

[34] Araştırmacı: Bir fen etkinliğin uygulama aşamasında neler yapıyorsunuz?
Bayan Satürn: Ben her zaman onları etkinliğin içine dahil etmeye gayret ediyorum. Çünkü onlar dahil oldukları her işte daha şevkli, daha mutlu oluyorlar.
Araştırmacı: Bir örnek vereblir misiniz?
Bayan Satürn: Olur. Mesela volkan deneyinde önceden kalın bir ruloyu folyo ile sarıyoruz. Daha uygulamaya geçmeden hazırlık aşamasında materyalleri hazırlamak için bana yardım etmek isteyen var mı diyorum. Eğer isteyen varsa genellikle diğerleri de geliyor. Çünkü hadi hadi gelin, bakalım deyince bazen oyununu bırakıp gelmek istemiyorlar. Ama mesela böyle spontan olarak bir kişiye 'bana yardım etmek ister misin' diyorum, 'öğretmenim isterim' diyor. O gelince diğerleri de 'öğretmenim ben de yardım edebilir miyim' diyor. 'Tabi ki istiyorsan

Ms. Saturn explained that in order to engage children in activity she called children for help to prepare the materials before the implementation. After she asked for some children, others also came and helped for the preparation of the activity materials voluntarily. As a result at engagement period she prepared children for the activity by leading them to help her and take roles at material preparation. When children involved in the material preparation, the activity was began simultaneously.

Supplying Materials with Children. Before the implementation period, another way to involve children in the activity was supplying activity materials with children. During the engagement period, teachers supplied activity materials with children. For example, Ms. Mars gave an example on a typical science activity and indicated supplying activity materials with children during the engagement period.

> The Researcher: Could you please give an example from your typical science activities in the class?
> Ms. Mars: For example this year we planted sunflowers. At the beginning we discussed about the characteristics and in which season should it be planted. After the discussion we watched a video on what product could be derived from sunflowers and then we went to a greenhouse. Together with children we gather sunflower seeds and soil. Then we discussed about the features and color of sunflower seeds. Afterwards we planted those seeds in to the flowerpots […] (from interview with Ms. Mars on July 17, 2013)[35].

Ms. Mars explained that they planted sunflower in one of the typical science activities in her class. She expressed that first she gave information on sunflower and presented a video on the topic. Afterwards they took soil and

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edebilirsin' diyorum. Aslında otomatikman deneye de başlamış oluyoruz. 'Biz bunu neyle hazırladık' diyorum ve spontan olarak hepsi etkiliğin etrafında toplanmış oluyor […]

[35] Araştırmacı: Sınıfınızda yaptığınız tipik bir fen etkinliğinden örnek verebilir misiniz?
Bayan Mars: Mesela bu sene bitki ektik, ayçiçeği ektik. İlk önce çocuklarla ayçiçeğinin hangi mevsimde ekileceğini, ayçiçeğinin nasıl bir bitki olduğunu konuştuk. Sonra ayçiçeğinden neler elde edildiğini hakkında bir video izledik. Video izledikten sonra seraya gittik. Çocuklarla beraber seradan toprak ve ayçiçeği tohumu aldık. Ayçiçek tohumunun özellikleri hakkında konuştuk, renginden bahsettik. Daha sonra çocuklarla birlikte tohumları saksılara ektik […]

sunflower seeds from greenhouse with the children before the implementation. Through supplying activity materials with children, the teacher engaged children in the activity.

Identify Materials

Before the implementations of science activities, teachers identified activity materials with children. Teachers engaged children in the activity through identifying the materials. They discovered the materials through using five senses such as smelling and tasting.

Five Senses. During the engagement period of the activities teachers asked children whether they knew the materials. Afterwards they identified the activity materials by using their five senses. For example Ms. Jupiter gave an example on how they used five senses to identify activity materials at the beginning of a science activity.

> The Researcher: Could you please explain the implementation period of a science activity?
> Ms. Jupiter: First I ask them about the materials. We taste materials if it is possible for example, for the volcano activity we were using baking soda and we tasted it whether it was sour or chilly. Moreover, we used soda and we also tasted it (from interview of Ms. Jupiter on July 25, 2013)[36].

Ms. Jupiter stated that she asked the names of the materials to the children and then they identified soda and baking soda through tasting. In the excerpt, Ms. Jupiter indicated that they tasted activity materials since they were safe to eat.

[36] The Researcher: Fen etkinliklerinizin uygulama aşamasını bir örnekle anlatabilir misiniz?
Ms. Jupiter: Önce malzemelerin neler olduğunu soruyorum. Eğer tadına bakılabilecek malzemeelr varsa tadına bakıyoruz. Mesela volkan deneyinde karbonat kullanılıyordu karbonatın tadına baktık acı mı, ekşi mi, tadı nasıl diye. Bir de maden suyu kullanıyordu, maden suyunun tadına baktık.

In addition, when Ms. Saturn asked about a typical science activity, she gave an example on identifying activity materials through smelling.

> The Researcher: Could you please give an example of a typical science activity that you performed in your class?
> Ms. Saturn: I could give example from the carnation flower activity. First we brought a white carnation flower to the classroom. Then each of the children smelled the carnation and we said that it was carnation. Afterwards, we discussed about how trees and flowers grow and how they nourish from their roots (from interview with Ms. Saturn on July 30, 2013)[37].

Ms. Saturn explained the activity done with carnation flower as a typical science practice in her class. She indicated that at the first step she introduced the flower at the beginning of the activity. Then, they described the characteristics of the flower through smelling.

Implementation

The implementation period of science practices were based on roles of the children and the roles of the teachers (see Fig. 4.10 Implementation).

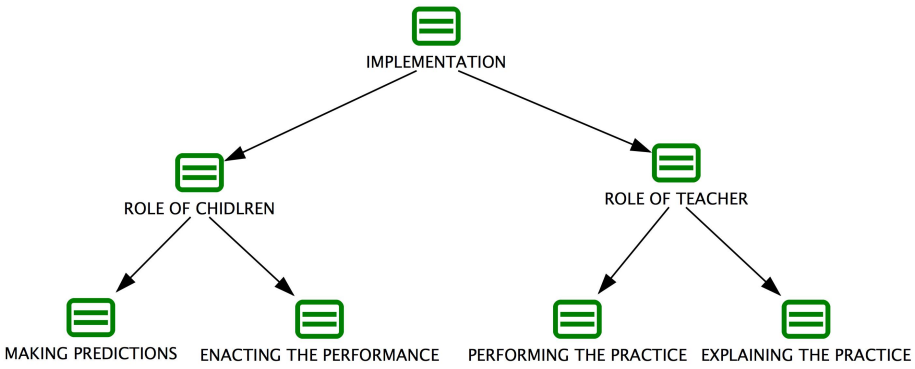

Fig. 4.10 Implementation.

[37] Araştırmacı: Sınıfınızda gerçekleştirdiğiniz tipik bir fen etkinliği örneği verebilir misiniz?
Bayan Satürn: Karanfil etkinliğini anlatayım. İlk önce çocuklarla sınıfa beyaz karanfil getirdik. Herkes kokladı, bunun karanfil olduğunu söyledik. Daha sonra ağaçların ve çiçeklerin nasıl büyüdüğü ve köklerinden beslendiği hakkında konuştuk.

Roles of the Children

At the implementation period of science practices mostly observed roles of children were making predictions and enacting the performance.

Making Predictions. During the implementation period of science activities, teachers asked questions to children mostly about their predictions on the performance and the conclusion of the activities. For example, at the implementation period of the activity that focused on monkeys regarding the weekly theme "Animals Living in Trees," Ms. Saturn asked children that which animals lives in trees. Children made predictions on the animals that live in trees.

> Ms. Saturn: I could not remember which animals live in trees. Do you have any ideas about that?
> Alper: Panda.
> Children: Panda.
> Ms. Saturn: Do crabs live in trees?
> Alper: No, they live in water.
> Ms. Saturn: How could I forget that. Could you please tell me which animals live in trees?
> Ahmet: The owl.
> Ms. Saturn: Owls...
> Berk: The monkey.
> Ms. Saturn: Monkeys...
> Berk: Some kind of birds.
> Ms. Saturn: Yes and what else?
> Ahmet: Bees.
> Ms. Saturn: Yes there are beehives on trees. Also there was an animal with mucus what was that?
> Children: The slug.
> Ms. Saturn: You are right. It leaves traces on the surface while it moves. Other than the slug?
> Ahmet: Snakes.
> Emre: Snakes cling to trees.
> Ms. Saturn: Yes they move among tree branches.
> Serkan: Woodinsect.
> Ms. Saturn: Does it woodinsect or chinch?
> Berk: It is chinch. And there is also the red eyed frog.
> Ms. Saturn: I never saw a frog that lives on a tree.
> Alper: Red eyed frog.

Serkan: It jumps over the leaves of trees.
Alper: Tree frog.
(Ms. Saturn never mentioned about the red eyed tree frog again)
Ms. Saturn: There is also this tiny and tall animal....
Children: Giraffe.
Ms. Saturn: Does the giraffe tiny?
Children: No it is big.
Ms. Saturn: It is very small and eats leaves.
Children: Caterpillar.
Ms. Saturn: Then we see that it is a colorful and beautiful...
Children: It is a butterfly.
Ms. Saturn: Yes, once it was a caterpillar then it became a butterfly [...]
(from field notes of April 18, 2013)[38].

In this excerpt, Ms. Saturn wanted children to predict that which animals live in trees. When children expressed their predictions, Ms. Saturn implied the correct answers through repeating them after the children. When there were

[38] Bayan Satürn: Hangi hayvanlar ağaşta yaşar ben bilmiyorum. Sizin bir fikriniz var mı?
Alper: Panda.
Çocuklar: Panda.
Bayan Satürn: Peki, yengeç ağaçta mı yaşıyordu?
Alper: Hayır suda.
Bayan Satürn: Nasıl unuturum ben bunu. Peki hangi hayvanlar ağaçta yaşıyor?
Ahmet: Baykuş.
Bayan Satürn: Baykuşlar…
Berk: Maymun.
Bayan Satürn: Maymunlaaar...
Berk: Kuş türleri.
Bayan Satürn: Evet. Başka?
Ahmet: Arı.
Bayan Satürn: Evet arıların kovanları var. Sümüklü bir şey vardı onu adı neydi?
Çocuklar: Sümüklü böcek.
Bayan Satürn: Değil mi gittiği yere böyle iz bırakıyor. Başka ne vardı?
Ahmet: Yılan.
Emre: Yılan sarılıyor.
Bayan Satürn: Evet dalların arasında yaprakların arasında dolaşıyor değil mi?
Serkan: Tahta böceği.
Bayan Satürn: Tahta böceği mi? Tahtakurusu mu acaba?
Berk: Tahtakurusu. Bir de öğretmenim kırmızı gözlü kurbağa.
Bayan Satürn: Ben hiç ağaçta yaşayan kurbağa görmedim.
Alper: Kırmızı gözlü kurbağa.
Serkan: Ağaçların yapraklarına zıplıyor.
Alper: Ağaç kurbağası.
(Bayan Satürn bir daha kurbağadan bahsetmedi)
Bayan Satürn: Bir de böyle küçük uzun bir hayvan var...
Çocuklar: Zürafa.
Bayan Satürn: Zürafa küçük mü?
Çocuklar: Hayır büyük.
Bayan Satürn: Küçücük bir şey, yaprakları yiyor...
Çocuklar: Tırtıl.
Bayan Satürn: Sonra bakıyoruz rengârenk çok güzel bir...
Çocuklar: Kelebek
Bayan Satürn: Evet tırtıllardı değil mi sonra da kelebek oluyorlar [...]

unwanted answers, the teacher ignored them. In the excerpt, one of the children stated that red-eyed tree frog lived in trees. However, the teacher advocated that she have never heard about it. Although other children were also supported the idea, she ignored the answer and continued with talking on other animals. Moreover, she ignored the information on the red-eyed tree frog that I shared with her after the activity.

> The Researcher: Children mentioned about the red-eyed tree frog...
> Ms. Saturn: Yes.
> The Researcher: Look student teachers were mentioned about it.
> (I shows the photo of the activity that was perfomed by student teachers)
> Ms. Saturn: Hmm.
> The Researcher: They talked about the red-eyed tree frog because they remember from that activity.
> Ms. Saturn: Does any frog lives on trees? I recall slugs, birds but I don't recall frog when I heard about animals living in trees. According to my knowledge red-eyed or blue eyed frogs live on water lilies and in water (she smiled).
> (Ms. Saturn gathered children around her and started talking about monkey models)
> (I shared the information from the web on the red-eyed tree frog with Ms. Saturn)
> The Researcher: I searched it from the web and it even empasises as the red-eyed tree frog living in trees.
> Ms. Saturn: I learned something new. The frogs that I knew don't have red eyes (she smiled and go on with the monkey models).
> (She continued to the monkey models activity) (from field notes of April 18, 2013)[39].

[39] Araştırmacı: Çocuklar bir tane cevap verdiler ya kırmızı gözlü kurbağa diye...
Bayan Satürn: Evet.
Araştırmacı: Bakın, stajyer öğretmenler yaptıkları etkinlikte bahsetmişler (Stajyer öğretmenlerin yaptığı etkinliğin fotoğrafını gösterdim).
Bayan Satürn: Hmm.
Araştırmacı: Kırmızı gözlü kurbağa diyorlar ya demek buradan akıllarında kalmış.
Bayan Satürn: Kurbağa ağaçta yaşar mı? Ne bileyim ağaç deyince salyangoz yaşar, kuş yaşar ama kurbağa yaşar mı bilemiyorum. Mavi gözlü ya da kırmızı gözlü, kurbağa nilüfer çiçeklerinin üstünde, genelde suda yaşar diye biliyorum (güldü).
(Bayan Satürn, çocukları yanına çağırarak maymun modellerini yaptırıyor)
(Kırmızı kurbağa ile ilgili internetten bulduğum bilgiyi paylaştım)
Araştırmacı: Bakın internetten arattım, kırmızı gözlü kurbağa değil hatta kırmızı gözlü ağaç kurbağası olarak geçiyor.
Bayan Satürn: Yeni bir şey öğrendik. Benim bildiğim kurbağalar kırmızı gözlü değil (güldü ve maymun modellerini yapmaya devam etti).

After the activity, I showed the photo of the activity, which was carried out by student teachers, to Ms. Saturn (see Fig. 4.11 Animals living in trees). I indicated that children have learnt red-eyed tree frog from this activity. However, she suggested that frogs lived in water rather than trees. Then, I found information on the red-eyed tree frog from the web and shared with her. She laughed at the information and stated that the frogs she knew were not red-eyed.

Fig. 4.11 Animals living in trees.

Enacting the Performance. Regarding the implementation period, children performed the roles that teachers gave to them and they enacted the applications of the teachers. During the implementation periods of science activities, teachers mostly gave roles to the children on handling the objects. In addition, teachers performed the practice first, and then led children to enact the performance. For example, Ms. Saturn carried out a science activity on planting four o'clock flower. After they talked on the flower and its seeds, they went to the garden in order to plant the seeds. Ms. Saturn was the

first that dug the soil and watered the soil and the seeds (see Fig. 4.12. Planting seed). Children enacted the performance of teachers and applied the performance according to the directions of the teachers.

> We went out to garden and went to the area for planting.
> Ms. Saturn: Let me dig here and after me you will also dig. To dig easily we need to water the soil a little (Ms. Saturn dug and poured water to soil)
> […]
> Ms. Saturn: Ahmet; please bring the shovel, and Serkan please take mine. Now you can dig just like (she showed how to do). Derya and Alper please come along and start digging here. Emre; please with a rake gather the soil.
> (Each child put a seed. Derya tried to water right after)
> Ms. Saturn: We need to complete one more step before watering. Hand me over the shovel.
> (Ms. Saturn covered the seeds with soil)
> Ms. Saturn: Ahmet could you please bring the water?
> Derya: We will pour water in a row.
> Ms. Saturn: Yes you are. Ahmet, you hold it together with Emre.
> (Ms. Saturn also held the watering cup with them)
> Ms. Saturn: Now cover it with soil.
> (Ms. Saturn covered it with soil and children observed)
> Derya: I want to take over right after you.
> Ms. Saturn: Now Ahmet and Emre come along and hold the watering cup and let's water together.
> Ms. Saturn: Now its Derya's turn to water.
> (Derya poured some water)
> Ms. Saturn: Wait a second. Let me put some more soil on it.
> (Ms. Saturn put soil while Derya was waiting for her)
> Ms. Saturn: Let me also take out these weeds.
> (Derya poured the rest of the water)
> […] (from field notes of July 17, 2013)[40].

[40] Bahçeye çıktık. Bahçenin arkasındaki ekim için ayrılan kısma gittik.
Bayan Satürn: İlk önce ben şurayı biraz kazayım, ondan sonra siz de yapacaksınız.. Daha rahat kazmak için su dökmemiz lazım. Sonra siz de yapacaksınız (Bayan Satürn toprağı kazdı ve biraz su döktü)
[…]
Bayan Satürn: Ahmet sen sarı küreği al, Serkan sen de bunu al. Bakın böyle bu tarafa doğru kazın (nasıl yapmaları gerektiğini gösterdi). Derya ve Alper gelin bakalım kazın burayı. Emre sen de biraz tırmıkla kendine doğru çek toprağı.
(Herkes birer tane tohum attı. Derya hemen su dökmek istedi)
Bayan Satürn: Hayır su dökmeden önce bir şey yapmamız gerekiyor. Getirin bakalım küreği.
(Bayan Satürn tohumların üzerini toprakla kapattı)
Bayan Satürn: Suyu getirir misin Ahmet?
Derya: Sırayla hepimiz dökeceğiz.
Bayan Satürn: Evet. Tut Ahmet, sen de tut Emre.
(Bayan Satürn, Ahmet ve Emre kabı üçü birlikte tutup su döktü)
Bayan Satürn: Evet. Şimdi biraz daha toprakla kapatalım.

In this excerpt, the control of Ms. Saturn was apparent at the implementation. She first dug and watered the soil. Then, she informed children that they were going to do the same thing after her. While Ms. Saturn was digging the soil children watched the teacher by standing (see Fig. 4.12 Planting seed). Then the teacher wanted them to perform the same thing as she presented. She gave directions to the children on what to do and how to do. When children did not apply the process as she presented, she presented the process again. Even in watering, the teacher watered the seeds firstly. Also she held the watering cup together with the children. As a result, during the implementation periods of the science activities, the teacher first performed the activity while the children observed her. Afterwards the teacher gave roles to the children and wanted them to repeat the process in the way that she applied.

Fig. 4.12 Planting seed.

(Bayan Satürn kürekle kapattı, çocuklar izledi)
Derya: Öğretmenim sonra ben tamam mı?
Bayan Satürn: Gel bakalım Ahmet ve Alper, tutun (üçü birlikte kabı tutarak Bayan Satürn'ün toprak kapattığı yere döktü).
Bayan Satürn: Tamam, şimdi de Derya sulasın.
(Derya biraz suladı)
Bayan Satürn: Bir dakika dur, biraz daha toprakla kapatalım.
(Bayan Satürn toprakla kapattı, Derya bekdi)
Bayan Satürn: Tamam, şu yabani otları da alayım.
(Derya kalan suyu döktü)
[…]

Roles of the Teacher

During the science practices, mostly observed roles of teachers were performing the practice and explaining the practice.

Performing the Practice. Most of the time teachers started and carried out the implementation period of the science practices. Although they could give some roles to children as holding and pouring the activity materials, generally they controlled and performed the implementation periods. For example, after Ms. Saturn presented a video on ice sports, she brought a cup of water into the class. Then she suggested children to make their own ice-skating rink and performed the practice without giving roles to children.

> Ms. Saturn: Let's make a ice-skating rink and in the afternoon slide our toys in that. But first of all what do we need to have ice?
> Children: Water (They showed the cup filled with water that Ms. Saturn brought in).
> Ms. Saturn: I only brought water and unfortunately I forget what to do next.
> Children: We wil make ice.
> Ms. Saturn: Do we supposed to make ice?
> Children: Yes.
> Ms. Saturn: Alright let me pour the water then (She poured water to a wide cup). Look ice did not formed it is still water. How will our toys will slide on this?
> Emre: We need to put ice in it.
> Ms. Saturn: Where could we find ice?
> Children: From the refirgerator.
> Ms. Saturn: I checked the refrigerator and there is no ice in it. We need to obtain our own ice-skating rink. We need to solidify water. To do so where should we store our water, in a warm place or cold?
> Children: Cold.
> Ms. Saturn: Should it be cold?
> Ahmet: It should be warm.
> Ms. Saturn: To obtain ice from this water do we need to keep it in warm place?
> Derya: No it should be cold.
> Ms. Saturn: You are right. We need to keep it in cold place. Where could it be?

Children: The refrigerator.
Ms. Saturn: Yes the refrigerator. Now together we put this pot to the freezer of the refrigerator.
Emre: We will put it to the freezer.
Ms. Saturn: What will happen to the water in the freezer?
Children: It will become ice.
Ms. Saturn: Yes and then it will be our little ice-skating rink.
Ahmet: After that we will slide our toy cars.
Ms. Saturn: Along with cars our animal toys could ice-skate.
Children: Also let people ice-skate.
Ms. Saturn: Yes people also ice-skate. Let's go to the kitchen and make our own ice-skating rink.
(We went to the kitchen and children opened the lower door of the refrigerator)
Ms. Saturn: Not that door because we need to freeze the water and the upper side of the refrigerator is the freezer and colder than lower part.
Ahmet: This part is too cold (After opening the upper door).
Ms. Saturn: Yes it is. Now I am putting our water and in the afternoon we will take it back. Do not forget it alright?
Children: Yes […] (from field notes of June 18, 2013)[41].

[41] Bayan Satürn: Hadi şimdi biz de bir buz pisti yapalım. Öğleden sonra oyuncaklarımızı buz pistinde kaydıralım. Ama buz elde etmek için ne yapıyorduk?
Çocuklar: Su (Ms. Saturn'nin getirdiği su dolu kabı gösteriyorlar).
Bayan Satürn: Bir tek suyumu getirdim ama ondan sonra ne yapmam gerektiğini unuttum?
Çocuklar: Buz yapacağız.
Bayan Satürn: Buz mu yapmamız gerekiyor?
Çocuklar: Evet.
Bayan Satürn: Peki ben şu suyumu dökeyim (suyu sürahiden geniş teneke kaba döküyor). Ama bu buz olmadı hala sıvı. Bunun üzerinde nasıl kayacak bizim oyuncaklarımız?
Emre: Buz dökmeliyiz.
Bayan Satürn: Ama buzu nereden bulacağız?
Çocuklar: Dolaptan.
Bayan Satürn: Yok orada baktım ben. Kendimiz buz pistini elde etmemiz gerekiyor. Bu suyun katı olması için yani buza dönüşmesi için sıcak bir yerde mi saklamalıyız yoksa soğuk mu?
Çocuklar: Soğuk.
Bayan Satürn: Soğuk bir yerde mi saklamalıyız?
Ahmet: Sıcak.
Bayan Satürn: Şimdi bu suyu buza dönüştürmek için sıcakta mı saklamamız gerekiyor?
Derya: Hayır soğuk.
Bayan Satürn: Soğuk bir yerde saklamamız gerekiyor. Neresi olabilir?
Çocuklar: Buz dolabı.
Bayan Satürn: Evet buz dolabı. Şimdi hep birlikte gideceğiz bunu buz dolabının en üst kısmına yani buzluğa koyacağız.
Emre: Buzluğa koyacağız.
Bayan Satürn: Daha sonra bu su ne olacak buz dolabında?
Çocuklar: Buz.
Bayan Satürn: Buz. Bizim küçük buz pistimiz olacak değil mi?
Ahmet: Sonra arabaları kaydıracağız.
Bayan Satürn: Evet daha sonra arabaları belki hayvanlarımıza buz pateni yaptırabiliriz.
Çocuklar: İnsanları da kaydıralım.
Bayan Satürn: Evet insanlar da olabilir. Kendi buz pistimizi oluşturalım, hadi gelin.
(Mutfağa geçtik. Çocuklar alt kapağı açtı)

In the excerpt, Ms. Saturn asked opinions of children on how to obtain ice from water. She generally directed children to find out the correct answers. After she poured the water into another cup, they moved to kitchen and placed it into the freezer. The teacher performed all of these steps on herself. She supplied the cup and water, poured the water into another cup and placed it into the freezer (see Fig. 4.13 Ice-skating rink). During the implementation period she did not give any roles to children. Children only followed the performance and response to questions of the teacher.

Fig. 4.13 Ice-skating rink.

Explaining the Practice. Other role of teachers during the implementation period of science practices was explaining the practice. Teachers gave new information and did explanations on the topic while performing the activity. For example, at the activity on koalas regarding the weekly theme "Animals living in Trees" Ms. Saturn presented photos of koalas and found a website on characteristics of koalas. She

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Bayan Satürn: Hayır, üst tarafa koymamız gerekiyor. Çünkü üst tarafı dondurucu, daha soğuk.
Ahmet: Aaa burası en çok soğuk (Üst kapağı açınca).
Bayan Satürn: Evet bakın buraya koyuyorum sonra alacağız. Öğleden sonra bakacağız unutmayın tamam mı?
Çocuklar: Tamam […]

asked opinions of children on the characteristics of koalas and at the same time she skimmed the information at the website. After the responses of children, she did explanation on the characteristics of koalas.

(Ms. Saturn skimmed web for photos and videos on koalas)
Ms. Saturn: What do you think about a koala's fur? Does it soft?
Children: It is soft.
Ms. Saturn: Look where koalas live (She showed a picture)?
Children: They live in trees.
Ms. Saturn: Yes.
(Ms. Saturn continued to search the web)
Ms. Saturn: Look! what are they eating?
Berk: Leaves.
Ms. Saturn: Yes they are eating leaves.
Ms. Saturn: Do you have any ideas on how a koala carries her cub?
Emre: They carry them on their laps.
Serkan: On their back.
Ms. Saturn: Look at the Picture (She showed a picture).
Ms. Saturn: What about the kangaroos. How do they carry their cubs?
Children: In their pouches.
Ms. Saturn: Look koala puts its cub on its back and they hug. Koalas love hugging.
Ms. Saturn: Look! It says koalas rarely drink water.
Ms. Saturn: Look! It says koalas eat leaves of eucalytus trees. Did you ever heard about it?
Berk: Eucalyptus?
Ms. Saturn: Since there is a huge amount of water in eucalyptus leaves koalas drink water rarely.
[...]
Ms. Saturn: Do you have any idea on how many hours does a koala sleeps in a day?
Berk: Fifteen
Ms. Saturn: Ahmet?
Ahmet: Five.
(Ms. Saturn asked each children about their guesses)
[...]
Ms. Saturn: Koalas sleep eighteen to twenty hours in a day and they spend rest of their time on eating and caring their cubs.
Ms. Saturn: What do you think koalas resemble?
Ahmet: Dogs.
Derya: Mouse.
Ms. Saturn: Other than these?
Berk: Cat.
(Ms. Saturn asked each child on their guesses)
Ms. Saturn: Even though the koalas resemble with bears they have no connection with bears. They have thick fur, big ears and big black nose. Other than that they do not have tails.
Ms. Saturn: Do you have any ideas on the height of koalas?

Children: Five centimeters.
Ms. Saturn: Any other guess?
Children: One hundred centimeters.
Ms. Saturn: Let me tell you. Their height is ninety centimeters.
Ms. Saturn: What about their weight?
Children: One hundred and five kilograms.
Ms. Saturn: Make a guess of maximum.
Children: One hundred and thirty five kilograms.
Ms. Saturn: It is fifteen.
(She was looking at the computer)
Ms. Saturn: Look! They also have pouches just like the kangaroos [...]
(from field notes of April 17, 2013)[42].

[42] (Bayan Satürn internetten video ve resim baktı)
Bayan Satürn: Koalanın tüyleri nasıl olabilir? Yumuşak mıdır?
Çocuklar: Yumuşak.
Bayan Satürn: Bakın koalalar nerede yaşıyor, neyin üstünde (resim gösteriyor)?
Çocuklar: Ağaçta.
Bayan Satürn: Ağaçta evet.
(Bayan Satürn bilgisayarda araştırmaya devam ediyor)
Bayan Satürn: Bakın ne yiyorlar?
Berk: Yaprak.
Bayan Satürn: Evet yaprak.
Bayan Satürn: Sizce yavrularını nasıl taşıyor koalalar?
Emre: Kucağında.
Serkan: Sırtında.
Bayan Satürn: Bakın gördünüz mü? (resmi gösteriyor)
Bayan Satürn: Kangurular nasıl taşıyor yavrularını?
Çocuklar: Keselerinde.
Bayan Satürn: Bakın koalalar da böyle sırtına almış, sarılmışlar. Koalalar sarılmayı çok seviyorlar.
Bayan Satürn: Bakın koalalar çok nadiren su içerlermiş arkadaşlar.
Bayan Satürn: Bakın koalalar okaliptüs yaprakları yiyorlarmış biliyor musunuz?
Berk: Okaliptüs mü?
Bayan Satürn: Yapraklarını yiyorlarmış. O yapraklarda yeterince su olduğu için koalalar çok nadir su içiyorlarmış.
[...]
Bayan Satürn: Peki sizce koalalar günde kaç saat uyuyor olabilir?
Berk: Onbeş.
Bayan Satürn: Sence?
Ahmet: Beş.
(Her çocuğa tahminini soruyor)
[..]
Bayan Satürn: Koalalar yemek yemeleri dışında günde onsekiz ile yirmi saat arasında uyuyorlarmış.Günlük onsekiz ile yimi arasında uyuyorlar ya geri kalan zamanı da yemek yemeye ve bebeklerine bakmaya ayırıyorlarmış.
Bayan Satürn: Sizce koalalar neye benziyor? Tahmin edin neye benziyor olabilir?
Ahmet: Köpek.
Derya: Fareye
Bayan Satürn: Fareye benziyor, başka?
Berk: Kediye benziyor, başka?
(Bayan Satürn her çocuğa tahminini soruyor)
[..]
Bayan Satürn: Koalalar ayıya benzediği halde ayılarla hiç bir akrabalığı yokmuş. Koalalar bol tüylü, geniş kulaklı hayvanlar ve siyah iri bir burnu var. Ayrıca kuyruksuz olması da özellikleri arasında geçiyor arkadaşlar.
Bayan Satürn: Sizce koalanın boyu kaç olabilir? Kaç santimdir?
Çocuklar: Beş.

In this excerpt, Ms. Saturn made children informed about some characteristics of koalas as their nourishment, the amount of time they sleep, their height and weight. For each characteristic Ms. Saturn wanted children to predict the correct answer. Therefore, this case was an example for roles of children on making predictions, as well. After the predictions of children, the teacher did explanations on the features of koalas. Since she obtained and transferred the information from the website at the meantime, she did explanations on the topic by directly referring the information on the website.

Conclusion

After the implementation period of the science activitites, teachers concluded the activites through different ways. EC teachers in the setting, especially Ms. Saturn, carried out conslusion periods of science practices through summative assessment, transition, and imaging and planning, which are presented in detailed in the flowing sections (see Fig. 4.14 Conclusion).

Bayan Satürn: Başka tahmini olan var mı?
Çocuklar: Yüz.
Bayan Satürn: Söyleyeyim mi, doksan.
Bayan Satürn: Doksan.
Bayan Satürn: Evet boyu en fazla doksanmış.
Bayan Satürn: Sizce kilosu kaç olabilir?
Çocuklar: 105.
Bayan Satürn: Peki kaç kilodur en fazla?
Çocuklar: Yüzotuzbeş.
Bayan Satürn: Onbeş.
(Bayan Satürn bilgisayara bakıyor)
Bayan Satürn: Bakın kanguru gibi koala da keseli bir hayvanmış […]

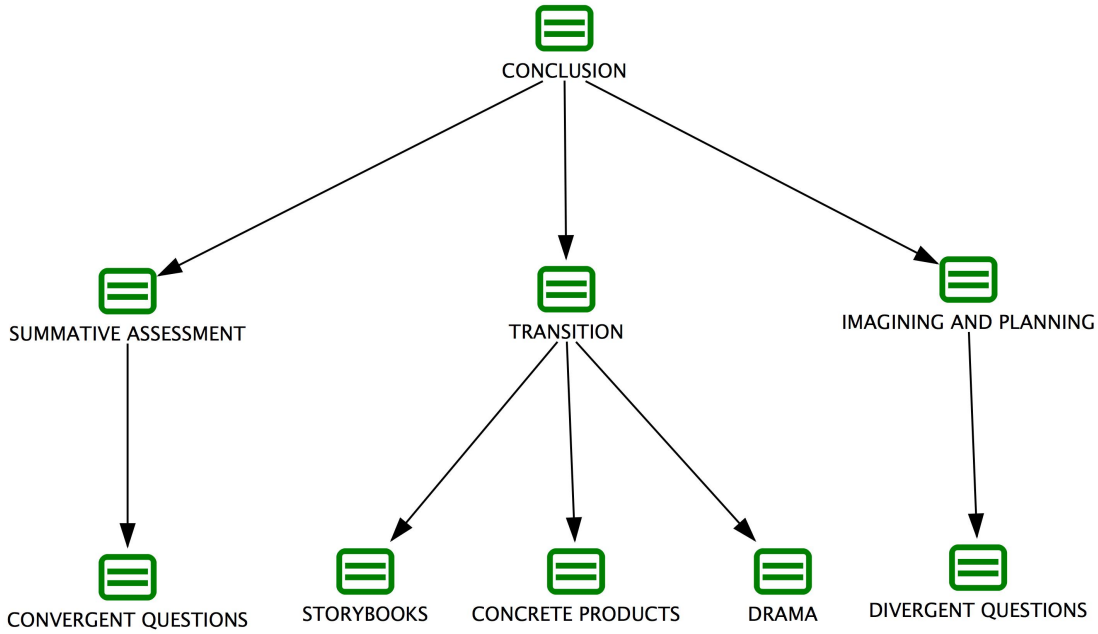

Fig. 4.14 Conclusion.

Summative Assessment

One of the strategies that teacher used in the conclusion period of the science activities was summative assessment. They assessed understanding and knowledge of the children through convergent questions.

Convergent Questions. At the end of the science activities, teachers did summative assessment through convergent questions. For example, Ms. Saturn implemented an activity on protecting from harmful effects of sun during the weekly theme called "Summer." While concluding the activity, she evaluated the understanding of children by convergent questions.

> Ms. Saturn: During the summer how could we protect ourselves from the sun?
> Children: Sunscreens.
> Ms. Saturn: Other than the creams?
> Children: Sun glasses, hats.
> Ahmet: Swimming pool.

Derya: Swimsuits.
Ms. Saturn: I asked for how we are protected from dangerous rays of the sun and you said hats, sunscreen and sun glasses. Other than these what could you say?
Children: …
Ms. Saturn: Are playing outside when the sun rises to the top in the middle of day?
Children: We play under an umbrella.
Ms. Saturn: Yes we play under an umbrella or in a shadowy place. But why we use sunscreens?
Alper: To be protected from the Sun.
Ms. Saturn: You are right it is to be protected from the harmful rays of the sun. How could the sun's rays harm us?
Children: Sunburns.
Ms. Saturn: Other than sunburn?
Children: …
Ms. Saturn: What about sun-struck?
Children: …
Ms. Saturn: We got sick right?
Children: We could get red spots.
Ms. Saturn: Yes we could get freckles. If we stay under sun long time we would get freckles (from field notes of June 4, 2013)[43].

In this excerpt, at the end of the activity Ms. Saturn asked questions to the children that focused on single answers about the implemented tasks. She assessed children's understanding on protecting from harmful effects of sun by

[43] Bayan Satürn: Yaz mevsiminde güneşten nasıl korunuyorduk?
Çocuklar: Krem.
Bayan Satürn: Krem. Başka?
Çocuklar: Gözlük.
Çocuklar: Şapka.
Ahmet: Havuz.
Derya: Mayo.
Bayan Satürn: Güneşin tehlikeli ışınlarından nasıl korunuyoruz diye soru sordum? Dediniz ki şapka, güneş kremi, gözlük, başka?
Çocuklar: ...
Bayan Satürn: Güneşin en yoğun olduğu saatlerde gidip güneşin altında oturarak oyun oynuyor muyuz?
Çocuklar: Şemsiyenin altında.
Bayan Satürn: Evet, şemsiyenin altında gölgelikte oynuyoruz. Peki neden güneş kremi sürüyorduk?
Alper: Çünkü güneşten korunmak için.
Bayan Satürn: Değil mi güneşin zararlı ışınlarından korunmak için. Güneş ışınlarının bize ne gibi zararları olabilirdi?
Çocuklar: Yakar bizi.
Bayan Satürn: Evet cildimizi yakar bize zarar verirdi. Başka?
Çocuklar:..
Bayan Satürn: Başımıza çok güneş geçtiğinde ne olurdu?
Çocuklar:..
Bayan Satürn: Hasta oluruz değil mi ateşimiz çıkabilir.
Çocuklar: Kırmızı benekler çıkabilir.
Bayan Satürn: Evet çillerimiz çıkabilir. Çok fazla güneşte kalırsak çilli oluruz.

asking convergent questions. After she got the correct answers, she repeated them in a more detailed way and summarized the task.

Transition

After teachers implemented the science activities, they provided children with opportunities to transfer their knowledge to other contexts. The EC teachers at the setting helped children to elaborate the mentioned tasks through storybooks, concrete products, and drama (see Fig. 4.15 Transition).

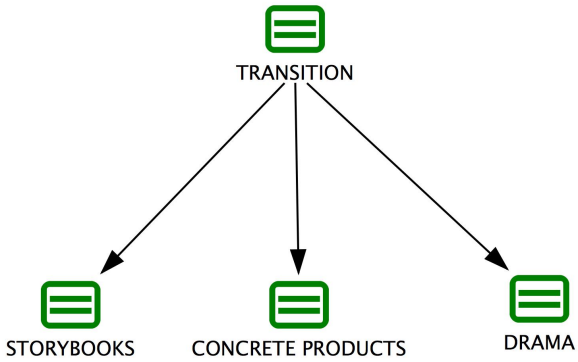

Fig. 4.15 Transition.

Storybooks. One of the transition strategies in conclusion of science activities was reading storybooks. After the implementation periods, teachers enhanced the topics by reading storybooks that were relevant to the activity and the weekly theme. For example, Ms. Saturn carried out an activity on germination that was performed apart of the weekly theme "Spring." Before the rest/sleep time, she read a book on fruits, which was brought into the class by one of the children.

Ms. Saturn: Serkan what is your book's name?
Serkan: Its name is 'Fruits.'
Ms. Saturn: It is about which fruits?

Serkan: Apples, strawberries and pears.
Ms. Saturn: Which fruit is this?
Serkan: Apple.
Ms. Saturn: The books name is 'Apple and Its Friends.' What kind of apple is this?
Children: A red apple.
Ms. Saturn: This is a whole or half apple. So what kind of apple is this?
Serkan: It is a half apple.
Ms. Saturn: Yes it is half. Other than that what you see Serkan?
Serkan: A red apple.
Ms. Saturn: Here you can see types of apple.
Serkan: Red apple and green apple.
Ms. Saturn: These ones are called Starking, Amasya and Golden.
Serkan: Golden is also yellow apple.
Jeremy: Those are apple kernels.
Ms. Saturn: We use apple kernels as what?
Serkan: We use them as seeds.
Ms. Saturn: Yes.
Serkan: They are extracting apple's kernels.
Ms. Saturn: We could not eat them right Serkan?
Serkan: No, we could not.
Ms. Saturn: Apple's kernels are also seeds in the same time. In the book they planted apple seed, and then they watered it and with sun shine apple seeds rooted. After that apple seeds germinated.
Ahmet: And its leaves also formed.
Ms. Saturn: In a short period of time an apple tree has grown from apple seeds. *"Apple trees blossos in the spring… In summer it is covered with tiny apples"* Look just like it is in the book. Could you please tell me in which season does a tree shed its leaves?
Serkan: In the spring.
Ms. Saturn: Trees blossom in the spring and what happens to tree leaves in the fall?
Children: They fall.
Ms. Saturn: You are right they fall. Hey look there is a fig tree and a kiwi tree and pear tree. Ooo look there inside of a fig.
Ms. Saturn: Could a water melon grow on a tree?
Children: No.
Ms. Saturn: Water melon grows on the ground and it becomes huge did you ever see it? Hey look this is grape and this one is banana tree.
[…]
Ms. Saturn: These are apricot tree, plum tree, grape tree and cherry tree.
Derya: When do these fruits grow?
Ms. Saturn: There is a plenty of time. They grow in June.
Ms. Saturn: Look there are raspberries, strawberries, blackberries and red currants they are all red fruits.
Children: There are also strawberries.
Ms. Saturn: Yes they are all red fruits (from field notes of March 26, 2013)[44].

[44] Bayan Satürn: Serkan kitabının adı nedir?
Serkan: Meyveler.

In this excerpt, Ms. Saturn looked out for the most relevant book that was brought by the children. After she decided on the most relevant, she wanted the child to introduce his storybook on fruits. The teacher asked questions on the fruits, expanded explanations of the children and transferred information to the

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Bayan Satürn: Hangi meyve var burada?
Serkan: Elma, armut, çilek.
Bayan Satürn: Bu hangi meyve?
Serkan: Elma.
Bayan Satürn: Kitabın adı 'Elma ve arkadaşları'.
Bayan Satürn: Aaa bu nasıl bir elma?
Çocuklar: Kırmızı.
Bayan Satürn: Bu bütün bir elma, bu da yarım bir elma. Bu nasıl bir elmaymış?
Serkan: Yarım.
Bayan Satürn: Evet yarım elma. Burada ne var Serkan?
Serkan: Kırmızı elma.
Bayan Satürn: Burada elma çeşitleri var.
Serkan: Kırmızı elma, yeşil elma.
Bayan Satürn: Ferik elmaymış bunun adı.
Serkan: Ferik elma.
Bayan Satürn: Bu starking elma, Amasya elması, golden elmaymış.
Serkan: Golden elma, bu da sarı elma.
Ahmet: Onlar elmanın çekirdekleri.
Bayan Satürn: Peki bunları ne olarak kullanabiliriz?
Serkan: Tohum.
Bayan Satürn: Evet.
Serkan: Elmanın çekirdeklerini çıkarıyorlar.
Bayan Satürn: Elmanın çekirdekleri yenmez değil mi Serkan?
Serkan: Evet.
Bayan Satürn: Bakın, elmanın çekirdeği aynı zamanda bir tohum. Ne yapmışlar tohumu toprağa ekmişler. Daha sonra sulamışlar, güneş açmış. Bakın kök salmış gördünüz mü. Daha sonra bu kabuğundan çıkmış ve filizlenmiş.
Ahmet: Ve yaprakları oluşmuş.
Bayan Satürn: Kısa zamanda tohum topraktan çıkan elma ağacı oldu, bakın. "*Elma ağacı ilk baharda çiçek açar... Yazın üzeri küçük elmalarla kaplanır."* Bakın burada olduğu gibi. Peki Serkan ne zaman ağaç bu şeklide olur, hangi mevsimde yaprakları dökülür?
Serkan: İlkbahar.
Bayan Satürn: İlkbaharda açıyor. Sonbahar mevsiminde ağaçların yaprakları ne oluyor?
Çocuklar: Dökülüyor.
Bayan Satürn: Dökülüyor değil mi. Bakın bu bir incir ağacı. Bakın bu kivi ağacı, bu da armut ağacı. Aaa bakın inicin içi.
Bayan Satürn: Karpuz ağaçta mı yetişir?
Çocuklar: Hayır.
Bayan Satürn: Yerde yetişiyor böyle büyüyor kocaman oluyor, gördünüz mü. Bakın bu üzüm, bu da muz ağacı.
[…]
Bayan Satürn: Bular da kayısı, erik ve üzüm. Kiraz, kayısı ve erik ağacı.
Derya: Bunlar ne zaman olur öğretmenim?
Bayan Satürn: Daha var haziranda çıkmaya başlar.
Bayan Satürn: Bakın, frambuaz, yaban çileği, böğürtlen, koca yemiş, Frenk üzümü hepsi de kırmızı meyveler.
Çocuklar: Çilek de var.
Bayan Satürn: Evet çilek, hepsi kırmızı meyve.

children from the book. While they were following and talking on the fruits at the book, Ms. Saturn emphasized the concept "seed" in the germination activity.

On the other hand, the content of the books did not always overlap with the activities and the weekly themes. Even though the teachers stated at the interviews that they prepared children's book related with the activities, there were exceptions. For example, Ms. Saturn carried out an activity on wooden houses within the "Wooden Objects" theme. Throughout the implementation she pointed out the characteristics and construction phases of wooden houses. At the end of the implementation period, she read a storybook on wooden houses. Although, the story was occurred near a wooden house, the main theme of the story was on sharing and friendship. Therefore, the content of the book did not correspond to the storybook.

Concrete Products. During the conclusion period of the science activities, teachers provided opportunities for children to develop concrete products on the topic. They drew pictures and produced models related with the implemented activity. For example, Ms. Jupiter indicated that after the activity related with the weekly theme "Space and Sky," they drew pictures on their practice.

> Ms. Jupiter: […] We discussed about the space and the sky in the class and we even observed the sky once during the day and before we leave for home. We conducted this observation in winter and since days are shorter in winter we got the chance to observe the sky in the morning and after the sunset. I asked children about what they observed in sky and than to have concrete products we drew pictures on their observations (from interview with Ms.Jupiter on July 25, 2013)[45].

[45] Bayan Jüpiter: […] Uzayda ve gökyüzünde neler var diye konuşmuştuk. Hatta bir gündüz bir de akşam eve gitmeden once gökyüzünü gözlemlemiştik. Kışın yapmıştık bu etkinliği. Kışın hava daha çabuk karardığı için, hem gündüz hem de akşam gözlemlemiş olduk. Neler gördünüz diye sormuştum çocuklara. Sonra somut ürünler çıksın diye gördükleriyle ilgili resim yapmıştık.

Ms. Jupiter stated that they observed and compared the objects in the sky in the morning and after the sunset. In order to elaborate their practice they drew pictures on their observations. Similarly, Ms. Saturn led the children in her class to develop a model of monkey after the activity on the weekly theme "Animals Living in Trees" (see Fig. 4.16 Concrete products).

> Ms. Saturn: Now we are going to make tiny monkeys together but before that I need to cut them. After that we will fill and adorn them together and expose them in our class. While I am cutting the monkeys you are going to play and I will call each of you one by one.
> Ms. Saturn: We need to be prepared for the exposition (To the researcher).
> The Researcher: Let me help you on cuttings.
> […]
> Ms. Saturn: Its better I prepare the buttons children will decide on the choice.
> Ms. Saturn: Could you please cut these?
> (I cut out legs from foam plates)
> The Researcher: Should I cut them in equal pieces?
> Ms. Saturn: Yes you could cut them in to four equal pieces.
> Ms. Saturn: Could you please pick two buttons for the eyes Alper?
> (Alper placed the buttons on monkey's body)
> Ms. Saturn: I asked you to pick for eyes. This is monkey's head where should be its eyes?
> (Alper placed the buttons on its head)
> Ms. Saturn: Emre it's your turn please pick two buttons and place the monkey's eyes.
> (Emre placed the buttons and leaved)
> Ms. Saturn: Serkan now it's your turn to give the monkey two eyes. Could you please pick two buttons?
> (Serkan placed the buttons and leaved)
> Ms. Saturn: Derya now it's your turn.
> (Derya placed the buttons on monkey's body)
> Ms. Saturn: Do you place the buttons for belly button? We are placing them for eyes alright? You need to put them as this (she arranged the buttons on her own).
> (Derya glued the buttons where Ms. Saturn placed and turn back to her game)
> Ms. Saturn: Ahmet now its your turn to give monkey its eyes.
> Ms. Saturn: what is this? Are these eyes?
> Ahmet: Yes.
> Ms. Saturn: Alright. Are your eyes on your belly?
> Ms. Saturn: Where is the monkey's head?
> (Ahmet showed the monkey's head)
> Ms. Saturn: You are telling me that that point is the head of the monkey and this is the eye. However, you need to place the eyes to the head but

you placed them on the belly.
(Ahmet placed the buttons correctly in the same time Aysel and her grandfather came)
Aysel's Grandfather: What are you doing?
Ms. Saturn: We are getting prepared for the exhibition. I prepare and they produce for the exhibition.
(After Aysel's grandfather left Ms. Saturn made explanation to the researcher)
Ms. Saturn: Since it is the exhibition term I try hard to complete the activities. However, I don't want to prevent them from playing. They could make this far and I will complete the rest. There were not this much trainees in past years and we could spread our activities to whole. I even began carrying out this type of activities and at the end of the year I did not think much on completing the activities. However, this year was chaos. Normally I have already prepared my exhibition and if I was absent that day we just complete her activity. Other than that we were ready for the exhibition (from field notes of April 18, 2013)[46].

[46] Bayan Satürn: Şimdi sizinle küçük maymuncuklar yapacağız ama önce o maymunları benim kesmem gerekiyor. Daha sonra hep bilirlikte o maymunların içini dolduracağız sonra süsleyip sınıfımıza asacağız tamam mı? Ben kesene kadar birazcık oyun oynayacaksınız, size sırayla çağıracağım.
Bayan Satürn: Biraz sergiye hazırlanalım (Bana dönerek).
Araştırmacı: Ben de yardım edeyim size, kesilecek şeylerde.
[…]
Bayan Satürn: Ben düğmeleri hazırlayayım da onlar hangisini takacaklarına karar verirler.
Bayan Satürn: Öğretmenim sana zahmet şunları keser misin?
(Köpük tabaklardan kol ve bacak kestim)
Araştırma: Eşit mi böleyim?
Bayan Satürn: Evet dörde bölebilirsin?
Bayan Satürn: Alper maymuna iki tane düğme seç bakalım onun gözü için.
Alper: (Seçtiği düğmeleri gövdesine yeleştirdi)
Bayan Satürn: Göz Alper göz… Bak şimdi bu kafası, gözü nerede olur?
(Alper kafasına yerleştirdi)
Bayan Satürn: Emre gel. İki tane düğme seç, yapıştır gözünü.
(Emre düğmeleri yapıştıdı ve gitti)
Bayan Satürn: Serkan gel. Maymuna iki tane göz yapacağız, düğme seçer misin?
(Serkan düğmeleri yapıştırdı ve gitti)
Bayan Satürn: Derya gel.
(Derya düğmeleri gövdesine yerleştirdi)
Bayan Satürn: Sen göbek deliği mi yaptın, göz yapıyoruz tamam mı böyle bak (düğmelerin yerini kendi ayarladı).
(Derya düğmeleri Bayan Satürn'ün gösterdiği yere yapıştıdı ve oyununa geri döndü)
Bayan Satürn: Ahmet Volkan gel. Bunlarla göz yapacaksın.
Bayan Satürn: Bu ne oldu, göz mü?
Ahmet: Evet.
Bayan Satürn: Peki senin gözün göbeğinde mi?
Bayan Satürn: Bunun kafası nerede?
(Ahmet maymunun kafasını gösterdi)
Bayan Satürn: Ahmetciğim bak buranın kafası olduğunu söylüyorsun Bu da gözü. Gözünü kafaya takman gerekiyor ama sen göbeğine taktın.
(Ahmet düğmeleri maymunun kafasına taktı. O sırada Aysel dedesiyle geldi)
Aysel'nin Dedesi: Ne yapıyorsunuz?
Bayan Satürn: Sergiye hazırlık yapıyoruz. Ben hazırlıyorum, onlar yapıyor.
(Aysel'nin dedesi gittikten sonra Bayan Satürn bana açıklama yaptı)

In this excerpt, after implementation Ms. Saturn explained that they were going the develop models of monkeys. Since she was going to prepare the materials, she let children to free play. After we prepared the activity materials with her, she called the children in an order. Children filled the monkeys with paper and chose buttons for its eyes. While developing the product, she decided the body of the monkey on her own but gave children chance to select buttons for eyes. Although the teacher made children informed about the product before, some children did not locate the buttons on the heads of the monkey and tried different locations. In such situations, the teacher quickly led children to locate the button on the head of the monkey. Moreover, Ms. Saturn complained about could not be able to prepare products for the exhibition on time. She indicated that student teachers' implementations take more time than previous years. Therefore, she had a tendency to prepare activity products in a quick way.

Fig. 4.16 Concrete products.

Bayan Satürn: Sergi zamanı olunca bu etkinlikleri yetiştirmek için gayret ediyorum. Ama onları oyunundan da etmek istemiyorum. Onlar bu kadarını yapar ben bacaklarını yapıştırırım artık. Geçen sene ve ondan sonraki seneler bu kadar yoğun stajyer olmuyordu o zaman her şeyi yayıyorduk. Hatta böyle etkinlikleri birinci dönemden yapmaya başlıyordum, sonra etkinlik yaptırayım diye derdim olmuyordu. Ama bu sene bir hengame oldu. Yoksa sergi zamanına benim her şeyim hazır olurdu. Sadece çocuk o gün gelmemişse onun etkinliğini tamamlardık, onun haricinde bir şey olmazdı.

Drama. At the end of the implementation period of the science activities, teachers might elaborate the task through drama. For example, during the activity related with the weekly theme "Spring," Ms. Saturn pointed out the components of germination. Afterwards, she elaborated these components through drama performance of the children.

> Ms. Saturn: Blue shoe, blue shoe who's it not you…
> Ms. Saturn: You are the farmer Alper.
> Ms. Saturn: Now I am going to pick one of you as seed. So I am closing my eyes and rolling around you will tell me to stop and to whom my finger spots that is the seed.
> Children: Stop
> Ms. Saturn: Ahmet you are the seed come next to me.
> Ms. Saturn: Now who will be the water that farmer pour to the earth (she clapped her hands to represent perfomance)?
> Ms. Saturn: Blue shoe, blue shoe who's it not you. It's you Serkan
> Ms. Saturn: And now the sun. Blue shoe blue shoe who's it not you. It is you Emre come next to me.
> Ms. Saturn: Farmer this place is your farm and how do you plant seeds?
> Emre: I plant the seeds.
> Ms. Saturn: To plant seeds what you need to do at first?
> Emre: I need to dig (He acted as digging).
> Ms. Saturn: You digged the earth and now you need to plant the seed. Seed was Ahmet you can plant him and than cover him with soil. Now it is time to water the seeds and take water and it is Serkan, you clap your hands to sound like water. Seed now it is your turn let's start to germinate. Let's have a look whether our seed grown and have leaves. What seed are you?
> Ahmet: I am a flower seed.
> Ms. Saturn: Ah a flower let us smell this lovely flower and what a lovely smell is this. Let's cheer our friends for their performance.
> (They appluded)
> Ms. Saturn: Now let's pick the new farmer, seed, sun and the water […] (from field notes of March 26, 2013)[47].

[47] Bayan Satürn: Ooo portakalı soydum, başucuma koydum, ben bir yalan uydurdum, duma duma dum kırmızı mumu, git komşunun damına kon, kon kon kon sarı limon…
Bayan Satürn: Sen çiftçisin Alper, gel bakalım.
Bayan Satürn: Şimdi bir de tohum seçeceğim. Şimdi ben gözlerimi kapatıyorum, siz bana dur diyeceksiniz, parmağım kimi gösterirse o tohum olacak. Başlıyorum, siz dur diyeceksiniz.
Çocuklar: Dur.
Bayan Satürn: Ahmet gel bakalım sen de tohum olacaksın.
Bayan Satürn: Evet şimdi çiftçinin dökeceği su kim olacak? Bakalım böyle sularken şap şap şap yapan kim olacak (ellerini birbirine vurup yapması gerekeni gösteriyor)?
Bayan Satürn: Ooo, ooo pitipiti karemela sepeti, terazi lastik jimnastik, biz size geldik bitlendik, hamama gittik temizlendik, dik dik dik, gel bakalım Serkan.
Bayan Satürn: Güneş kim olacak bakalım? Portakalı soydum, başucuma koydum, ben bir yalan uydurdum, duma duma dum kırmızı mum, git komşunun damına kon, kon kon

In this excerpt, Ms. Satrun made a count and selected four children for drama performance on germination. The case at the above excerpt repeated two times in order to give roles all of the children in the drama. During the each drama performance, selected children played the role of seed, rain, sun, and farmer. Although Ms. Saturn asked children about what were they going to do, she mostly gave directions to the children and explained that what they were going to do.

Imagining and Planning

To conclude the science activities, teachers carried out a section called imagining and planning. This session was rooted from High Scope Model. Teachers asked imagination and plans of children through divergent questions at the end of the activities.

Divergent Questions. During the imagining and planning section of the activities, teachers posed divergent questions as "if you have a [object mentioned in the activity], how would it be" or "if you were a [object mentioned in the activity] how would you act" to each child in an order. Then, teachers wanted them to explain their imagination to the class. For example, at the end of the activity related with the

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kon sarı limon. Emre gel bakalım.
Bayan Satürn: Çiftçi burası senin tarlan. Tohum ekmek için ne yapıyorsun?
Emre: Tohumu ekiyorum.
Ms. Saturn: Peki ekmek için ne yapman gerekiyor önce?
Emre: Kazmam gerekiyor (kazıyor gibi yapıyor).
Bayan Satürn: Kazdın toprağını şimdi tohumunu ek toprağa. Tohum Ahmet'di, tohumunu ek. Kapat şimdi toprağı. Şimdi suyunu al, tut Serkan'ı. Sen de şap şap yap elinle Emre. Çok güzel. Tohum hadi bakalım filizlenmeye başla. Yapraklarını açtı mı bakayım tohum. Sen ne tohumusun?
Ahmet: Çiçek.
Bayan Satürn: Çiçek mi o zamana koklayalım. Ooo ne güzel kokuyor. Çok güzeldi arkadaşlarınızı alkışlayalım.
(Alkışladılar)
Bayan Satürn: Şimdi yine bir çiftçi, tohum, güneş ve su seçeceğim […]

theme “Animals Living in Tress,” Ms. Saturn asked, “If you were a monkey, how would you walk” to the each child.

> Ms. Saturn: Deya if you were a monkey how would you walk?
> Derya: I would be jumpy and I would eat banana.
> Ms. Saturn: How about you Emre, how would you walk if you were a monkey?
> Emre: I would like fix my tail on a tree than walk through.
> Ms. Saturn: This is nice Emre. How about you Serkan?
> Serkan: I would walk on my hands.
> Ms. Saturn: This is a little bit different style. How about you Berk?
> Berk: I would like to walk through on my head spinning.
> Ms. Saturn: This is a different idea. What about you Elif?
> Elif: I think on my arms.
> Ms. Saturn: Like the gorillas (She animates with her arms)?
> Ms. Saturn: How about you Alper?
> Alper: I will hang myself on a tree with my tail and eat every banana.
> Ms. Saturn: This is a brilliant idea Alper. And you Ahmet?
> Ahmet: I will go fast just like a race car.
> Ms. Saturn: You mean you run?
> Ahmet: No I will be fast with my engine.
> Ms. Saturn: Do monkeys have engines on them?
> Ahmet: They have in their tails.
> (They laughed)
> Ahmet: I would climb to the tree with my ears.
> Ms. Saturn: Ooo this means you have very strong ears (from field notes on April 18, 2013)[48].

In this excerpt, Ms. Saturn led children imagine to be a monkey and wanted

[48] Bayan Satürn: Derya sen bir maymun olsan nasıl yürürdün?
Derya: Zıp zıp zıp diye zıplayıp yerdim muzları.
Bayan Satürn: Hmm. Peki Emre sen bir maymun olsan nasıl yürümek isterdin?
Emre: Kuyruğumu ağaca takıp öyle yürümek isterdim.
Bayan Satürn: Ooo güzel. Serkancığım sen?
Serkan: Elimle.
Bayan Satürn: Ellerinin üstünde, farklı. Sen Berk bir maymun olsan Bayan Satürn: Berk nasıl yürümek isterdin?
Berk: Ben kafamla dönerek yürümek isterdim.
Bayan Satürn: Farklı. Peki, Elifciğim sen bir maymun olsan nasıl yürümek isterdin?
Elif: Kollarımın üstünde.
Bayan Satürn: Hmm goriller gibi mi? (kollarıyla gösteriyor)
Bayan Satürn: Sen Alper?
Alper: Kuyruğumla ağaca takılı dururum sonra muzları yerim.
Bayan Satürn: Ooo güzel. Ahmetciğim sen?
Ahmet. Ben de yarış arabası gibi hızlı giderim.
Bayan Satürn: Yani koşarak mı?
Ahmet: Hayır motorumla…
Bayan Satürn: Maymunların neresinde motoru var?
Ahmet: Kuyruğunda.
(Güldüler)
Ahmet: Kulaklarımla ağaca tırmanırdım.
Bayan Satürn: Ooo kulakların çok güçlü demek ki.

them to explain how would they walk. While children were explaining their imagination, the teacher asked additional questions to make their imaginations detailed and encouraged them by her comments. After imagining, the section continued with planning. For example, at the end of the activity on wooden house that was related with the weekly theme "Wooden Objects," teacher inquired imagination of children and then their plan for the work time

> Ms. Saturn: Serkan if you have a wooden house how would it be?
> Serkan: It would be fine.
> Ms. Saturn: Fine is ok but could please elaborate it with like small or big, its color, would you paint it or not and whether it has a roof or not?
> Serkan: It would have a roof and I would paint it.
> Ms. Saturn: What color would you prefer?
> Serkan: Red.
> Ms. Saturn: How about your wooden house Ahmet?
> […]
> Ms. Saturn: I would not paint my wooden house. I would keep its original natural color. It would have stairs and there would ropes leaned out to do sports. And when you come to visit me we climb through ropes all together. And guess what else do I do?
> Berk: No.
> Ms. Saturn: To see the sky in the night, when I go to the bed, I would put a huge glass to the roof.
> Berk: Ooo really?
> Ms. Saturn: Of course.
> […]
> Ms. Saturn: How are you today Berk?
> Berk: I am fine.
> Ms. Saturn: How much?
> (Berk showed through opening his arms)
> Ms. Saturn: What is your plan for today?
> Berk: With Ümit I will play with blocks.
> Ms. Saturn: What are you going to do with blocks?
> Berk: I will make a tower.
> […] (from filed notes on April 9, 2013)[49].

[49] Bayan Satürn: Serkan senin bir ağaç evin olsa nasıl olurdu?
Serkan: Güzel.
Bayan Satürn: Güzel ama küçük mü büyük mü, ne renk, ağaç evini boyar mıydın, çatısı olur muydu olmaz mıydı?
Serkan: Çatısı olurdu, boyardım.
Bayan Satürn: Ne renge boyardın?
Serkan: Kırmızı.
Bayan Satürn: Peki Ahmet senin ağaç üzerinde bir evin olsa nasıl olurdu?
[…]
Bayan Satürn: Ben ağaç evimi boyamazdım, ağaç renginde ahşap renginde bırakırdım. Merdivenleri olurdu ama spor yapmak için de aşağı kalın halatlar bırakırdım. Siz beni

In this excerpt, Ms. Saturn first asked each child that if she had a wooden house how it would be. At the end of the imaginations of children the teacher also stated her imagination on the topic. While she was sharing her imagination with the chidlren, they got amazed. Afterwards, the teacher concluded the activity by asking each child her plan for the work time.

Teaching Strategies

The science activities stated by teachers at the interviews and the observed activities in the Ms. Saturn's class provided the database of science practices indicated at the current study. Throughout the study, EC teachers indicated eighteen different science activities at the interviews and fifteen science activities were observed in Ms. Saturn's class. Totally, seven types of teaching strategies were used during these practices. Teaching strategies at the science practices indicated in interviews and observations are indicated separately in the following sections (see Fig. 4.17 Teaching Strategies).

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ziyarete geldiğinizde halatlardan tırmana tırmana çıkardık. Bir de ne yapardım biliyor musunuz?
Berk: Hayır.
Bayan Satürn: Akşam yattığımda gökyüzünü görebilmek için çatısına kocamaaan bir cam yapardım,
Berk: Ooo gerçekten mi?
Bayan Satürn: Tabi.
[…]
Bayan Satürn: Nasılsın bugün Berk?
Berk: İyiyim.
Bayan Satürn: Ne kadar?
(Berk kollarını açarak gösterdi)
Bayan Satürn: Bugünkü planın nedir?
Berk: Ümitle bloklarla oynayacağım.
Bayan Satürn: Ne yapacaksın?
Berk: Kule yapacağım.
[…]

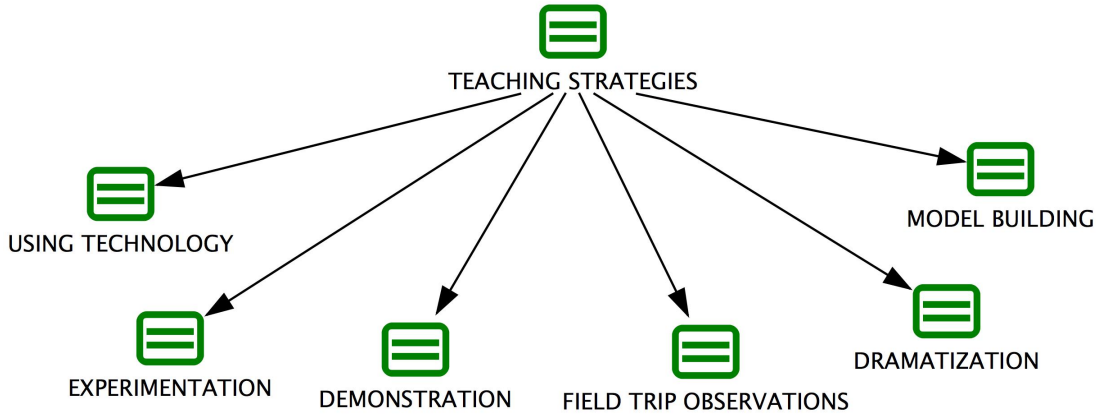

Fig. 4.17 Teaching strategies.

Using Technology

Presenting video was one of the teaching strategies, which was used during both planned and unplanned practices. Teachers found technology a useful tool to present the concepts that they could not teach through application. Also, it provided teachers to search and present visuals on unplanned practices.

> The Researcher: Do you use any of teaching strategies?
> Ms. Uranus: I think using videos are mostly effective. For the cases that I could not conduct in the classroom I prefer showing videos such as in the earthquake activity. At this point we could use technology a lot, I mean the Internet, and it is beneficial in many aspects.
> […]
> Ms. Uranus: I wish we have a projector in our class but we don't. At least we have internet connection which provides me the comfort of the chance to make a web search whenever I need. In situations that are developed out of your plan for instance when your existed materials could not meet the needs, or children could wonder things that you don't have them at that moment. At that instance I readily make a web search and show them a video [...] (from interview with Ms. Uranus on July 22, 2013)[50].

[50] Araştırmacı: Peki kullandığınız öğretim stratejileri var mı?
Bayan Uranüs: Hani video izletmek etkili oluyor. Mesela sel baskınıyla ilgili video izliyorsun ya da deprem Çünkü bazı şeyleri, ortamda yapamayacağın şeyler olabiliyor. O yapamayacağın şeylerde mesela deprem konusunu işleyeceğiz bir depremle ilgili video izletiyorduk. Teknolojiyi yani interneti çok kullanıyorsunuz. İnternetin her konuda faydası var.
[…]

Ms. Uranus's explanation on using technology and presenting videos indicated that they used technology to present videos most of the time. She stated that it was useful for both planned and unplanned practices. By the means of the Internet, teachers could find visuals on newly appeared topics whenever they needed.

Throughout the observations in Ms. Saturn's class, the mostly used strategy was using technology. For the eight of fifteen science activities, she integrated technology into the activity. She searched videos from the Internet at the six of these eight activities. Although she and other teachers mostly stated that they prepared the videos before the activities, Ms. Saturn searched the videos from the Internet during the activities. As a result, using technology referred to presenting videos form Internet.

Presenting videos based on question-answer sessions between the teacher and the children. Since the teacher did not supply the video before the activity, she gained the information at the video while presenting it. This situation brought about information transfer by the teachers and authoritative question-answer sessions.

Experimentation

During the interviews with teachers they had a tendency to give examples from the experiments that they carried out on their classes. They called the nine of the eighteen activities as experiments. However, when they explained the flow and gave details about the activity, it was revealed that six of these nine activities did not involve any manipulations. Only three of them involved controlling and

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Bayan Uranüs: Bizim burada tepegöz veya projeksiyon makinası olsa keşke ama yok. Ama internet olduğu için ben rahat konuşabiliyorum. İnternetimiz var hemen bir şey olduğu zaman açıyorum. Mesela planlamanın dışında olan şeyler de olabiliyor. Mesela bir konuyla ilgili konuşuyorsun görsellerin var resimlerin var ama yetersiz kalıyor diyelim ki, bunula ilgili bir şey izletmek istiyorsun hemen o anda araştırıp video izletebiliyorsun [...]

manipulating variables. Therefore, only these three of the eighteen activities were carried out through experimentation.

Similarly, Ms. Saturn called three of the fifteen activities as experiment even though none of them were carried out through experimentation. The activities categorized as experiments were carried out through demonstration in reality. The mostly stated activities were volcano and growing plant activities. Four teachers stated the volcano activity during the interviews and all of them called it as experiment. This situation revealed that teachers were not aware of the aspects of an experiment and also not aware of the difference between experimentation and demonstration.

Demonstration

Eleven of the eighteen activities indicated at interviews were demonstrations. During the demonstrations teachers performed the activity and showed how the things work. After they performed the practice, sometimes they let children to repeat the practice and sometimes only they performed the practice.

The five of fifteen activities observed in Ms. Saturn's class were demonstrations. As a result, demonstrations were the second most used stratgy in science activities. The demonstration based science activities in Ms. Saturn's class involved teacher performance and teacher explanations. After teacher performed the activity, she did explanations on the topic. While the teacher was carring out the demonstration, children involved in the activity through making predictions, handling objects, and imitating the performance of the teacher.

Field Trip Observations

Three of the eighteen activities stated at the interviews and one activity in Ms. Saturn's class were carried out through field trip observations. Two observations at the interviews and the observation at the Ms. Saturn's class were performed at the garden of the setting. On the other hand, one of the observations in the interviews was carried out at outside of the setting. During the observations, children collected data through collecting samples as leaves and recorded data through drawing pictures or taking photos.

Dramatization

One of science activities in both interviews and observations was carried out by dramatization. Teachers used dramatization to enhance the learning of the concepts in the activities. However, when teachers were lacked content knowledge this method might be result in strengthening false information.

As indicated at the previous section, Ms. Saturn used drama to do transition. She gave children roles to be farmer, seed, water and sun. During the drama she gave directions to the children on what and how to do. She stated water, sun and soil as requirements for seeds to be germinated. The children with roles water and sun acted their performance at the same time. However, the first hand requirements of germination are soil and water and when the plant grows up on the soil, the need for sun appears. When I shared the information with Ms. Saturn she got surprised. When she recalled the activity on the next days, she highlighted this information. If she did not get informed about this issue, she might enhance the false information on the

topic by repeating it several times. Therefore, using many kinds of strategies in science activities did not imply the quality of science activities all the time.

Model Building

Some activities perfomed through demonstrations and video presentations, which were observed in Ms. Saturn's class or indicated by teachers at the interviews, aslo involved the strategy of model building. For instance, during the volcano activity they built a model on volcano. Moreover, while carrying out the activity on flood Ms. Saturn built up a model of dam. Then, she perfomed the demonstration and explained how flood occurred and reached to the towns.

The concrete products built in model building reinforce learning of children and provide opportunities from them to comprehend the task. However, when the model includes misconceptions or wrong information, it results in deficiencies in chidlren's learning. The science practice on solar system in Ms. Saturn class reveals how misuse of teaching strategies affects learning of children. Ms. Saturn used model building strategy integrated with video presenetations. Regarding the weekly theme "Sky and Space," she carried out and an activity on the solar system and presented a video on the solar system. They talked about the features of planets. The numbers of the plantes indicated as nine at the video and she transferred the information at the video to the chidlren without any change. After the activity she asked my opinion on the activity.

> Ms. Saturn: What do you think about activity?
> The Researcher: It was good. However, in the video it says there are nine planets in the solar system.
> Ms. Saturn: I also recognized that. I know there are eight planets in the solar system.
> The Researcher: It is acknowledged that there are eight planets. You may

explain at the end of the video that now there are eight planets in the solar system.
Ms. Saturn: You are right but in that case children will ask the why it is now eight, which is hard to answer for me (smiling) (from field notes of March 14, 2013)[51].

In the excerpt, I wondered about whether she was aware of the wrong information in the video or not. Although she recognized the wrong information in the video, she did not do any explanations to the children. Her explanations at the excerpt obviously indicated that she refrained from explanation because of could not be able to answer children's questions. Moreover, I observed a solar system model, which was developed after the video presentation on solar system and include nine planets (see Fig. 4.18 Model building). This excerpt revealed that the teacher did not use the strategies, using technology and model building, in an efficient way. She did not check the information in the video. In fact, she strengthened the wrong information by building models. Similar to the situation stated at the previous section, using different kinds of methods it did not imply the quality of science activities.

Fig. 4.18 Model building.

[51] Bayan Satürn: Nasıl buldun öğretmenim?
Araştırmacı: Güzeldi. Ama video da dokuz gezegen olarak gösterdi güneş sistemini.
Bayan Satürn: Evet ben de farkettim, sekiz gezegen var değil mi?
Araştırmacı: Evet şuan 8 gezegen kabul ediliyor. Belki video sonunda söyleyebilirdiniz, bir açıklama yapabilirdiniz?
Bayan Satürn: Doğru... Ama o zaman da niye sekiz oldu derler, gel de cevap ver (gülerek)

Perspectives of seven EC teachers at the setting on science education are described under three sections. The first section is called “Contribution of Science” where teacher perspectives regarding contribution of science education in ECE are presented. The second section is called “Science in the Curriculum” where the perspectives of teachers on how science is located in their curriculum are described. Finally, the third section is called “Teacher Success in ECE Science” where the issues related with success of EC teachers in science practices are indicated. A summary of the findings regarding the teacher perspectives on science education in ECE is mapped out at Fig. 4.19 Teacher perspectives.

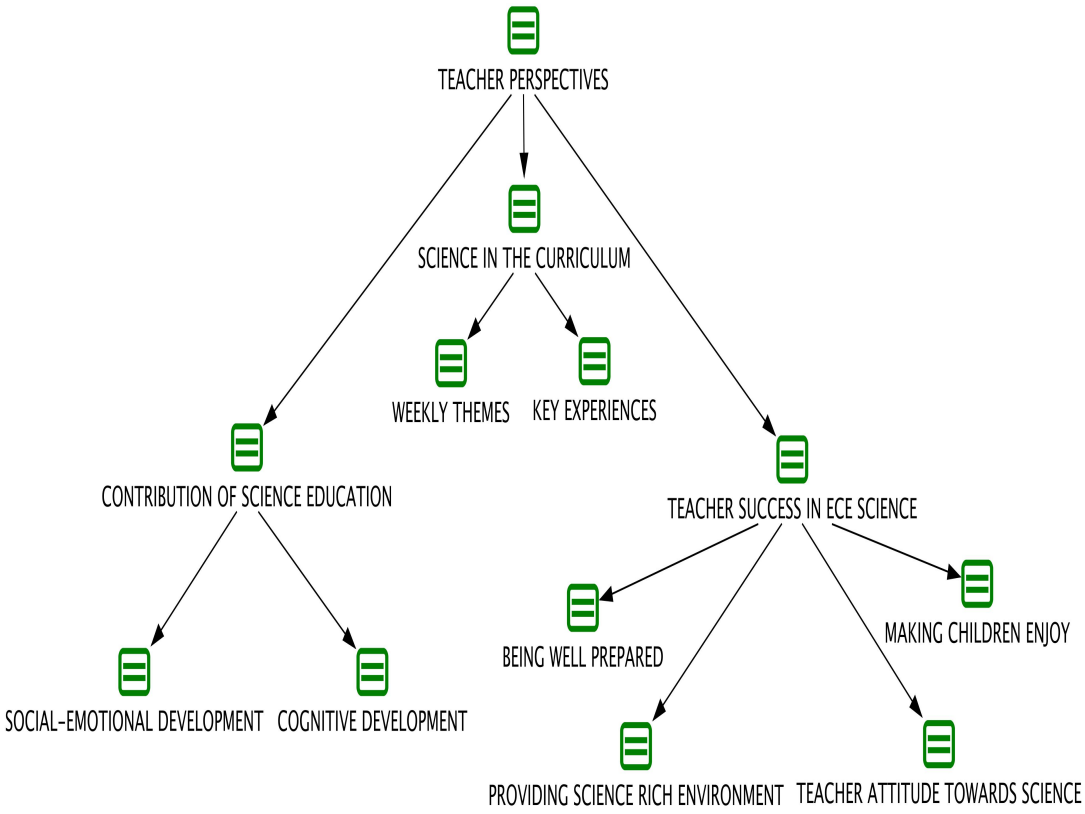

Fig. 4.19 Teacher perspectives.

Contribution of Science Education

Contribution of science education presented in this section involves teacher perspectives on how science education contributes to ECE. Regarding aim, importance and necessity of science education in ECE, perspectives of teachers on contribution of science education in ECE was appeared as social-emotional development and cognitive development. The themes and their sub-themes are indicated in Fig. 4.20 Contribution of science and described in detailed in the following sections.

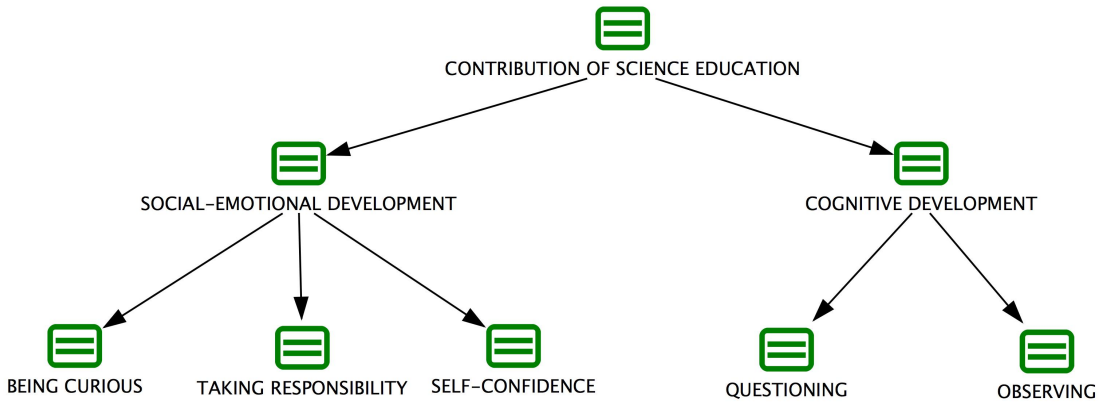

Fig. 4.20 Contribution of science.

Social-Emotional Development

While expressing the contribution of science education in ECE, teachers mostly pointed out skills that belong to social-emotional development domain. They stated that science practices in ECE gave rise to being curious, taking responsibility, and self-confidence.

Being Curious. During the interviews, three teachers revealed that science education in ECE nurturde curiosity of children. For example, while explaining aim and necessity of science education in ECE, Ms. Sun stated the role of science practices on being curious.

> The Researcher: In your opinion what is the aim of science education in early childhood?
> Ms. Sun: I think to foster curiosity. Fostering curiosity and inquiry.
> The Researcher: What about the necessity of science education in early childhood?
> Ms. Sun: I believe it is very important
> The Researcher: Why?
> Ms. Sun: Curiosity is crucial for child development and we always intend to help children to be curious. Science activities provide us this opportunity. So I think it is necessary to make children curious (from interview with Ms. Sun on July 29, 2013)[52].

Ms. Sun indicated that being curious was an important aspect of child development. She stated that both ECE and science in ECE had an aim to foster curiosity. From her perspective science practices were a tool for supporting curiosity as well as child development.

Taking Responsibility. Two teachers expressed that science education in ECE provided children with opportunities to take responsibility. While Ms. Venus gave an example of science practices in her class, she also pointed out how science practices lead children to take responsibilities.

> Ms. Venus: […] Each child brought different types of seed to the class. First we examined the size of seeds. After that each student tried to guess the type of the seed others brought. Then we planted them into pots.

[52] Araştırmacı: Sizce okul öncesi dönemde fen eğitiminin amacı nedir?
Bayan Güneş: Merak uyandırmak diye düşünüyorum. Merak uyandırmak, sorular sormak.
Araştırmacı: Gerekliliği hakkında ne düşünüyorsunuz?
Bayan Güneş: Çok önemli bence.
Araştırmacı: Neden?
Bayan Güneş: Merak çocuk gelişimi için de çok önemli. Çocuğa bunu hep aşılamak istiyoruz, meraklı olmasını istiyoruz. Fen etkinlikleri bunu sağlıyor. Meraklı olması için gerekli diye düşünüyorum.

> Some of them germinated in two weeks some in a month and some in six weeks. Together with the activity children also learned to be patient. Watering the seeds was children's responsibility and at the end children who act responsible had the first germinated seeds. After the germinations they discussed among themselves why germination times differed one another. I think this science activity also contributed to them on taking responsibility and being patient […] (from interview with Ms. Venus on July 15, 2013)[53]

In this excerpt, Ms. Venus explained the planting activity implemented in her class. At the activity children took responsibility to care their plants. Due to their care and responsibility, they obtained different results regarding growth of plants. From, the teacher's perspective science practices provided children with duties and led them to take responsibilities.

Self-Confidence. Other two teachers indicated that science education in ECE contributes to self-confidence of children. While indicating importance of science in ECE, Ms. Mercury pointed out contribution of science practices on self-confidence.

> The Researcher: What is the importance of science education in early childhood?
> Ms. Mercury: First of all science education provides children with self-confidence through helping them to imagine whether she could achieve the activity in her mind and helping her to wonder whether she could able to conduct the activity and at the end guiding them to do. In friction activity for example, children tried different materials to comprehend with which material they could get the result. Learning through experiencing is also what we aim with High Scope Model (from interview with Ms. Mercury on July 15, 2013)[54].

[53] Bayan Venüs: […] Herkes evinden farklı tohumlar getirdi.İlk önce tohumların büyüklüklerini inceledik. Herkes arkadaşlarından ne tohumu olabileceğini tahmin etmesini istedi. Sonrasında herkes getirdiği tohumu tanıttı. Sonra tohumları saksılara ektik. Tabi kimisi bir haftada çıkarken kimisi bir ay hatta bir buçuk ayda çıktı. Burada aynı zamanda sabrı da öğrenmiş olduk. Sulamak onların göreviydi çünkü kendi bitkileri. Böylece sorumluluk da aldılar. Düzenli sulamayanların bitkisi hiç çıkmadı, düzenli sulayanların daha çabuk çıktı vs gibi kendi içlerinde de gözlemleyerek neden neler oldu, ne sonuçlar çıktı ortaya gibi kendi aralarında tartışmalara da neden oldu. Ayrıca sabretmelerine ve sorumluluk almalarına da katkıda bulunduğunu düşünüyorum. […]

[54] Araştırmacı: Okul öncesinde fen eğitiminin önemi nedir?
Bayan Merkür: Çocuğun kendine özgüveni olur öncelikle, ben bunu yapabilir miyim, başarabilir miyim şeklinde zihninde bir şeyleri hayal eder, merak eder ve yapabileceğini düşünüp dener. Mesela sürtünme olayında, farklı materyaller kullanarak sonuca ulaşıyor. High Scope sisteminde de bizim amacımız odur, yaşayarak çocukların öğrenmesidir.

Ms. Mercury indicated the aim of science education in ECE as fostering self-confidence. She stated that children wondered about something and after believed in themselves they implemented practices. During the implementation self-confidence led children to try different methods to get a result. She expressed that through supporting self-confidence, science practices provided children to learn by concrete experiences.

Cognitive Development

During the interviews with teachers they indicated that science education in ECE nurtured questioning and observing skills of children, which are belong to cognitive development domain.

Questioning. Three of the seven teachers stated that science practices in ECE, contributes to questioning skills of children. Ms. Jupiter explained the aim of science education in ECE as leading children questioning.

> The Researcher: What is the importance of science education in early childhood?
> Ms. Jupiter: Especially leading children to questioning and helping them to create cause effect relationship.
> The Researcher: What about the necessity of science education in early childhood?
> Ms. Jupiter: It is necessary for questioning. Children do not trust blindly. They question causes and ask why questions.
> The Researcher: So, what is the importance of science education in early childhood?
> Ms. Jupiter: It is important because in order to make children inquire about life. For example to make children ask questions about causes of something they face instead of accepting what they told (from interview with Ms. Jupiter on July 25, 2013)[55].

[55] Araştırmacı: Peki okul öncesinde fen eğitiminin amacı nedir sizce?
Bayan Jüpiter: Çocukları özellikle sorgulamaya yönelmek, neden sonuç ilişkisi kurmalarına yardım etmek.
Araştırmacı: Peki gerekliliği hakkında ne düşünüyorsunuz?
Bayan Jüpiter: Sorgulama için gerekli. Bir şeye körü körüne inanmıyorlar, her şeyin

Ms. Jupiter stated that science practices in ECE led children to ask why question and contributed their questioning skills. She expressed that after children gained questioning skills by science practices, they started to ask why questions in real life as well. As a result rather than believing something without questioning, they searched for reasons behind the issues through using their questioning skills.

Observing. Two teachers pointed out that science education in ECE supports observing skills of children. Ms. Saturn explained how science practices provide children to gain observing skills and carry them to other contexts by an example.

> The Researcher: What is the importance of science education in early childhood?
> Ms. Saturn: Science education provides children to gain observing and questioning skills. In planting activity their observation skills are developing, besides they take responsibility. Last year when we were conducting this activity we have a white board on which we have checklist for the activity flow. In reality these activities motivate children to take responsibility and help them to gain observation skills. They apply these skills in their home and they enjoy this. We also get feedbacks from children for instance we had a flower at home which he watered before we leave and at our arrival he told me whether the flower grow or not. Through science activities they began to observe things not only in the class but also in real life. Another example on children's observations; Poyraz [Ms. Saturn's son] could not able to speak, and Derya [a child in her class] told her mother about Poyraz that he call her "du" before but now he is able to call her Derya and talk them appropriately. Maybe conducting science activities with beginning of her school experience let her to make this observation. This is a simple example but in the end science activities support children' observation skills in various ways (from interview with Ms. Saturn on July 30, 2013)[56].

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nedenini soruyorlar, niye böyle, neden böyle diye sorguluyorlar.
Araştırmacı: Okul öncesinde fen eğitiminin önemi nedir sizce?
Bayan Jüpiter: Hayatı da sorgulamaya başlamaları için önemli. Mesela sadece başkasının söylediği şeklide değil de niye böyle, neden böyle, bunun bir nedeni olmalı diye sorgulamaları için önemli.

[56] Araştırmacı: Okul öncesinde fenin önemi nedir denildiğinde neler söyleyebilirsiniz?
Bayan Satürn: Çocuklara gözlemleme yeteneği, sorgulama yeteneği kazandırıyor. Aslında çiçek yetiştirmede gözlem yetenekleri gelişiyor ve sorumluluk da alıyorlar. Geçen sene yaptığımızda bir kartonumuz vardı ona tik atıyorduk bugün suladık, sulamadık, çıktı, çıkmadı diye. Aslında hem sorumluluk hem gözlemleme yeteneği kazanıyorlar. Daha sonra bunları eve de taşıyorlar. Hoşlarına da gidiyor çocukların. Geri dönüt de alıyoruz. Mesela evde çiçeğimiz vardı, biz gitmeden kendisi suladı, anne bak bu büyümüş, büyümemiş dedi, gibi. Aslında bir

Ms. Saturn stated that science education in ECE supports observing skills of children as well as leading them to questioning and taking responsibility. She gave an example from growing plants. She indicated that while growing plants children develop observing skills and they also follow the differences. She emphasized that children use these observation skills in different contexts as well. From her perspective, observing the difference in language ability of a toddler might be rooted from children's science experiences in ECE.

Science in the Curriculum

At the twelfth question of the formal interviews, the list of weekly themes and the list of key experiences of High Scope Model, which they used to form educational plans, were shown to the teachers. Teachers were asked that which themes and key experiences could be related with science education in ECE. The answers of the teacher are indicated numerically at the following sections called "Weekly Themes" and "Key Experiences."

Weekly Themes

Teachers related more than half of the themes with science education. According to the explanations at the interviews, teachers found thirteen of twenty-one themes

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tek burada değil, normal yaşantısında da bir şeyleri gözlemlemeye başlıyorlar. En basitinden Poyraz [oğlu] çok konuşamıyordu, Derya [sınıfındaki bir çocuk] annesine 'Anne Poyraz eskiden bana 'du' diyordu ama artık benim adımı söyleyip bizimle çok güzel konuşabiliyor' demiş. Belki okula başladığından beri böyle bir şey yapılması onun farkındalığını, gözlem yeteneğini geliştirmiş de olabilir. Bu çok basit bir örnek ama sonuçta çok farklı yönlerde de çocukların gözlemleme yetisini destekliyor fen etkinlikleri.

convenient to carry out science practices (see Table 4.3. Relation between Weekly Themes and Science).

Table 4.3. Relation between Weekly Themes and Science

Months	Weekly Themes	Frequency
March	Light and Shadow	4
	Space and Sky	7
	Natural Events	6
	Spring	7
April	Kinds of Trees	7
	Wooden Objects	2
	Animals Living in Trees	6
	Countries	0
May	Science and Experiments	7
	Arts	0
	Seeds and Flowers	7
	Project (Recycle)	7
	Paint and Colors	3
June	Summer	1
	Garden Games	0
	Sports	0
	Costumes	0
July	Colors	3
	Emotions	0
	Water Games	0
	Garden Games	0

All of the seven teachers proposed that science activities might take place at themes of “Space and Sky,” “Spring,” “Kinds of Trees,” “Science and Experiments,” “Seeds and Flowers,” and “Project (Recycle).” Among these themes teachers supported their argument on themes of “Space and Sky,” “Science and Experiment,” and “Project (Recycle)” through using words as ‘certainly’ and ‘already.’

At the educational plans, there were science practice examples at “Light and Shadow” theme; experiment suggestions at “Natural Events” theme, and trip to botanic garden at “Wooden Objects”. However, themes with experiment and trip examples in the educational plans were not related with science education by all of the teachers.

Key Experiences

After teachers skimmed through the list of key experiences [KEs], they offered the domains and KEs, which might be pointed out and achieved through science practices (see Table 4.4. Relation between Domains and KEs with Science).

Table 4.4. Relation between High Scope Domains and KEs with Science

Domains	KEs	Frequency
Creative Representation	1. Recognizing objects by sight, sound, touch, taste, and smell	4
	3. Relating models, pictures, and photographs to real places and things	2
	5. Making models out of clay, blocks, and other materials	1
Language and Literacy	1. Talking with others about personally meaningful experiences	3
Initiative and Social Relations	1. Making and expressing choices, plans, and decisions	2
	2. Solving problems encountered in play	1
	3. Taking care of one’s own needs	2
	4. Expressing feelings in words	1
	5. Participating in group routines	1
Movement	3. Moving with objects	2
	5. Describing movement	1
	7. Feeling and expressing steady beat	1
Music	2. Exploring and identifying sounds	1
	3. Exploring the singing voice	1
Classification	1. Exploring and describing similarities, differences, and the attributes of things	3
	3. Sorting and matching	2
	5. Holding more than one attribute in mind at a time	2
	7. Describing characteristics something does not possess or what class it does not belong to	1

Seriation	3. Fitting one ordered set of objects to another through trial and error (small cup—small saucer/medium cup—medium saucer/big cup—big saucer)	2
Number	2. Arranging two sets of objects in one-to-one correspondence	1
Space	1. Filling and emptying	3
	2. Fitting things together and taking them apart	1
	3. Changing the shape and arrangement of objects (wrapping, twisting, stretching, stacking, enclosing)	1
	4. Observing people, places, and things from different spatial viewpoints	1
	5. Experiencing and describing positions, directions, and distances in the play space, building, and neighborhood	1
Time	3. Experiencing and comparing time intervals	1
	4.Anticipating, remembering, and describing sequences of events	2

Each of the seven teachers stated at least one key experience of creative representation and classification domains, which could be indicated by science practices. The total number of expressed KEs was highest at classification domain. Ms. Uranus explained that children could do classification while grouping flowers and leaves due to their shapes and colors.

> The Researcher: At which point classification could be included?
> Ms. Uranus: As an example we go out and gather leaves, branches and flowers. Then in the classroom we examine them whether they are same. We discuss on why some of them are green and others are yellow. After that we classify them according to their shape and color (from interview with Ms. Uranus on July 22, 2013)[57].

Immediately after, teachers stated KEs of creative representation, space, and initiative and social relations domains. Ms. Saturn gave an example on how and which KEs of creative representation might be pointed out by science practices.

> Ms. Saturn: In creative representation 'recognize objects by sight, sound, touch, taste and smell' (Creative representation-1) for example, there could be different foods on one side and on the other there could be different clothes. You may blind fold a child and let her smell cinnamon then vanilla. Make her touch sandpaper and touch cotton then you may

[57] Araştırmacı: Sınıflandırma hangi açılardan olabilir?
Bayan Uranüs: Mesela dışarı çıkıp yaprak, dallar, çiçekler topluyoruz. Sonra sınıfa gelip bu yapraklara, çiçeklere bakıyoruz aynı mı diye. Bazısı yeşil bazısı sarı neden diye konuşuyoruz. Sonra onları sınıflandırıyoruz renklerine, şekillerine göre.

> ask her to describe what she touched and smelled. Later on when you open her eyes it could be asked her to which object that she touched. Moreover same practice could be done with her eyes unfolded (from interview with Ms. Saturn on July 30, 2013)[58].

Teachers stated five of nine KEs of initiative and social relations domain. Ms. Mercury gave an example of how these KEs appeared in science practices.

> Ms. Mercury: Children could make plans, take decisions and voice them [Initiative and Social Relatons-1] moreover they could take care of their needs (Initiative and Social Relatons-3). For example, if soda spilled, she could get napkins and cleans spilled soda then throw the napkins to trash. This is a requisite for her and she fulfills it (from interview with Ms. Mercury on July 15, 2013)[59].

While expressing the domain of space, teachers pointed out five of six KEs of the domain. They indicated that domain of space takes place mostly in experiments. They mostly emphasized the KEs related with filling and emptying and two of them gave examples of filling and emptying in volcano activity. Ms. Uranus stated that space seemed to be domain of mathematics more than science. However, she related space with science by indicating that science and mathematics were closer subjects.

> Ms. Uranus: Space is the most important one.
> The Researcher: In what respect?
> Ms. Uranus: Space is the most frequently used thing in experiments with respect to its preservation and acquisition.
> The Researcher: How do you use it?
> Ms. Uranus: In fact space and volume take place more in mathematics. Yet in science you may go out and there you may touch on space issue. I could not recall but in experiments you may do fill-empty. For example children do filling and emptying while taking sand from sand pool for volcano experiment. Space seems more likely as a mathematics domain but since science and mathematics are close to each other and used together they say science and mathematics activity (from interview with

[58] Bayan Satürn: Mesela yaratıcı temsilde 'nesneleri görünüm, ses, tat, dokunma yoluyla tanıma' (Yaratıcı temsil-1). Burada farklı tatlarda yiyecekler konulabilir, farklı kumaşlar konulabilir. Çocuğun gözü kapatılır. Mesela tarçın koklatılır, daha sonra vanilyayı koklatırsın. Bir tane zımparaya dokundurtursun, sonra pamuğa dokundurtursun. Şimdi sence bu neydi, daha sonra gözünü açınca sence neye dokunmuş olabilirsin dıye sorulur. Bir de gözü açıkken yapabilir.

[59] Bayan Merkür: Plan yapar, karar alır, bunu dile getirir; kendi gereksinimini karşılayabilir, mesela soda döküldü peçeteyi alır siler ve çöpe atar, o bir gereksinimdir karşılar (İnisiyatif alma ve sosyal ilişkiler-1-3).

Ms. Uranus on 22 July, 2013)[60].

In addition, teachers did not have an exact opinion on relation between science education in ECE and domains of number, music and seriation. They stated least KEs for these domains and their explanations on the domains were not comprehensive or consistent. At the beginning of her explanation, Ms. Saturn indicated the difficulty to relate numbers to science education. However, she stated that the domain of number could be a part of science activities by counting the objects.

> The Researcher: Could these experiences of number take place in science education?
> Ms. Saturn: I think mentioning numbers could be hard but on the other hand other issues I mentioned you take more place. It could take place in form of counting objects in science, such as a flower, adding a seed or asking for the amount of seeds planted. In planting four o'clock flower activity for instance I gave each child two seeds and ask them how many seed do they have and they responded as two. Maybe numbers could take place in science in this form. Not particularly mentioning that we are working on number rather it could be implementing as a supportive object in another activity. As an example number could be given in an activity such as "Let's count how much seeds we have planted, if everyone put two seed before we place soil, count how much seeds we got, afterwards if we got ten seeds we could place soil on them" (from interview with Ms. Saturn on July 30, 2013)[61].

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[60] Bayan Uranüs: Alan zaten en önemlisi.
Araştırmacı: Ne açıdan?
Bayan Uranüs: Ahmet korunumu, kazanımı açıdan deneylerde en çok kullanılan şey.
Araştırmacı: Nasıl kullanıyorsunuz?
Bayan Uranüs: Aslında matematik daha çok yer veriyor, alan hacim. Yine fende de bahçeye çıkıyorsun, orada da alan konusu almış oluyorsun. Doldurma boşaltma yapıyorsun mesela. Deneylerde yine aklıma gelmiyor şimdi... Mesela kum havuzundan volkan deneyi için kum alırken doldurtma boşaltma yapıyorsun. Daha çok matematiğe de giriyor gibi alan konusu. Ama fen matematik biraz yakın diye, genelde fen ve matematik birlikte kullanılıyor ya fen ve matematik etkinliği diyorlar.

[61] Araştırmacı: Fen eğitiminde yer alabilir mi bu deneyimler?
Bayan Satürn: Yok, sayıyı vermek biraz kasabilir diye düşünüyorum ama diğer söylediklerim belki biraz daha yer alabilir. Belki söyle bir şey yapılabilir nesneleri sayma anlamında, mesela fen bilgisinde bir çiçek, bir tohum eklemek, kaç tane tohum ektik diye sormak. Mesela akşam sefası ekerken ben her çocuğa iki tane tohum verdim avuçlarına. Hadi bakalım sayın kaç tane tohumunuz var dedim, iki tane tohumumuz var dediler. Belki bu şeklide yapılabilir. Onun içinde geçebilir, özellikle şuan sayıyı veriyoruz anlamında değil de farklı bir şey hedefleyip onu da onun içinde destekleyici olarak verilebilir. Hadi bakalım kaç tane tohum attık, herkes iki tohum attıysa toprağı kapatmadan sayalım bakalım toprağın üstünde kaç tohumumuz oldu deyip sayarız, on tane tohumumuz oldu deyip üstünü toprakla örteriz.

Similar to the previous excerpt, explanations of Ms. Saturn implied that she perceived domain of number more related with mathematics. She considered that focusing on numbers was hard in science activities. However, she staed that numbers could be a part of science activities. Although she gave a proper example and explained it comprehensively, she could not relate science education with numbers completely.

Moreover, some explanations of teachers revealed their misunderstanding on the domains. For example, while looking to the experiences under seriation, Ms. Uranus misunderstood the first experience "comparing attributes (longer/shorter, bigger/smaller)." She misinterpreted the word 'comparing.' She gave examples on comparing before and after the implementations and building cause-effect relations.

> Ms. Uranus: Considering as seriation it could not take place, however when you look at the content it talks about comparing. After an experiment, we can talk on before and after issues, and cause-effect relations (from interview with Ms. Uranus on 22 July, 2013)[62].

Teacher Success in ECE Science

During the formal interviews, adequacy of teachers in science practices, difficulties they come across, ways to accomplish the difficulties, issues related with an EC teacher's success in science practices were asked. The answers to these questions were merged under this section. EC teachers indicated four points that were related with teacher success in science practices. They identified being well prepared, providing science rich environment, teacher attitude towards science, and having

[62] Bayan Uranüs: Sıralama diye düşünce olmuyor da içeriğine bakınca nesneleri karşılaştırma diyor. Bir deney yaptıktan sonra önce nasıldı, sonra ne oldu ve sebep-sonuç ilişkisinden bahsedebiliriz.

children enjoy as considerations that played role in teacher success in science practices (see Fig. 4.21 Teacher success in ECE science).

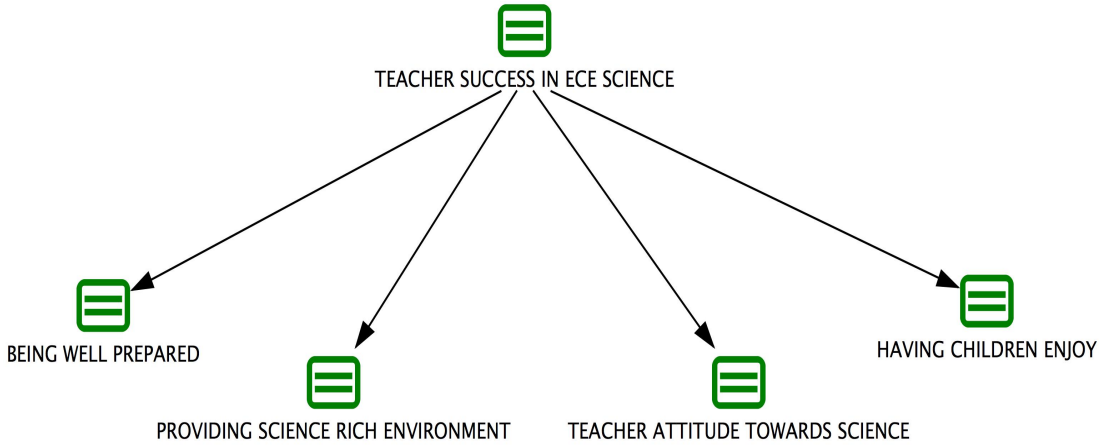

Fig. 4.21 Teacher success in ECE science.

Being Well Prepared

Being well prepared was the most common issue that teachers stated for teacher success in science practices. As shown in Fig. 4.22 Being well prepared, the teachers indicated different considerations about being well prepared and each consideration regarding being well prepared is described separately in the following sections.

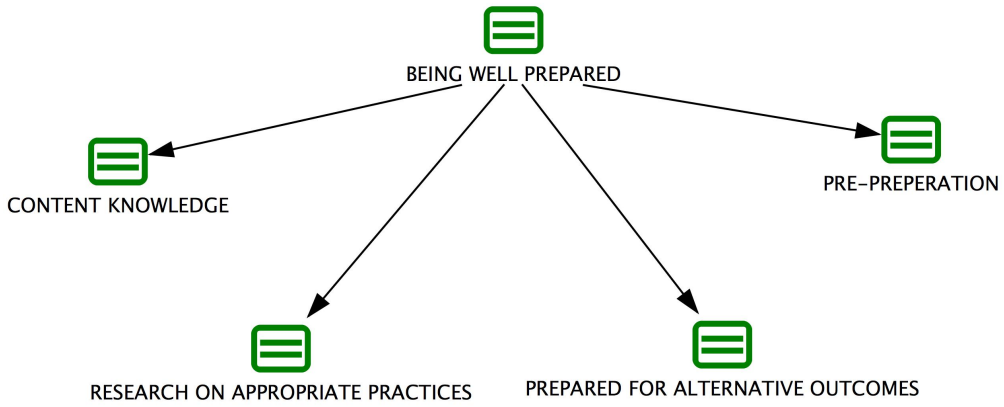

Fig. 4.22 Being well prepared.

Content Knowledge. Five of the seven teachers stated that in order to be well prepared and successful in science practices they should have content knowledge on the topic. Lacking content knowledge resulted in difficulties in implementation and inadequate answers to questions that were raised by children. During the interview with Ms. Venus, she stated that science practices required teachers to be knowledgeable about the topic and different than other subjects, teachers could not tolerate inadequate content knowledge in science practices.

> The Researcher: If we are mentioning an ordinary early childhood teacher what are the factors that could help her to be successful?
> Ms. Venus: I believe content knowledge is a must. […] On other subjects such as language for example we can tolerate lack of knowledge. However, in science activities it is a requirement that early childhood teachers should have the content knowledge on the topic that she will be focusing (from interview with Ms. Venus on July 15, 2013)[63].

Teachers related content knowledge with inadequacy and success in science practices. They stated that content knowledge was one of the indispensable tools to be successful in science practices. They believed that EC teachers should know a variety of things to carry out science practices in a successful way and if they did not have sufficient content knowledge, these science practices would be result in failure. During the interview with Ms. Jupiter, she expressed that she had difficulties due to her superficial knowledge about topics. Especially she emphasized lacking content knowledge regarding why to do.

> The Researcher: Concerning preparation and implementation of the science activities you conducted, how would you evaluate yourself?
> Ms. Jupiter: Not so good actually. How can I tell… I think I lack some content knowledge on why to do instead of how to do.
> The Researcher: Could you please specify the difficulties that you have during the activities?

[63] Araştırmacı: O zaman herhangi bir okul öncesi öğretmeninden bahsediyorsak onu başarılı kılacak şey ne diyebiliriz ya da neler?
Bayan Venüs: Zaten bilgi olmazsa olmaz diye düşünüyorum. O bilginin kesinlikle olması
gerekiyor […] Diğer konularda mesela Türkçe'de belki onu tolere edebilirsiniz, ama fende verdiğiniz konunun gerçekliğini çok iyi bilmeniz gerekiyor, doğruluğunu çok iyi bilmeniz gerekiyor bilgi gerektiriyor diye düşünüyorum.

> Ms. Jupiter: Basically it is lack of content knowledge moreover, having inadequate knowledge or superficial knowledge on the specific topic.
> The Researcher: According to you what is the cause of the lack of content knowledge?
> Ms. Jupiter: We need to have lots of things on these topics or have some knowledge on each subject. However, we could not know accordingly and that's why we have difficulties (smiling) (from interview with Ms. Jupiter on July 25, 2013)[64].

Teachers stated that they had difficulties in application when they had inadequate content knowledge. Since difficulties in application period affected preparation period of the following activity, they were interrelated. In addition, Ms. Uranus explained the role of content knowledge at being successful in science practices by comparing her adequacy at preparation and implementation periods of science practices.

> The Researcher: how do you evaluate yourself regarding preparation and application periods of science activities?
> Ms. Uranus: Actually I have difficulties in planning the activities.
> The Researcher: From which view for example?
> Ms. Uranus: I don't know. As I said you avoid doing it, giving it secondary importance. This attitude could be because of the application period, the feeling of inadequacy in the application period.
> The Researcher: What can be done according to you?
> Ms. Uranus: First of all I think through reading books I need to improve myself. Besides reading books I may make researches. Actually it is not only related with reading books but also with application experience. You face many experiments in the books and while reading them from inside I say these are easy and I can apply this in the class. However, when it comes to application the situation is upside down. I think application period is difficult for me and that's why I avoid planning activities.
> The Researcher: What are the difficulties that you face during application period?
> Ms. Uranus: I think lack of content knowledge is the cause of difficulties.

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[64] Araştırmacı: Peki, bütün bu fen etkinliklerinin hem hazırlığını hem uygulama aşamalarını göz önünde bulundurduğunuzda kendinizi nasıl değerlendirirsiniz?
Bayan Jüpiter: Çok iyi değil. Yani nasıl anlatayım… Bazı bilgilerim çok yetersiz kalıyor bazen konuyla ilgili; hani tamam bunu böyle yapıyorsun ama niye yapıyorsun ile ilgili.
[…]
Araştırmacı: Peki yaşadığınız zorluklar özellikle neler?
Bayan Jüpiter: Bilgisizlik işte, konuyla ilgili bilgisizlik genellikle ya da bizim çok yüzeysel bilmemiz. Yani biz sadece sürtününce elektrik olduğunu biliyoruz.
Araştırmacı: Peki sizce bu yetersizlik, bilgisizlik nereden geliyor, acaba sebebi ne olabilir?
Bayan Jüpiter: Bu konularla ilgili çok şey bilmemiz gerekiyor, her alandan bir şeyler bilmemiz gerekiyor. Her şeyi de bilemiyoruz, o yüzden oluyor (gülerek).

> For example, during the application a child can raise a question that you have no answer for and besides you cannot say I don't know. Unfortunately, early childhood teachers should know everything. She has to know everything to answer each question raised by children instantly (from interview with Ms. Uranus on July 22, 2013)[65].

Ms. Uranus stated that she lacked in application period of science practices and she related this situation with inadequate content knowledge. If she did not have enough knowledge she had difficulty while answering questions of children. In order to answer questions of children, she required content knowledge on the topic. Additionally, such difficulties rooted from inadequate content knowledge were resulted in reluctance of the teacher to implement science practices. Therefore, they refrained from preparing science practices.

Research on Appropriate Practices. Three teachers stated that doing research and finding appropriate practices for children was another issue that had role in being well prepared and hence being successful in science practices. While searching for appropriate practices, teachers took care about understanding of children and teaching strategies.

[65] Araştırmacı: Ffen etkinliklerinin hazırlık ve uygulama aşamasında kendinizi nasıl değerlendiriyorsunuz?
Bayan Uranüs: Aslında planlama bana daha zor geliyor.
Araştırmacı: Ne açılardan mesela?
Bayan Uranüs: Bilmiyorum. Dedim ya geri planda kalıyor, yapmaktan bir kaçınıyorsun. Belki uygulamadan dolayı da olabilir, uygulama aşamasında kendimi yetersiz hissettiğim için de olabilir.
Araştırmacı: Neler yapılabilir sizce?
Bayan Uranüs: Aslında bununla ilgili kendimi bu konuda geliştirmem lazım tabi. Kitap okuyabilirim, bu konuyla ilgili daha çok araştırma yapabilirim kitapları okuyup. Aslında uygulama yapmakla da alakalı kitap okumak da değil. Kitabı okuyorsun aaa çok basit diyorsun. Etkinliği okuyorsun fen etkinliğini, bir sürü deneyler var etkinlikler var. Çok basitmiş bu ya diyorsun, bu yapılır ya diyorsun ama uygulamaya geçince zor oluyor. Uygulama aşaması sanırım daha zor, evet evet. O yüzden uygulama zor olduğu için de planlamaktan çekiniyorsun, yapmak istemiyorsun.
Araştırmacı: Mesela nelerde uygulamada zorlanıyorsunuz?
Bayan Uranüs: Konuyla ilgili geniş bir bilgin olmadığı için zorlanıyorum diye düşünüyorum. Çünkü o anda çocuk öyle bir soru soruyor ki cevap veremiyorsun çünkü bilmiyorsun. Bilmiyorum da diyemiyorsun. Okul öncesi öğretmeninin her şeyi bilmesi gerekiyor maalesef. Her şeyi bilmesi gerekiyor ki çocukların sorularına hemen cevap verebilesin.

For example, Ms. Mars emphasized the importance of being well prepared to be successful in science practices. She pointed out that when she was not well prepared, she could not implement science practices properly and children could realize this situation. In order to be well prepared and successful, she suggested doing research on appropriateness of science practices.

> The Researcher: How do you evaluate yourself regarding science activities?
> Ms. Mars: I believe I am competent whenever I am well prepared and know what to do in the class.
> The Researcher: Does it apply in both [preparation and application] periods?
> Ms. Mars: Of course in both periods especially, because I carry out preparation period. If you begin conducting an activity without preparation you would stuck at some point and children would understand that you are stuck, so to control children during the activity it is crucial to be well prepared.
> The Researcher: Than would it be easier to handle difficulties during the activity?
> Ms. Mars: I believe being well prepared makes it easier to handle and since I am well prepared I think I manage the difficulties. Moreover, whenever I lack I appoint children with duties or since I know children well, I apply different strategies to take their attention.
> The Researcher: According to you what do early childhood teachers need to have in order to be successful in science activities in general?
> Ms. Mars: In my opinion she should do research and should be well prepared.
> The Researcher: By mentioning research, what was your focus? What should an early childhood teacher research and what is the aim of that research?
> Ms. Mars: By telling doing research I mean she should do research on the appropriateness of the topic considering the range of children's understanding. Moreover she should focus on the method to teach the topic (from interview with Ms. Mars on July 17, 2013)[66].

[66] Araştırmacı: Fen tkinlikleri açısından kendinizi nasıl değerlendiriyorsunuz?
Bayan Mars: Ben hazırlıklı olduğum sürece, ne yapacağımı bildiğim zaman yeterli olduğumu düşünüyorum.
Araştırmacı: İki aşamada da mı?
Bayan Mars: Evet. Zaten daha önceden kendimize hazırladığımız için, yani ben öyle yapıyorum, hazırlıksız bir şeye başladığınız zaman gerçekten o iyi gitmiyor zaten. Gitmediği zaman da bir yerde kalıyorsunuz. O yüzden çocuklar da bunu çok iyi anlayabiliyorlar ve öğretmenin hazırlıklı olması gerçekten grubu toparlamada önemli.
Araştırmacı: O zaman yaşanılacak zorlukları telafi edebilir mi?
Bayan Mars: Öğretmenin hazırlıklı olması daha kolaylık sağlıyor bence. Ben de hazırlıklı olduğum için çözümlendiğini düşünüyorum. Çözüm yolları bulabiliyorum yani kısıtlı kalsam da çocuklara görev vererek ya da çocuğu tanıdığım için dikkatini toparlamanın yollarını bulabiliyorum.
Araştırmacı: Peki, genel anlamda bir okul öncesi öğretmeninin fen etkinliklerinde başarılı

Ms. Mars also indicated that doing research on appropriate practices as a factor to be well prepared. While doing research on appropriateness of the practices, she pointed out understanding of children and methods for how to teach. During the interview with Ms. Sun, she stated similar considerations. Ms. Sun suggested to do research on appropriateness of practices regarding searching appropriate materials, methods to simplify and teach, and how to support learning of children.

> The Researcher: According to you what are the issues that an early childhood teacher's success in science activities based on?
> Ms. Sun: Basically she needs to do research focusing on deciding the activity supporting it with experiences to help children to clearly understand the topic. Moreover, she also needs to focus on how to carry out the practice and reach the level of children and with which materials to meet children's needs (from interview with Ms. Sun on July 29, 2013)[67].

Prepared for Alternative Outcomes. Prepared for alternative outcomes was another consideration of teachers to be well prepared for science practices. Two teachers suggested that being prepared for alternative outcomes to overcome unexpected issues at science practices. During the plementation periods of science practices, teachers might come across with unexpected events regarding children's demands and attitudes. Ms. Venus explained how science practices might not go on as teachers planned and how being prepared for alternative outcomes facilitated overcoming unexpected events.

> The Researcher: Regarding preparation and application periods of

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olabilmesi için nelere ihtiyacı var sizce?
Bayan Mars: Bence araştırma yapması gerekiyor, hazırlıklı olması gerekiyor.
Araştırmacı: Araştırma yapması derken neyi araştırması neye ulaşmasını bekliyorsunuz?
Bayan Mars: Araştırma dediğim şey konuya göre araştırma yapması lazım, uygun mu, çocukların bunu algılaması nereye kadar, çocuklara bunu nasıl verebilirim anlamında araştırma yapması lazım.

[67] Araştırmacı: Peki bir okul öncesi öğretmeninin fen etkinliklerinde başarılı olabilmesi sizce nelere bağlıdır?
Bayan Güneş: Yani araştırma yapması gerekir. Etkinlik hakkında, bu etkinliği neyle desteklerse çocuğun kafasında netlik kazanacağı, nasıl vereceği, hangi malzemeleri kullanacağını, o çocuğun seviyesine nasıl ulaşacağı hakkında araştıma yapması lazım.

science activities how would you evaluate yourself?
Ms. Venus: …
The Researcher: You may consider them separately.
Ms. Venus: I think I am competent in preparation period. However, in application period I face some difficulties.
The Researcher: You face what kind of difficulties?
Ms. Venus: Mostly in application period because in some cases things not go on as you planned. For instance, when I let children to do the activity on their own something may not go as I expected and from inside I think I should be prepared next time. Moreover you have to have an alternative. When you let children to do activity it causes the concern that some children could do the activity and some could not. Let me give example from planting activity. In this activity some children completed their tasks. However, some of them don't even touch the soil and this is I never thought before. During the preparation period I never thought that some children do not want to touch the soil, I learned this during the activity by experiencing.
The Researcher: What could be done to have a better application period?
Ms. Venus: It is a must to think possible challenges while applying the activity. However, since we are working with children there is always a possibility that children's feedbacks are one step forward from our thought. So this requires us to always have an alternative and act instantly according to children's feedback. For example in our planting activity, I asked the child to whether she wants to do it by wearing a glove and than she accepted it. When we talked about her situation she said she scared to touch an insect during the activity. We should have some different alternatives and should producing quick solutions. Moreover, EC teachers are required to have these skills even in the daily activities such as sleeping hour (from interview with Ms. Venus on July 15, 2013)[68].

[68] Araştırmacı: Fen etkinliklerinin hazırlık ve uygulama aşamalarını düşündüğünüzde kendinizi nasıl değerlendiriyorsunuz?
Bayan Venüs: ....
Araştırmacı: Ayrı ayrı da yapabilirsiniz.
Bayan Venüs: Hazırlık aşamasında evet yeterli olduğumu düşünüyorum açıkçası. Ama uygulamalarda tabi bazı aksaklıklar karşılaştığım oluyor.
Araştırmacı: Ne gibi aksaklıklar oluyor?
Bayan Venüs: Uygulamada daha çok karşılaşılabiliyor çünkü sizin hedeflediğiniz şekilde gitmeyebiliyor o program. Mesela ben geri çekilip çocukların yapmasına müsaade ettiğimde bazı şeyleri düşünemiyorsunuz onu yaşadıktan sonra 'bir dahaki sefere buna hazırlıklı gelmem gerekiyor' diyorsunuz. Zaten alternatifiniz mutlaka olması gerekiyor. Onlara bıraktığınızda yapamayanlar, acaba onlar üzerinde farklı bir baskı oluşturur mu endişesi yaşamanıza neden oluyor çünkü bir kısmı çok iyi oluştururken verdiğiniz etkinliği ya da saksı ekiminden örneklendireyim yine kimisi çok güzel yerleştirip kapatırken, hiçbir şekilde yardıma ve desteğe ihtiyaç duymazken kimi toprağı eline almak bile istemiyor. Mesela bu hiç düşünmediğim bir şeydi benim; çocuğun toprağa dokunmak istemeyişi. Bunu hiç düşünmemiştim etkinliğimi hazırlarken ama o etkinlikte çocukların bir kısmının buna dokunma istemeyişinin olabileceğini görmüş oldum direkt tecrübeyle.
Araştırmacı: Uygulama aşamasının daha iyi geçmesi için neler yapılabilir?
Bayan Venüs: Mutlaka karşılaşacağınız olumsuzlukları da düşünmek lazım ama biz çocuklarla çalışıyoruz. Siz ne kadar düşünürseniz düşünün sonuçta onların verdikleri tepki bizim düşündüklerimizin hep bir üstünde oluyor. Dolayısıyla cepte mutlaka bir şeyler olması gerekiyor alternative olarak, yine hazırlıklı olmak gerekiyor ama bir de hızlı düşünmek gerekiyor herhalde o anda çözümlerle ilgili direkt çaresiz kalmak yerine farklı bir şeyler; o gün

Ms. Venus stated that teachers might come across with unexpected events regarding demands of children and therefore science practices might not go on properly. For such situations, she emphasized to present alternative suggestions to children. She indicated that even though teachers learnt what to do and how to be prepared for next practices after experiencing, they should be well prepared. However, she stated that even if teachers were well prepared it was impossible to predict all possible reaction of children. Therefore, she proposed to thinking and producing quick solutions.

Pre-preparation. Two teachers pointed out importance of pre-preparation to be well prepared for science practices. During science practices, implementation might not work properly and desired conclusion might not be achieved. In order to reach conclusion in a successful way, Ms. Sun offered to implement the practice with same materials before implementing with the children.

> Ms. Sun: […] Sometimes during application even you have the right materials and right procedure you could not achieve. For example we performed volcano activity but it did not erupt. We prepared lots of materials but we could not get the result. Then we started to think what to do and how to explain to children. Besides we thought that we had the right material and right procedure, something went wrong and we failed.
> The Researcher: What happen in those situations?
> Ms. Sun: Disappointment, which we don't want children to experience.
> The Researcher: What could be done to avoid this?
> Ms. Sun: Pre-preparation with the same materials can be done before doing it with the children (from interview with Ms. Sun on July 29, 2013)[69].

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mesela eldiven takıp denemek ister misin diye sordum çünkü beklemiyordum öyle bir tepki. Öyle bir denedik, o biraz daha rahatlattı. Çünkü böcek varsa eline gelebileceğinden endişe ediyormuş, sonrasında konuştuğumuzda ortaya çıktı. Birazcık daha alternatifler olması gerekiyor ama biraz da hızlı çözümler üretmek gerekiyor. Bu zaten her etkinlikte geçerli uyuma saatinde bile.

[69] Bayan Güneş: […] Bazen uygulamalarda malzemeni alıyorsunuz uyguluyorsunuz ama sonuca ulaşamıyorsunuz. Mesela volkan etkiliği yaptık, patlamadı. Orada bir sürü malzeme hazırladık ama patlamadı. Ne yapsak, nasıl açıklama yapsak düşündük. Bütün malzemeleri tam yaptık, uygulamayı da tam yaptığımızı düşünüyoruz ama bir şeyde hata yaptık orada.
Araştırmacı: Ne oluyor mesela o durumlarda?
Bayan Güneş: Yani hayal kırıklığı. Onu da yaşatmak istemiyoruz çocuklara.
Araştırmacı: Onun için neler yapılabilir?
Bayan Güneş: Aynı malzemelerle çocuklarla yapmadan önce bir ön çalışma yapılabilir.

During the interview with Ms. Jupiter, she explained the role of pre-preparation at being successful in science practices by giving an example of her experience.

> Ms. Jupiter: [...] The electrification experiment for example, if I did not do it at home and do it in the class first time and could not get the result than I could not explain to the children. I find out the result by experiencing on my own. That's why I need to learn much about the topics.
> The Researcher: Considering the preparation and application period how do you evaluate yourself?
> Ms. Jupiter: If I am not prepared to the activity and start it I falter and I could not answer children's questions adequately. Then I feel bad. Other than that I try to do each activity at home (from interview with Ms. Jupiter on July 25, 2013)[70].

In this excerpt, Ms. Jupiter emphasized the importance of being well prepared to answer questions of children and implement science practices properly. In order to feel prepared for the science practice it was important for her to implement the practice before the class, for example at home. If she has not practiced the activity before, she came across with difficulties during application period. The pre-preparation period provided self-confidence and therefore the teacher implemented the practice successfully.

Providing Science Rich Environment

The second issue that EC teachers related teacher success in science education in ECE was providing science rich environment. Teachers pointed out three considerations through which they could enrich their implementations and hence

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[70] Bayan Jüpiter: […] Mesela o elektriklenme deneyinde, evde denememiş olsaydım, burada yapmış olsaydım o elektriği bulamamış olsaydım açıklayamamış olacaktım. Deneyip yanılarak kendim de buldum. O yüzden çok şey öğrenmem gerekiyor konularla ilgili.
Araştırmacı: Peki hazırlık ve uygulama aşamasını düşündüğünüzde kendinizi nasıl değerlendiriyorsunuz?
Bayan Jüpiter: Eğer hazırlanmazsam etkinliğe o zaman çok bocalıyorum, çocukların sorularına da yeterli cevap veremiyorum. O zaman ben de kendimi kötü hissediyorum. Ama onun dışında mutlaka evde denemeye çalışıyorum.

became successful in science practices. They are course work, interactive seminars, and expert help (see Fig. 4.23 Providing science rich environment).

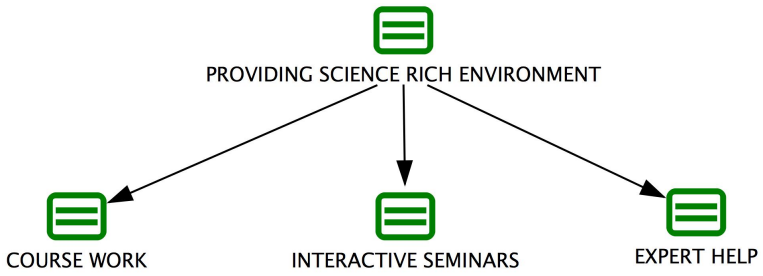

Fig. 4.23 Providing science rich environment.

Course Work. Regarding providing science rich environment and carrying out successful science practices into class, involving in science practices through the courses at educational years was stated by four of the seven teachers. Teachers graduated from child development programs of vocational high schools and ECE programs of universities took courses regarding teaching practice. Science education in ECE appeared as a part of these courses or as a sole course in teacher education programs.

Ms. Uranus, who was one of the university graduates, indicated the difference between emphasis of science education in ECE in teacher education programs at high school and university. She stated the emphasis of applied courses regarding science education in ECE in the university education.

> The Researcher: Does being graduated from university or high school has an impact?
> Ms. Uranus: Of course university education far more different than high school education.
> The Researcher: Does the science education course that you took at university differentiate from other courses?
> Ms. Uranus: I cannot say that instructor of that course was competent. Besides the course was application based with a little focus on theoretical knowledge. We both have experiences during the course and at the preschool institutes as a trainee. I think it was my luck. At that time it was maybe hard or boring but at the end it is the only way to learn. Only reading books come short and application is much better (from interview

with Ms. Uranus on July 22, 2013)[71].

During her university education, Ms. Uranus took theoretical as well as applied courses regarding science education in ECE. She indicated the importance of application rather than theoretical work. Therefore, from her perspective it was a chance to apply the issues learnt from theoretical courses. Although Ms. Jupiter was a university graduate as Ms. Uranus, her education was distant training. Ms. Jupiter stated the lack of applied courses during her vocational high school education and distant training.

> The Researcher: What are the issues that early childhood teachers' success in science activities based on?
> Ms. Jupiter: [...] Having a comprehensive course on that topic at university or any other educational institute may have impact because experiences gained during education are mostly self-practicing.
> The Researcher: During your undergraduate education did you take any science education course in early childhood?
> Ms. Jupiter: I took but I know nothing. We just read and took exams. It would be better if there were applications on the topics. Since I graduated from distant education program I did not do any experiments.
> The Researcher: How were the courses in the high school?
> Ms. Jupiter: I do not remember clearly but we did have some experience.
> The Researcher: Did you take any course related with science education?
> Ms. Jupiter: No, I did not.
> The Researcher: At the university?
> Ms. Jupiter: Yes, there was one course during second or third grade. But I don't remember high school years.
> [...]
> The Researcher: Considering your educational experiences do you think that they have impact on the activities you conducted in the class?
> Ms. Jupiter: No, they don't. Here I learn by doing together with children. I learned nothing before and also remember nothing from my education.
> The Researcher: So what is the source that your knowledge nourished from?
> Ms. Jupiter: …
> The Researcher: For instance you said you know the topic electricity.

[71] Araştırmacı: Üniversite veya lise mezunu olmanın etkisi var mı sizce?
Bayan Uranüs: Tabi ki üniversite eğitimi liseden çok daha farklı.
Araştırmacı: Aldığınız o fen eğitimi dersinin bir farkı var mı?
Bayan Uranüs: Hani fen eğitimi hocam çok iyiydi diyemiyorum. Zaten hep uygulamayla geçti, hiç bir zaman sadece teorik bilgi almadık. Hem sınıfta uygulama yaptık hem gidip yerinde uygulama yaptık. O konuda gerçekten şanslı olduğumu düşünüyorum. Belki zorlandım, belki bıktım, sıkıntıya düştüm ama gerçekten böyle öğreniyorsun. Kitapla, okumakla olmuyor gerçekten, uygulama yapmak daha iyi.

> Ms. Jupiter: I remember that topic from primary school. The simplest things are the ones mostly applied. I somehow learned them. Practicing helps me to remember but if I don't have any practice I remember nothing (from interview with Ms. Jupiter on July 25, 2013)[72].

Ms. Jupiter expressed that she did not do any applications regarding the course science education in ECE. She pointed out the importance of application in teacher education to learn and carry them into class. She advocated that she did not remember anything unless she practiced it. She explained that her current teaching practices on science depended on science experiences in primary years.

In addition to lack of application in science education in ECE courses, teaching practice courses also lacked an emphasis of science education in ECE. The teacher practice courses required teacher candidates to have daily implementations. Ms. Jupiter explained that their teaching practice courses allowed them to choose any type of activities.

> Ms. Jupiter: [...] When I was a trainee I conducted activities. However, I

[72] Araştırmacı: Bir okul öncesi öğretmeninin fen etkinliklerinde başarılı olması nelere bağlıdır sizce?
Bayan Jüpiter: […] Üniversitedeki ya da hangi eğitim kurumundaysa orada bu konuda ayrıca iyi bir ders, bir eğitim alması okulda öğretilenler yapıldığı için etkileyebilir.
Araştırmacı: Siz okul önceside fen eğitimi ile ilgili ders aldınız mı üniversitede?
Bayan Jüpiter: Aldım ama hiç bir şey bilmiyorum. Sadece okuduk sınava girdik. Belki bir şekilde uygulama yapılsa bu konularda ya da deney yaptırılsa... Gerçeği normal örgün eğitimde nasıl yapılıyor bilmiyorum ama ben Açıköğretimde okudum, hiç deney yapmadım.
Araştırmacı: Lisede nasıldı?
Bayan Jüpiter: Net hatırlamıyorum ama lisede ufak tefek şeyler yapıyorduk.
Araştırmacı: Lisede dersiniz var mıydı okul öncesinde fen eğitimiyle ilgili?
Bayan Jüpiter: Yoktu.
Araştırmacı: Peki üniversitede?
Bayan Jüpiter: Evet bir ders var o da ya ikinci ya üçüncü sınıftaydı. Ama liseyi hatırlamıyorum.
[…]
Araştırmacı: Peki kendi eğitim geçmişinizi ve tecrübelerinizi düşündüğünüzde sınıfınızda yaptığınız fen etkinliklerine katkısı olduğunu düşünüyor musunuz?
Bayan Jüpiter: Hayır. Ben burada çocuklarla bir araya gelip yapa yapa öğreniyorum. Öncesinde hiçbir şey öğrenmedim ki, hiç bir şey hatırlamıyorum da.
Araştırmacı: Sizin bildiğiniz şeylerin kaynağı ne acaba?
Bayan Jüpiter: Yani…
Araştırmacı: Mesela elektriği biliyordum dediniz?
Bayan Jüpiter: İlkokuldan onları hatırlıyorum. En basit şeyler zaten en çok yapılan şeylerdir o, eskiden kalemi bacağına sürtüp ya da tarakla yapardık. Onları da bir şeklide denemişiz ki öğrenmişiz, uygulamaya geçince aklımda kalmış. Ama uygulama yapmadığım hiçbir şeyi hatırlamıyorum.

> have never asked to conduct a science or mathematics activity. We were not obliged to do.
> The Researcher: Was the decision up to you?
> Ms. Jupiter: Yes, generally we were choosing art activities. However, it was also not conducted as it was expected to be, there were strict guides and we drive children to obey with commands.
> The Researcher: Does science activities differ from other activities?
> Ms. Jupiter: Of course, because children ask why questions. During other activities children are just attending without even asking "why we bend like this" e.g. On the other hand in science activities they ask questions such as "why you do it like this" (from interview with Ms. Jupiter on July 25, 2013)[73].

The teacher stated that they decided to implement whichever type of activity they want during teaching practice courses. Instructors of the courses did not lead them to implement science activities. From her perspective, teacher candidates had a tendency to prepare and implement art activities in teaching practice courses. She explained this situation with the level of teacher control. While teacher could control the art activities through directions, children asked why questions during science activities. This might be a reason for teachers to mostly implement art activities and refrain from implementing science activities.

Interactive Seminars. The second issue that contributed to providing science rich environment and teacher success in science education in ECE was interactive seminars. Three teachers proposed the importance of interactive and application based seminars on science education in ECE to improve their science practices.

[73] Bayan Jüpiter: […] Mesela staja giderken uygulama yapıyorduk kimse benden fen ve matematik etkinliği istemedi, öyle bir zorunluluğumuz yoktu.
Araştırmacı: Sizin tercihinizde miydi?
Bayan Jüpiter: Evet. Genellikle sanat etkinliği tercih ediliyor. O da gerçek anlamda yapılmıyor. Çünkü malzemeleri veriyorsun şunu yap, şunu yap diyorsun ve çocuklar da onu yapıyor, yani sürekli yönlendirme var.
Araştırmacı: Fen etkinliği bu noktada ayrılıyor mu sizce onlardan?
Bayan Jüpiter: Tabi ayrılıyor. Çünkü niye olduğunu soruyor çocuklar. Orada böyle katlıyorsun, tamam bitiyor ve çocuk da onu yapıyor. Ama bunu niye böyle katladın demiyor. Ama fen etkinliklerinde öyle değil; niye böyle yaptın, bu nasıl oldu diye soruyorlar.

During the interview with Ms. Jupiter, she stated the effectiveness of interactive seminars on science practices of teachers.

> The Researcher: What is your opinion on seminars?
> Ms. Jupiter: Seminars should be and also be interaction based. They should not only be verbal and suggestive on how to conduct the activity but also have something to do with application. We have nothing in our mind from seminars that were verbal and suggestive (from interview with Ms. Jupiter on July 25, 2013)[74].

Ms. Jupiter pointed out the requirement of seminars that give place to applications on science education in ECE rather than suggestions for teachers. From her perspective, if the seminars were suggestion based, they resembled to theoretical courses and turned out to be forgotten. However, when the seminars on science education in ECE were application based they could contribute to science practices of teachers. Similar to Ms. Jupiter, Ms. Uranus suggested interactive seminars to enrich science practices. She gave an example from her experience on interactive drama seminar to point out how such seminars facilitated permanent learning.

> The Researcher: Which types of seminars in your opinion are more beneficial for science education in early childhood?
> Ms. Uranus: I prefer mostly interactive seminars. I have an experience on such a seminar it was not about science education but about drama. In that seminar the instructor have some people on the scene and have some applications on the topic. I wish we had seminars like that on science education that based on active participation. Because in solely narrative seminars you may say from inside that I understand and can do this in my class but after one day inevitably you would forget the issues mentioned in the seminar. On the other hand from drama seminars I remember more because in those seminars we used ourselves in the activities, that's why they are easier to remember […](from interview with Ms. Uranus on July 22, 2013)[75].

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[74] Araştırmacı: Seminerler hakkında ne düşüyorsunuz?
Bayan Jüpiter: Kesinlikle ve uygulamalı olmalı. Sadece sözle değil işte çocuğa şöyle davranın böyle davranın değil; etkinliklerde yönlendirmeyin, şöyle yapın değil. Gerçekten uygulama anlamında bir şeyler yapılmalı. Sadece ders olarak anlatınca hiçbir şey kalmamış aklımızda zaten.

[75] Araştırmacı: Okul öncesinde fen eğitimi için ne tarz seminerler daha faydalı olabilir?
Bayan Uranüs: Daha çok interaktif seminerler. Fen eğitimi değildi ama dramayla ilgili böyle bir tecrübem olmuştu. Mesela dramayla ilgili hoca anlatıyor, gönüllü kişileri alıyor onlarla ilgili bir şey yaptırıyor. Keşke fenle ilgili de aktif katılımlı seminerler olsa. Yoksa düz anlatım

In this excerpt Ms. Uranus explained that involving and taking roles in seminars provided teachers with permanent learning about mentioned issues. When teachers comprehended the issues by practicing, it facilitated integrating these issues to their teaching practice as well. On the other hand, issues mentioned at theoretical seminars were inevitability forgettable. In this regard, Ms. Uranus offered applied seminars to support teacher success in science education in ECE.

Expert Help. Cooperating with an expert was the last consideration of teachers to provide science rich environment and teacher success in science in ECE. Two teachers suggested that help of an expert provided teachers to improve their science practices. For example, Ms. Mercury suggested having a separate unit outside the class and help of an expert for science practices rather than having science corners inside the class.

> The Researcher: How do you evaluate yourself in science activities?
> Ms. Mercury: I believe I am sufficient in science activities. However, I wish in our institute there were a separate branch or a room that focuses on this subject. Other than having a small corner in each classroom it would be nice to have a laboratory and more materials. With the lead of an expert together with early childhood teacher it would be better to conduct science activities weekly instead of monthly (from interview with Ms. Mercury on July 15, 2013)[76].

Ms. Mercury stated that in a laboratory, teachers might cooperate with an expert. According to her explanation, cooperation of teachers with an expert increased the frequency of science practices. Hence, science practices took place at each week rather than in a month.

> olursa o an anlarsın ama bir gün sonra unutuyorsun. Mesela dramada biz hep kendimizi kullandık o yüzden daha akılda kalıcı oluyor […]

[76] Araştırmacı: Kendinizi nasıl değerlendiriyorsunuz fen etkinliklerinde?
Bayan Merkür: Aslında kendimi yeterli görüyorum. Ama keşke okulumuzda bununla ilgilenen ayrı bir branş ayrı bir oda olsa. Keşke sınıf içerisinde küçük bir köşe yerine bir laboratuvar tarzı bir şey olsa, malzemeler daha çok olsa. Gerçekten bilen biri liderliğinde sınıf öğretmeniyle birlikte ayda değil de haftada bir kez yapsak daha iyi olacağını düşünüyorum.

Teacher Attitude towards Science

EC teachers proposed teacher attitude towards science as a third issue to become successful in science education in ECE. Teachers' considerations regarding teacher attitude towards science were being progressive, attaching importance and teacher's interest (see Fig. 4.24 Teacher attitude towords science).

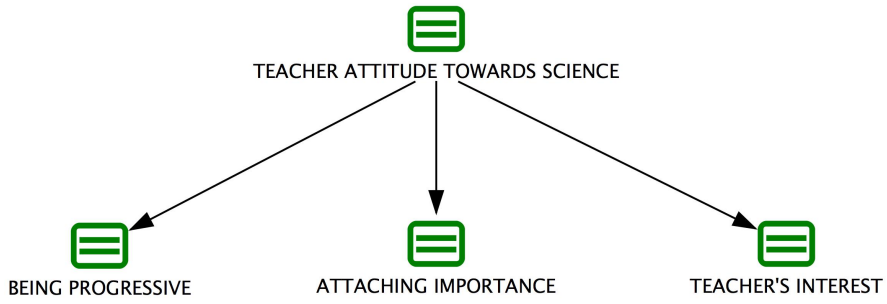

Fig. 4.24 Teacher attitude towards science.

Being Progressive. Three EC teachers pointed out being progressive as an important attitude to become successful in science practices. For example, while expressing her self-assessment on science education in ECE, Ms. Saturn stated the importance of being open-minded.

> The Researcher: Considering the preparation and application period of science activities how do you evaluate yourself?
> Ms. Saturn: In some aspects we could be insufficient; since things keep changing continuously I never tell that we are perfect, moreover this applies to everyone. […] In general I think I am not unsuccessful but I always tell that we need to be progressive because every time we face with something new. For example, I conduct an experiment with let's say with blue, but if we conduct that experiment with green maybe I would get a different result. This suggests me to be always open to be progressive (from interview with Ms. Saturn on July 30, 2013)[77].

[77] Araştırmacı: Fen etkinliklerinin hazırlık ve uygulama aşamalarını düşündüğünüzde, kendinizi nasıl değerlendirirsiniz?
Bayan Satürn: Belki yetersiz olduğumuz yönler var, hiç bir zaman dört dörtlüğüz diyemem bu herkes için geçerli. Çünkü her zaman yeni bir şeyler çıkıyor. […] Ama genel olarak çok başarısız olduğumu düşünmüyorum. Ama hep söylüyorum, yeniliklere her zaman açık olmak

Ms. Saturn expressed that teachers should be open to changes in the world and newly appeared issues. Following the changes and being open to learn them contributed to teacher success in science education in ECE. In addition Ms. Venus pointed out to that being progressive helps teachers to avoid repeating same things each year.

> The Researcher: Let's say teacher has sufficient content knowledge. What else does she required to have in order to be successful?
> Ms. Venus: She needs to search for resources. However, all the subjects are predefined and all the activities are being repeated each year. As I mentioned earlier germination activity for example, in each class we do the same activity with the same procedures. However, maybe it is necessary to consider how to improve these activities. We need to tear out our mind from the routine and find some different activities. I have a bunch of books related with science education that are pretty helpful to me. However, we should not have only one resource and repeat it every year. As early childhood educators we usually do this that we repeat the same tasks when the group of children chages after one year and when it does not cahnege we somehow make it difficult for the next year. I think we lack at this point (from interview with Ms. Venus on July 15, 2013)[78].

Ms. Venus stated that in order to be successful in science practices it was curial to do research, renew the existing knowledge and improve the existing activities. She expressed that teachers usually repeated same science practices each year by implementing the same practices to different groups or making them a bit difficult for the same groups. Therefore, she did not consider EC teachers progressive in science practices.

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durumundayız. Çünkü her zaman yeni bir şeyler çıkıyor. Örnek veriyorum, belki ben bunu mavi olarak biliyorum ama bunu mavi değil de yeşille yaptığımızda belki daha farklı bir şey çıkabiliyor. Her zaman yeni bir şeyleri öğrenmeğe açık olmak gerekiyor.

[78] Araştırmacı: Öğretmenin bilgisi var diyelim başka neyi olmalı başarılı olmak için?
Bayan Venüs: Kaynak taraması gerekiyor. Bu alanla ilgili maalesef ki şöyle bir gerçek var konularınız belli, o konularla ilgili her sene aynı etkinlikler yapılır. Biraz önce söylediğim çimlendirme çalışması gibi. Mutlaka her sene her sınıf bu etkinliği yapar. Şimdi bunun üzerine ne katabiliriz diye düşünmek gerekiyor belki. Aynı şeylerden kopup dağarcığınızı genişletmek, o alanlarla ilgili farklı etkinliklere ulaşabilmek gerekiyor. Fen egitimi ile ilgili birçok kitap var aslında, güzel kitaplar var elimde de mevcut, çok faydasının olduğunu düşünüyorum. Bir kaynak her sene onu tekrar etmemeliyiz. Biz okul öncesi eğitimciler genelde bunu yapıyoruz, bir tane kaynağım var seneye de çocuklar değişiyorsa zaten kullanabilirim, değişmiyorsa da onu biraz daha zorlaştırıp bir şey yapabilirim diyoruz. O anlamda biraz eksik olduğumuzu düşünüyorum.

Attaching Importance. Another attitude that three teachers suggested to become successful in science practices was attaching importance on science practices. When teachers were willing to implement science practices, paid attention on science practices and gave them place in lesson plans, they became successful. Ms. Saturn explained that teachers carried out successful science practices if they were eager to implement science practices.

> The Researcher: What are the factors that have impact on early childhood teachers' success in science activities?
> Ms. Saturn: First of all if you are willing to be successful then you can be successful.
> The Researcher: Does it mean willingness to conduct the activity?
> Ms. Saturn: Yes, if you hinder yourself at the beginning of an activity this results with skipping that activity. On the other hand, if you can tell yourself from inside that I am going to do this activity and teach children and really want to perform it then you would be successful and this applies to any other situation […] (from interview with Ms. Saturn on July 30, 2013)[79].

Ms. Venus pointed out that desire to implement science practices and paying attention on the subject affected the success of teachers in science education in ECE. While expressing her self-assessment on science practices, Ms. Uranus indicated the relationship between teacher attitude towards science education in ECE and success in science education in ECE.

> The Researcher: Considering the preparation and application period of science activities how do you evaluate yourself?
> Ms. Uranus: I am not telling that I am competent in science activities and give place in my class each week. Actually science activities have secondary importance because early childhood teachers have primarily the idea that conducting an art, language or play activity. As a result science activities inevitably placed in secondary order.
> […]

[79] Araştımacı: Bir okul öncesi öğretmenin fen etkinlerinde başarılı olması nelere bağlıdır?
Bayan Satürn: Her şeyden önce istiyorsan, başarılı olabilirsin diye düşünüyorum.
Araştırmacı: Etkinliği yapmayı istiyorsan mı?
Bayan Satürn: Evet. 'Ya uff' diye etkinliğe başlarsan zaten es geçeceksin demektir, çok kaale almadan başlıyorsun demektir. Ama her şeyden önce 'evet ben bunu yapacağım ve çocuklara bunu aktaracağım' diye başlarsan ve yapmayı gerçekten istiyorsan, bu her işte böyledir, başarılı olabilirsin […]

> The Researcher: In your opinion what an early childhood teacher needs to be successful in science acitivities?
> Ms. Uranus: […] I think it is attaching importance to science activities (from interview with Ms. Uranus on July 22, 2013)[80].

When Ms. Uranus stated that she was not good at science practices as much as implementing science practices each week, she indicated the direct correlation between frequency of science practices and success in science practices. She pointed out that art activities were mostly foregrounded in teacher plans. When teachers did not attach importance on science practices, they refrained from including science activities in their plans and perfoming science practices as well.

Teacher's Interest. The other attitude that three teachers expressed to be successful in science practices was teacher's interest. If teachers had an interest on science education, they would implement science practices properly. Similar to the excerpt of Ms. Uranus above, Ms. Saturn related frequency of science practices with success in science practices and explained the role of teacher's interest in carrying out successful science practices.

> Ms. Saturn: Some teachers are more prone to science and some are more to art and have better content knowledge. I for instance, if I tell you that I have a comprehensive content knowledge in science and I will successfully conduct activities it won't be total truth. Maybe I am better at art activities. However, I try to feed science activities conducted in the class from books or Internet sources that I read, my experiences, my

[80] Araştırmacı: Hazırlık ve uygulama aşamalarını, düşündüğünüzde kendinizi nasıl değerlendirirsiniz?
Bayan Uranüs: Yani fen etkinliklerinde çok da iyiyim, illaki her hafta yaparım demiyorum. Fen etkinlikleri aslında biraz arka planda kalıyor. Öğretmenlerde genelde bir sanat etkinliği illaki yapılacak, bir dil etkinliği Türkçe dil etkinliği, oyun hareket gibi bir düşünce var, bunlar daha çok ön plana çıkıyor. Fen etkinliği arada sırada yapılacak bir şey kalıyor, geri planda kalıyor.
[…]
Araştırmacı: Bir okul öncesi öğretmenin fen etkinliklerinde başarılı olması için sizce nelere ihtiyacı var?
Bayan Uranüs: […] Bunu önemsemesine de bağlı aslında. Önemsemekle de alkalı diye düşünüyorum.

> acquisitions from trainees and my previous learning (from interview with Ms. Saturn on July 30, 2013)[81].

Ms. Saturn stated that she was interested in arts and music more than science. Therefore, most of the time she preferred to perform art and music activities. Her interest in arts and music contributed to her success in practices related to these areas. Consistent with her lower interest in science compared to arts and music, she did not express her success in science practices as confident as her success in art and music activities.

Having Children Enjoy

During the interviews with teachers, they were asked to narrate some examples of science practices they implemented in their classes. While expressing the activity examples, four of the seven participants indicated quality of the activity through emphasizing enjoyment of children. For example, Ms. Saturn stated that the activity with carnation flower and pointed out that it made children enjoy.

> The Researcher: What are your activities concerning science education?
> Ms. Saturn: […] We divide a carnation flower into two pieces and poured one piece with blue ink and other one with red ink. After two or three days each piece dyed with the corresponding color. We observed changes to each piece in the class and children enjoyed with this activity. Moreover, we gave dyed carnation flower to other class and they also enjoyed (from interview with Ms. Saturn on July 30, 2013)[82].

[81] Bayan Satürn: Kimisi biraz daha fene yatkındır, kimisi sanata ve müziğe yatkındır ve daha bilgilidir. Ama çok iyi fen biliyorum, fen etkinliklerini çok iyi yapıyorum dersem yalan söylerim. Belki sanat etkinliğinde daha iyiyim. Ama kitaplardan, internetten okuduklarımı, tecrübelerimi, stajyer öğretmenlerden edindiklerimi, önceki okul döneminde öğrendiklerimi mümkün olduğunca uygulamaya çalışıyorum.

[82] Araştırmacı: Sınıfınızda fen eğitimine dair neler yapıyorsunuz?
Bayan Satürn: […] Karanfili ikiye ayırdık, kökün bir tarafına mavi bir tarafına kırmızı mürekkep döktük. Daha sonra karanfil iki üç gün sonra kırmızı ve mavi rengini aldı. Onu gözlemledik ve bu çocukların çok hoşuna gitti. Hatta yan sınıftaki çocuklara da verdik onlar da çok hoşlandılar.

Ms. Saturn concluded her narration of the activity through emphasizing the enjoyment of children. She stated that when they shared the product of the activity with other class, they also enjoyed with it. In this excerpt, she reinforced the enjoyment emphasis through mentioning the enjoyment of children at the other class. She implied the quality of the practice through enjoyment of children in both her class and other class.

Similar to Ms. Saturn, Ms. Mercury chose an example of science activity at which children enjoyed. In the following excerpt while explaining the activity with soda, Ms. Mercury pointed out enjoyment of children by her first sentence.

> The Researcher: Could you tell about an ordinary science activity?
> Ms. Mercury: This year children enjoyed mostly with the soda activity. Firstly we observed the bottle and ask questions about its content and its appearance such as its color and shape. Then I asked them to whether they would like to taste it. Then we opened it and tasted it together. After that each of them took raisins we observed them and discuss about their color shape and amount. Then we throw raisins into the soda and they began to dance from which children enjoyed […] (from interview with Ms. Mercury on July 15, 2013)[83].

Ms. Mercury preferred to express the activity with mineral water because of the high level of enjoyment of the children during the activity. Enjoyment of children was a criterion to distinguish science practices for her. Therefore her choice implied that making children enjoy was a component of science activities. Moreover, Ms. Uranus indicated the relationship between enjoyment of children and quality of the practice directly.

> Ms. Uranus: […] Firstly I did not give information and tried to acquire information from them through questioning. Since they could not able give any answers I told them in a manner like they are speaking; this will become a volcano and for now it is stable, silent but soon it will erupt.

[83] Araştırmacı: Tipik bir fen etkinliğinizi anlatabilir misiniz?
Bayan Merkür: Bu sene en çok soda etkinliği çocukların hoşuna gitmişti. Önce şişeye baktık, şişe içinde ne olabilir, neye benziyor, rengi nasıl diye konuştuk. Tadına bakmak ister misiniz dedim. Beraber sodayı açtık, tadına baktık. Herkes kuru üzümlerden aldı. Sayısını, rengini, tadını konuştuk. Daha sonra kuru üzümleri sodanın içine attık, dans etmeye başladılar çocuklar çok hoşlandılar. […]

> They enjoyed very much with the activity and it was a very nice activity (from interview with Ms. Uranus on July 22, 2013)[84].

Ms. Uranus explained the volcano eruption activity that she implemented in her class. At the end of her statement she directly related enjoyment of children and quality of the practice. Similar to previous excerpts, Ms. Uranus expressed enjoyment of children as a property of science practices. As a result explanations of teachers denoted enjoyment of children as an indicator of quality of science practices in ECE.

[84] Bayan Uranüs: […] Önce bilgi vermedim, onlardan bilgi aldım. Sonra onlar cevap vermeyince, bakın bu bir yanardağ olacak, şu anda yanardağ sakin, sessiz, patlamamış, birazdan patlayacak şeklinde onların dilinde anlattım. Çok hoşlarına gitmişti, çok güzel bir etkinlik olmuştu.

CHAPTER 5

CONCLUSION AND DISCUSSION

There were two main purposes of the current study. The first one was to describe science practices in the purposefully selected early childhood classroom and the second one was to represent perspectives and practices of the early childhood teachers on science education. In this context, the conclusion and discussion on the findings, suggestions, and limitations of the study are presented in this chapter.

Conclusion and Discussion

The perspectives and practices of seven early childhood teachers bring about a comprehensive understanding on the science education at the setting. At the lab school most of the teachers were high school graduates. There were two university graduates among the seven participants of the current study, one had formal education and the other had distant education. Ünal and Akman (2006) stated the significant difference between attitude of teachers towards science and education level. On the other hand, throughout the study, a relation between educational degree and teacher perspectives and practices on science education in early childhood was not discovered. Although the teachers did not have an intense background on science education in early childhood, the setting provided teachers with a rich learning environment. Since it was a lab school, early childhood teachers observed and involved in various activity implementations of student teachers throughout the year. These experiences provided them with much more examples of teaching practices

than their educational background. Nevertheless, the current study indicated that early childhood teachers did not have a precise understanding on the importance and goals of science education, which were reflected on their perspectives and practices.

Early childhood teachers concerned about having children enjoy during the science activities. Since it was a criterion for the quality of science activities, teachers paid considerable attention to implement science activities with which children enjoyed. They proceed a child-centered preparation period and considered the understanding level of children while deciding on the science activities. However, teachers did not determine the knowledge level of children before the activities. Since they were acquainted with the children, they did not use a strategy to assess children's knowledge on the topics during the preparation periods. Moreover, teachers pointed out considering interest of children to decide on science activities. Ayvacı, Devecioğlu, and Yiğit (2002) stated similar results on teacher perspectives regarding decision on the activity that interest of children was a priority for them to decide the activity and materials. Although, they found that teachers decide the materials due to accessibility in reality, perspectives of teaches did not contradict with their practices at the current study.

In addition all of the teachers pointed out that they used books while deciding the science activities. Even though all of the teachers used books for doing research and deciding on science activities, it was found that most of them complained about their insufficient content knowledge during the implementation period of the activities. Similarly the study of Alisinanoğlu, İnan, Özbey, and Uşak (2012) indicated that teachers had insufficient content knowledge on implementation period. However, the current study shed a light on the reasons why teachers had insufficient content knowledge in implementation periods. Teachers' explanations and the

observations at the current study revealed the contradiction between their perspectives and practices on doing research on science activities from books. It was found that teachers mostly used Internet for deciding the activities rather than books. They searched science activities from Internet. They read the flow of the activities and carried out the appropriate ones in their classes. Teachers called this process 'doing research.' However doing research requires teachers to focus on the all steps and details of the activity not only the flow. Pre-service and in-service teacher training programs may focus on how to do research from books and the Internet to decide and implement science activities. If they do such a comprehensive research, they can improve their content knowledge both on the topic and stages of implementation. Hence, they can minimize the difficulties as unexpected results or unanswered questions raised by the children.

The child-centered approach at preparation also took place in the engagement and conclusion periods of the science activities. Teachers were qualified in performing the engagement and conclusion periods of science activities. These periods were mostly revealed the aspects of developmentally appropriate science practices. During the engagement period, teachers involved children into the activity through various techniques. Teachers exposed children to new information, activated prior knowledge, listened and gave roles to them at the engagement period, in order to keep interest of children alive.

The conclusion period of science activities was the most child-centered period of science activities. Children took active roles at transition and imagining and planning sections of the conclusion periods. During the transition sections children took roles as performing a drama or explaining a book. Imagining and planning sections that based on High Scope Model provided children with much more

opportunities to express themselves, make decisions by themselves, and foster their creativity than any other periods of the science activities. Teachers used divergent questions mostly in imagining and planning sections. Moreover, teachers were open to questions and answers of the children. Therefore, strategies and approach of teachers at conclusion periods of science activities provided children with active involvement in the classroom discourse.

On the other hand, implementation period of science activities did not embrace a child-centered approach as much as the engagement and conclusion periods. Teacher control distinctly emerged during the implementation period of the science activities. Teachers mostly performed the practices and did explanations about them. The study of Karamustafaoğlu and Kandaz (2006) revealed the tendency of teachers to give place to explanations in science activities. Karamustafaoğlu and Kandaz (2006) stated that doing explanation was the mostly applied strategy by early childhood teachers while conducting science activities.

In their study Andersson and Gullberg (2012) stated important competencies for early childhood teachers in science activities. The two skills "paying attention to and using children's previous experiences" and " situated presence that is remaining in the situation and listening to the children and their explanations" overlap with the competencies of teachers in science practices. However, at the current study these skills were mostly occurred at engagement and conclusion periods rather than implementation periods of science activities.

The mostly used instructional method in science activities was using technology. Teachers presented videos regarding using technology in science activities. Since it is easy to access videos from Internet, teachers usually found videos from Internet. Although they stated that they prepare the videos before the

activities, the explanations of teachers and observed practices revealed that teachers did not have an exact preparation for using videos in the classroom. They usually search for the videos during the activity time rather than taking notes on the website links as they indicated at the interviews. Teachers avoided doing research on the topic before the activities because of the easy access to information on any topic from the Internet hindered teachers from. Teachers gained information from the Internet and transferred the knowledge to the children at the mean time. Since teachers did not aware of the upcoming information while presenting the videos, their explanations resulted in disconnectedness at the flow of the activity. This disconnectedness resulted in decrease in both the interaction between teacher and children and the involvement of children into the activities. Similarly, Kallery and Psillos (2007) pointed out transmitting knowledge to children and presenting pictures and objects during the instruction as predominant teaching practices that result in passive attendance of children.

Appropriate usage of technology in science activities is an efficient strategy. When teachers provide environments in which children do explorations and inquiry, use of technology contributes to educational experiences of children and serves for children with different learning styles (Van Scoter, Ellis, and Railsback, 2001). However, the technology usage in science activities at the setting did not represent these aspects. It triggered explanations of teachers and decreased the interaction between teacher and the children; therefore, augmented teacher-centeredness of the activity.

Teachers mainly indicated that they carried out experiments regarding science activities. Early childhood teachers involved in studies of Karaer and Kösterelioğlu (2005) and Karamustafaoğlu and Kandaz (2006) stated experiment as first and forth

major strategy in science activities, respectively. However, the quantitative data did not indicate the quality of the practices. The current study, revealed the lack of precise understanding of early childhood teachers on experiments. Most of the science practices that teachers named as experiments did not involve controlling variables. Actually, they mostly performed through demonstrations and question-answer sessions.

Demonstration appeared as the second mostly used instructional method in science activities as a result of teachers' misclassification of the methods. While demonstrations increased the teacher control in the activities, they decreased the active involvement of the children. Children generally followed the implementation that performed by the teacher during the demonstrations. Teachers did not let children to do exploration during the implementation period. Since they lack exploration, they lack collecting and recording data, organizing data and sharing experiences. As a result, children did not have an opportunity to involve in the 'Young children's inquiry process' explained by Worth and Grollman (2003). These findings were similar to Kallery and Psillos (2007) that stated demonstration experiments as one of the most predominant teaching activities that result in passive attendance. As in the engagement period, early childhood teachers at the current study gave roles to the children as holding objects. However, these roles were not sufficient to provide active participation of the children into the implementation period. Teachers generally considered that giving roles to children means actively involving them into the activity. It may be right for engagement but not for implementation. Children should have various different roles to be actively involved in implementation period than handling the activity materials. For example, they should control their actions and reflect on divergent questions of teacher.

Similar to the case of Peterson and French (2008) early childhood teachers directed children to make prediction on the outcomes of the practices during the implementation period. Although Peterson and French (2008) stated that making prediction provided opportunities for children with involving in cause-effect relations, early childhood teachers at the setting did not lead children to such a fruitful prediction process. The interaction between teachers and children was based on close-ended questions. When children express an opinion, which did not match with the answer in teachers' mind, teachers generally ignored them. Teachers did not elicit the ideas of children and children's contribution to the discourse was limited. Since contribution level of teachers and children on the conversation did not equal with the ones in the implementation periods, children did not participate in explanatory discourse as much as the case of Peterson and French (2008).

When the all periods of science activities are examined, it is not possible to consider them as developmentally appropriate science practices. Although the teachers had appropriate practices for engagement and conclusion periods of science activities, their practices at implementation period were not completely appropriate. Implementation period of science activities lacked important aspects of developmentally appropriate science practices for children through ages three to eight, which was indicated in Bredekamp and Coople (1997). Science practices of early childhood teachers at the setting mainly lack "controlling of their own actions," "observing results of their own actions," and "investigating and working individually or in small groups." Teacher control during the implementation period raised the aspects of inappropriate science practices as "watching the teacher do most of the demonstrating and handling of objects," " being restricted by closed, singled-right-

answer questioning or being told what to expect," and " participating in science activities only in large groups" (Bredekamp and Coople, 1997, p. 62).

One of the possible reasons behind the inappropriate science practices of early childhood teachers is lack of in-depth perspectives on science education in early childhood education. Teachers at the setting constantly tried to give examples of experiments regarding the science practices they carried out at their classes. They named mostly the conducted science activities as experiments. In addition, the curriculum of the setting, which was based on High Scope Model, does not include a separate domain for science. Although most of the domains and key experiences overlap with science process skills and serve science practices, teachers were not aware of this relation. Only classification and creative representation domains were related with science education by all of the teachers. Early childhood teachers' incomplete explanations on the relation between domains of High Scope and science education indicated teachers' lack of understanding of science process skills. The study of Batı, Ertürk, and Kaptan (2010) indicated similar results that awareness levels of preschool teachers regarding science process skills were low. While the teachers at the study of Batı, Ertürk, and Kaptan (2010) mostly stated observation and communication skills, they did not find it appropriate to teach measurement, data recording, and testing hypothesis skills to children.

In addition, almost all the weekly themes of the setting were appropriate for carrying out science practices. However, teachers related weekly themes with science activities in an ambivalent manner. Most of the science activites were performed during the themes at the spring. Themes at March, April, and May were the themes at which science activities were carried out most frequently throughout the year. All of the early childhood teachers related the themes "Space and Sky," "Spring," "Kinds

of Trees," "Science and Experiments," "Seeds and Flowers," and "Project (Recycle)" with science education. Çınar (2013) stated that early childhood teachers generally gave place to concepts related to human body and nature in science activities. The predetermined weekly themes of the second semester did not include concepts related to human body. However, there were various themes that included concepts related to nature such as "Spring," "Kinds of Trees," and "Seeds and Flowers."

Moreover, teachers were not completely aware of importance and contribution of science education in early childhood. They only emphasized on social-emotional and cognitive domains of child development. None of them indicated the contribution of science education on language development or physical development of children. This result dramatically raised questions on whether children had opportunities to involve in science practices in which they develop linguistic abilities and use fine and gross motor skills. Regarding social and emotional development, teachers indicated being curious, taking responsibility, and self-confidence. Similarly, Kıldan and Pektaş (2009) stated that subjects related to science promote curiosity of children. In addition, teachers at the setting advocated that science contributes to questioning and observing skills of children regarding cognitive development. Similarly, the studies of Batı, Ertürk, and Kaptan (2010) and İnan (2010) indicated that the mostly stated science process skill was observing that teachers mostly aware of it in science practices.

Another possible reason for developmentally inappropriate science practices was teachers' lack of content knowledge. Science knowledge tests results at the study of Garbett (2013) revealed that early childhood teachers had poor knowledge in science. At the current study, two of the teachers obviously stated that they were anxious about not be able to answer questions of children when children did

explorations on themselves. In order to get rid of unexpected results and unexpected questions of children, teachers made the implementation period teacher centered through demonstrations, explanations and authoritative question-answer sessions and video presentations. Therefore, their control at the implementation periods increased due to their lack of content knowledge.

Additionally, some early childhood teachers stated that they refrain from doing science activities because of their insufficient content knowledge on science. Teachers had a tendency to give place to the activity types in their educational plans at which they felt themselves competent and successful. Teachers did not feel themselves proficient in science activities as much as in the art activities. They refrained from preparing science practices and including science activities in their educational plans. Teachers at the setting related their low competency and low comfort at science activities with their lack of content knowledge. Therefore, content knowledge had an important role on self-efficacy of the teachers at the current study. Similarly, the study of Çakmak (2012) revealed the significant relation between subject knowledge level and attitude towards science. Moreover, there was a relation between frequency of science activities and teachers' self-efficacy. Erden and Sönmez (2011) found significant but weak relation between frequency of science activities and teachers' attitude towards science. In addition to the similar results with the related literature on content knowledge, attitude and frequency of science activities, the current study revealed the integrated relation among these concepts. For this case, content knowledge in science had an influence on attitude of teachers towards science and frequency of the science practices. Also, attitude towards science fostered content knowledge and hence frequency of the activities. Therefore,

increasing content knowledge of teachers might be result in qualified and frequent science practices in this case.

In order to bring up scientifically literate societies, it is necessary to involve children in scientific experiences at scientific contexts. Teachers are guides at this process. Through increasing the number of science activities, they could increase the number of scientific experiences. In addition, teachers need to comprehend the importance of science education in early childhood and feel themselves successful in order to provide scientific contexts and guidance. Early childhood teachers indicated the role of course work, in-service training and attitude of teachers towards science in satisfying self-efficacy. Similarly, Ekinci Vural and Hamurcu (2008) indicated the effect of taking science courses on self-efficacy. In the study, they found that the pre-service teachers who have taken science course had significantly higher self-efficacy beliefs than the pre-service teachers who have not take the course yet. On the other hand, Alisinanoğlu, İnan, Özbey, and Uşak (2012) found opposite results regarding the relation between qualification of early childhood teachers and science courses. They stated that qualification of early childhood teachers in preparing and carrying out science activities did not depend on high school or university graduation and science course grades. It might be suggested that although science courses might increase the self-efficacy beliefs of early childhood teachers in science activities, it might not be provide teacher with carrying out qualified science practices. In this regard, the study of Kalavari, Kakana, and Chistidou (2012) indicated that while science course do not help teachers in science concepts, personal inquiry and cooperation among colleagues help them most.

Moreover, early childhood teachers at the current study suggested being well prepared for science activities to successfully implement the practices. Perspectives

of the teachers on success in science activities, pointed out that they were exactly aware of what to do and how to do. While it is hard to make changes on the course work history and teachers' attitude towards science, in-service training and being well prepared might have positive effects on success of in-service teachers. In order to be well prepared they argued issues on content knowledge, doing research on appropriate practices, being prepared for alternative outcomes, and doing pre-preparation. These suggestions revealed teachers' awareness on how to plan qualified science practices. Planning the science activities is an important part of preparation periods. However, regarding the preparation periods teachers were lacking having plans to be well prepared. As indicated at previous sections, teachers paid attention on understandings of the children, however they did not used strategies to determine the level of children; they made use of different resources, however they did not know how to do research; they supplied educational materials, however they searched videos during the activities. The unplanned activities might result in lack of content knowledge and considerable amount of teacher control. However, if they plan the science practices, they could achieve all the steps of preparation period properly. Moreover, when teachers plan the activities, they could gain content knowledge on the topic. Hence the teacher control gives place to control of children in the activities.

To sum up, early childhood teachers' perspectives on science education at the setting are lacking providing a breeding ground for scientifically literate societies. Engagement and conclusion periods of science activities were performed through various methods and techniques and provided active involvement of children. On the other hand, the implementation period of the activities involved considerable amount of teacher control. Demonstrations, explanations, authoritative question-answer

session and video presentations were the predominant practices that result in teacher control. Science practices in this setting could not be named as developmentally appropriate science practices due to the lack of active involvement of children at the implementation periods. Throughout the study three possible reasons were indicated for inappropriate aspects of science practice. These were lack of understanding regarding science education; lack of understanding regarding importance and goals of science education; and lack of subject knowledge on science.

Even though the early childhood teachers did not have a precise understanding on importance and goals of science education in early childhood and their science practices were not completely developmentally appropriate, their perspectives and practices on science education could be improved. Some suggestions are given at the following section in order to enhance science education in early childhood education.

Suggestions

Suggestions for policy makers and further research in order to enhance science education in early childhood education are indicated separately at the following sections.

Suggestions for Policy Makers

In order to improve early childhood teachers' perspectives and practices on science there is need for an increase in content knowledge and self-efficacy beliefs of teachers. Teachers' suggestions on how to be well prepared to carry out successful science practices were considerable issues. Course work, interactive seminars, and

expert help would be suggestion to increase self-efficacy beliefs of early childhood teachers regarding science education.

Self-efficacy beliefs of pre-service early childhood teachers might be increased through enriching the science courses in the early childhood teacher education programs. These courses should be carried out by cooperative work between science education experts and early childhood education experts. In addition the content of the science courses should be enriched. They should be based on both theory and practice. From theoretical perspective, they should focus on importance, goals, and contribution of science education to early childhood education. Moreover, these courses should point out possible misconceptions and teaching strategies in early childhood science education. From the practical perspective, these courses should provide early childhood teachers with opportunities to plan and implement science practices in the field. In addition, teacher candidates should reflect on their practices through these courses. When teachers could practice the science activities before their teaching practices, they may develop positive attitudes towards science and carry out more science practices in their classes.

In-service teacher training programs and applied seminars should be carried out as the application based courses for early childhood teachers. Early childhood teachers should learn how to implement developmentally appropriate science practices through interactive seminars. In addition, the parts of early childhood education curriculums that emphasize science education should be improved. They should involve more detailed information for early childhood teachers on activity examples, implementation stages and content knowledge. Moreover there should be policies to increase the frequency of science practices. Teachers should be informed about contribution of science activities to early childhood education through in-

service training and should be supported to carry out more science practices in their classes. In order to increase frequency of developmentally appropriate science practices, they should be supported to do plans before the activities. When they do not plan the activities at the preparation period, they could not gain sufficient content knowledge to carry out developmentally appropriate science practices. However, they could determine the level of children's understanding, search appropriate educational materials and teaching strategies through planning the activities. Such a preparation period provides teachers with content knowledge on the topic as well. As a result, doing plans before the science activities provides a solution for teachers' lack of content knowledge on the topics of science activities.

Finally, as two of the teachers indicated at the study, there was a need for early childhood education context based activity books on science education. The important point here is that these books should be early childhood education context based. Science in early childhood education books should be written through cooperation of early childhood education experts and science education experts. The language of the books should be appropriate for early childhood teachers. In addition, they should involve details on flow of the activities and content knowledge related to the activity.

Suggestions for Further Studies

The research site of this study consisted of only one early childhood education setting. It was a lab school and teachers at the setting were mostly graduated from high school. This study presented practices and perspectives of high school graduate teachers and conducted in a lab school.

The further research should bring up early childhood teachers through in-serving training programs, who are qualified in science practices. The studies should train the teachers on science education and revealed appropriate ways to improve science teaching practices of early childhood teachers.

Moreover, the further studies might be conducted in other early childhood education settings such as public and private. This provides an insight on the policies of public and private institutions on science education in early childhood education. In addition, further studies might be conducted with teachers who were graduated from early childhood teacher education programs of universities. It provides an insight on perspectives of university programs on science education in early childhood education.

Limitations of the Study

Since it was not possible to observe practices of seven teachers at the same time, interviews were done with the teachers in addition to the observations in the selected classroom. In order to enrich the data on science practices of other teachers, short observations might be made in other classrooms addition to the purposefully selected classroom. Beside, the small sample size of the study resulted in a limitation to the generalizability of the findings.

Moreover, the student teachers had practices throughout they year at the lab school. Therefore, classroom teacher's implementations on some of the topics could be not observed. Finally, one of the teachers did not accept interviewing. This situation decreased the planned number of interviews.

APPENDIXES

Appendix A: Interview Questions

Öğretmen Görüşme Soruları

☐ **1. Bir okul öncesi öğretmeni olarak kendinizden bahseder misiniz? Eğitiminiz, mesleğe başlamanız, tecrübeleriniz hakkında bilgi verebilir misiniz?**
(Yaş - Lise - Üniversite - Staj - İş tecrübesi - Öğretmenlik tecrübesi)

☐ **2. Bu kurumdaki tecrübenizden bahseder misiniz**?
(Yıl - Yaş Grubu)

☐ **3. Şimdiki sınıfınızdan bahseder misiniz?**
(Yıl - Yaş Grubu – Kız ve Erkek Sayısı)

☐ **4. Bana tipik bir gününüzü anlatır mısınız**?
(Günlük Akış)

☐ **5. Takip ettiğiniz bir müfredat var mı? Müfredatınızdan bahseder misiniz?**
(Adı - Branşlar)

☐ **6. Eğitim ile ilgili planlamanızı nasıl yapıyorsunuz?**
(Günlük - Aylık - Yıllık)

☐ **7. Müfredatınızın haftalık temalar üzerine kurulu olmasını nasıl değerlendiriyorsunuz?**

☐ **8. Mesleki gelişiminiz için son bir yılda yaptığınız çeşitli çalışmalar var mı? (Kurs, seminer, konferans vb.) Nelerdir?**
(Tarih – Başlık – Konu – Sıklık – En Çok Faydalanılan Konular)

☐ **9. Okul öncesinde fen eğitimi denildiğinde ne anlıyorsunuz?**
(Amaç- Gereklilik – Önem)

☐ **10. Sınıfınızda fen eğitimi adına neler yapıyorsunuz?**
(Aktivite Örnekleri - Sıklık)

☐ **11. Sizin takip ettiğiniz müfredatın fen eğitimine bakış açısı nasıldır?**

☐ **12. Müfredatınızdaki "Haftalık Temalara ve "Anahtar Deneyimlere baktığınızda neleri fen eğitimi altında gruplandırırsınız?**

☐ **13. Bana tipik bir fen etkinliğinizi anlatabilir misiniz?**

☐ **14. Bir fen etkinliği yapmaya karar verdiğinizde neler yaparsınız, bir örnekle açıklar mısınız**?
(Dikkat Edilen Noktalar - Konu Kararı - Günlük Başlık Kararı - Kaynaklar)

☐ **15. Fen etkinliklerinizin uygulama aşamalarından bahseder misiniz, bir örnekle açıklayabilir misiniz?**
(Uygulama Akışı - Dikkat Edilen Noktalar - Öğretim Teknikleri)

☐ **16. Fen etkinliklerinizin hazırlık ve uygulamalarını göz önünde bulundurduğunuzda kendinizi nasıl değerlendirirsiniz?**
(Yeterli - Yetersiz – Yaşanılan Zorluklar – Zorlukların Sebepleri - Zorlukları Gidermek İçin Neler Yapılabilir)

☐ **17. Okul öncesi öğretmeninin fen etkinlilerinde başarılı olabilmesi neye/nelere bağlıdır**?
(Alan Bilgisi - Lisans Dersleri - Seminer vb.)

☐ **18. Eğitim vb. geçmişinizi düşündüğünüzde sınıfınızda gerçekleştirdiğiniz fen etkinliklerine katkısının olduğunu düşündüğünüz tecrübeleriniz nelerdir?**
(Alan Bilgisi - Lisans Dersleri - Seminer vb.)

☐ **19. Okul Öncesi Uygulama Biriminizde öğretmenler arasındaki iş birliği nasıldır?**
(Kaynak Paylaşımı - Genel Branşlarda İş Birliği - Fen Etkinliklerinde İş Birliği)

Birim Sorumlusu Görüşme Soruları

☐ **1. Kendinizden bahseder misiniz? Eğitiminiz, mesleğe başlamanız, tecrübeleriniz hakkında bilgi verebilir misiniz?**
(Yaş - Lise - Üniversite - Staj - İş tecrübesi - Öğretmenlik tecrübesi)

☐ **2. Bu kurumdaki tecrübenizden bahseder misiniz**? (Süre - Görevler)

☐ **3. Biriminiz hakkında bilgi verebilir misiniz?**
(Geçmiş - Yaş Grupları – Öğretmen Sayısı – Öğrenci Sayısı - Olanaklar)

☐ **4. Biriminizde tipik bir gününüz nasıl geçer?**
(Günlük Akış)

☐ **5. Biriminizdeki sınıflarda tipik bir gün nasıl geçer?**
(Yaş Gruplarına Göre Günlük Akış / Günlük Akışta Öğretmen İnsiyatifi)

☐ **6. Takip ettiğiniz bir müfredat var mı? Müfredatınızdan bahseder misiniz?**
(Adı - Branşlar)

☐ **7. Neden bu müfredat kullanıyorsunuz?**

☐ **8. Biriminizde eğitim ile ilgili planlamanızı nasıl yapıyorsunuz?**
(Günlük - Aylık - Yıllık)

☐ **9. Müfredatınızın haftalık konular üzerine kurulu olmasını nasıl değerlendiriyorsunuz?**

☐ **10. Öğretmenleriniz yapacakları günlük etkinlik konularına nasıl karar veriyorlar?**

☐ **11. Okul öncesinde fen eğitimi denildiğinde ne anlıyorsunuz?**
(Amaç - Gereklilik - Önem)

☐ **12. Biriminizin fen eğitimine bakış açısı nasıldır?**

☐ **13. Biriminizde fen eğitimi adına neler yapılıyor ve ne gibi uygulamalar var? Örneklerle açıklayabilir misiniz?**
(Aktivite Örnekleri - Sıklık)

☐ **14. Sizin takip ettiğiniz müfredatta fen eğitimine yer veriliyor mu? Bu müfredatın fen eğitimine bakış açısı nasıldır?**

☐ **15. Müfredatınızdaki "Haftalık Temalara ve "Anahtar Deneyimlere" baktığınızda neleri fen eğitimi altında gruplandırırsınız?**

☐ **16. Okul öncesi öğretmeninin fen etkinlilerinde başarılı olabilmesi neye/nelere bağlıdır**?
(Alan Bilgisi - Lisans Dersleri - Seminer vb.)

☐ **17. Fen etkinliklerinin hazırlık ve uygulama aşamalarını göz önünde bulundurduğunuzda birimizdeki öğretmenleri nasıl değerlendirirsiniz?**
(Yeterli - Yetersiz – Yaşanılan Zorluklar – Zorlukların Sebepleri - Zorlukları Gidermek İçin Neler Yapılabilir)

☐ **18. Okul Öncesi Biriminizde öğretmenler arasındaki iş birliği nasıldır?**
(Kaynak Paylaşımı - Genel Branşlarda İş Birliği - Fen Aktivitelerinde İş Birliği)

☐ **19. Biriminizde öğretmenlerin mesleki gelişimleri ile ilgili uygulamalarınız var mıdır ve nelerdir?**
(Birimdeki Eğitimler – Birim Dışındaki Eğitimler - Eğitim Masrafı – Öne Çıkan Alanlar)

☐ **20. Biriminizin ailelerle iş birliği nasıldır?**
(Bülten – Bülten İçeriği – Beraber Saat Konularını Destekleyen Etkinlikler (Gezi, Tiyatro, Deney) Örnekleri)

Interview Questions with Teachers

☐ **1. As a early childhood education teacher could you please tell me about yourself? Could you please give information about your education, your start the occupation and your experiences?**
(Age – High School – University – Internship – Occupational experiences – Teaching experiences)

☐ **2. Could you please tell me about your experience in the setting**? (Duration – Age group)

☐ **3. Could you please give information about your recent class?**
(Years – Age group – Number of girls and boys)

☐ **4. Could you please tell me about your typical day**? (Daily flow)

☐ **5. Do you have a curriculum to follow? Could you please tell me about the curriculum?**
(Name - Branches)

☐ **6. How do you make plans regarding your instruction?**
(Daily - Monthly - Annually)

☐ **7. How do you evaluate that the curriculum applied in the unit has a basis on weekly themes?**

☐ **8. Do you attended any activities for your occupational development in last year? (Course, Seminar, Conference etc.) What are they?**
(Date – Subject – Topic – Frequency – Most beneficial subjects)

☐ **9. What comes to your mind when you heard about science education in early childhood?**
(Aim- Requirement– Importance)

☐ **10. What kind of activities you conduct for science education in your class?**
(Activity examples - Frequency)

☐ **11. How is the view of the curriculum that you apply in your class on science education?**

☐ **12. Considering the weekly themes and key experiences in the curriculum which of them you could group under science education?**

☐ **13. Could you please tell me about your typical science activity?**

☐ **14. After you decided to conduct a science activity in the class what steps do you follow** and please elaborate it with an example?
(Points requires specicific attention – Deciding on the topic –Deciding on daily subject - Resources)

☐ **15. Could you please tell me about the implementation period of your scienceactivities,** and please elaborate it with an example?
(Application flow - Points requires specicific attention – Instructional techniques)

☐ **16. Considering the preparation and implementation periods of science activities, how do you evaluate yoursef?**
(Adequate – Inadequate – Faced difficulties– Causes of difficulties - What could be done to over come difficulties)

☐ **17. What are the factors that have impact on success of early childhood education teachers regarding science education**?
(Content knowledge – Taken courses – Seminars etc.)

☐ **18. Considering your background, educational for instance, what are the experiences that have a positive inpact on science activities you conduct in your class?**
(Content knowledge – Taken courses – Seminars etc.)

☐ **19. What is the level of cooperation between the teachers in the setting?**
(Resource sharing – Cooperation in general branches – Cooperation in science activities)

Interview Questions with the Director

☐ **1. Could you please tell me about yourself? Your education, when you start to the profession and your experiences in this profession?**
(Age – High School - University - Internship – Job experience- Teaching experience)

☐ **2. Could you please tell me about your experiences at the setting?** (Duration - Duties)

☐ **3. Could you please give information about your setting?**
(History – Age groups– Number of teachers– Number of students- Resources)

☐ **4. How is a typical day in the setting?** (Daily flow)

☐ **5. How is a typical day at the classes in your setting?**
(Daily flow of each age groups / Teachers' initiative in daily flow)

☐ **6. Do you follow a curriculum in the unit? Could you please tell me about the curriculum applied in the setting?**
(Name - Branches)

☐ **7. Why do you apply this curriculum?**

☐ **8. How do you make the plans regarding instruction in your setting?**
(Daily – Monthly - Annually)

☐ **9. How do you evaluate that the curriculum applied in the unit has a basis on the weekly themes?**

☐ **10. How do the teachers decide on the daily activities that they will conduct in the class?**

☐ **11. What comes to your mind when you heard about science education in early childhood education?**
(Aim - Requirement - Importance)

☐ **12. What is the view of your setting towards science education?**

☐ **13. What kind of applications conducted in the setting for science education? Could you please explain with examples?**
(Activity examples - Frequency)

☐ **14. Does science education take place in the curriculum applied in the setting? How is the view of the curriculum on science education?**

☐ **15. Considering the weekly themes and key experiences in the curriculum which of them you could group under science education?**

☐ **16. What are the factors that have impact on success of early childhood education teachers regarding science education**?
(Content knowledge – Taken courses – Seminars etc.)

☐ **17. Considering the preparation and implementation periods of science activities how would you evaluate the teachers at the setting?**
(Adequate – Inadequate – Faced difficulties – Causes of difficulties – What could be done to over come difficulties)

☐ **18. What is the level of cooperation between the teachers in the setting?**
(Resource sharing – Cooperation in general branches – Cooperation in science activities)

☐ **19. Are there any practices on occupational development of the teachers in the setting and what are they?**
(Training in the setting – Training out of the setting – Education expenses – Prominent areas)

☐ **20. What is the level of cooperation between the setting and the families?**
(Bulletin – Content of the bulletin – Joint activities to support art subjects (Trip, Theather, Experiment) Examples)

Appendix B: High Scope Model

High/Scope Okulöncesi Temel Deneyimleri

Yaratıcı Temsil

1. Nesneleri görünüm; ses, tat, koku ve dokunma yoluyla tanıma
2. Hareketleri ve sesleri taklit etme
3. Resim, fotoğraf ve modelleri gerçek yer ve nesnelerle ilişkilendirme
4. Hayali oyun oynama ve rol yapma
5. Kil, blok ve benzeri materyallerden model yapma
6. Çizme ve boyama

Dil ve Okuryazarlık

1. Kişisel olarak anlamlı deneyimler hakkında başkalarıyla konuşma
2. Nesneleri, olayları ve ilişkileri tanımlama
3. Dili eğlenceli biçimlerde kullanma: öykü ve şiir dinleme, masal ve tekerleme uydurma
4. Çeşitli biçimlerde yazma: resim çizme, karalama, harfe benzer şekiller, uydurma yazılar, geleneksel biçimler
5. Çeşitli biçimlerde okuma: öykü kitaplarını, işaret ve sembolleri, kendi yazdıklarını okuma
6. Birinin söylediklerinin yazıya geçirilip okunması

İnisiyatif Alma ve Sosyal İlişkiler

1. Seçimler, planlar yapma, kararlar alma ve bunları dile getirme
2. Oyunda karşılaşılan problemleri çözme
3. Kendi gereksinimlerini karşılama
4. Duyguları sözcüklerle dile dökme
5. Grup düzenine katılabilme
6. Başkalarının duygularına, ilgilerine ve gereksinimlerine duyarlı olma
7. Çocuklarla ve yetişkinlerle ilişkiler kurma
8. İşbirliğine dayalı oyunlar yaratıp deneme
9. Sosyal çatışmalarla başa çıkabilme

Hareket

1. Lokomotor olmayan biçimlerde hareket etme [demirlenmiş hareket (ayaklar yerde sabit durarak yapılan hareket): eğilme, bükülme, sallanma, kollarını sarkıtarak sallama]
2. Lokomotor olan biçimlerde hareket etme [demirlenmemiş hareket (ayaklar yerde sabit durmadan yapılan hareket): koşma, atlama, zıplama, sekerek gitme, uygun adım yürüme, tırmanma)
3. Nesnelerle birlikte hareket etme
4. Harekette yaratıcılığı ifade etme
5. Hareketi tanımlama
6. Hareket yönergelerine uyma
7. Tempoyu hissetme ve ifade etme
8. Ortak bir tempoya göre bir sıra izleyerek hareket etme

Müzik

1. Müzik eşliğinde hareket etme
2. Sesleri araştırma ve tanıma
3. Şarkı söyleyen sesi inceleme
4. Melodi geliştirme
5. Şarkı söyleme
6. Basit müzik aletlerini çalma

Sınıflandırma

1. Nesnelerin niteliklerini, benzerlik ve farklılıklarını araştırma ve tanımlama
2. Şekilleri ayırt etme ve tanımlama
3. Gruplara ayırma ve eşleştirme
4. Nesneleri değişik biçimlerde kullanma ve tanımlama
5. Aynı anda birden fazla niteliği akılda tutma
6. "Hepsi" ve "Bazıları" arasında ayırım yapma
7. Nesnelerin taşımadıkları özellikleri ya da ait olmadıkları bir sınıfı tanımlama

Sıralama

1. Nitelikleri karşılaştırma (daha uzun /daha kısa, daha büyük / daha küçük)
2. Çeşitli nesneleri bir dizi ya da desen oluşturacak düzenle arka arkaya sıralama ve aralarındaki ilişkileri tanımlama (büyük/daha büyük/en büyük, kırmızı/mavi/kırmızı/mavi)
3. Deneme-yanılma yoluyla, sıralı bir grup nesneyi sıralı başka bir grup nesneyle eşleştirme, birbirinin içine ya da üstüne koyma (küçük fincan-küçük tabak/orta boy fincan-orta boy tabak/büyük fincan-büyük tabak)

Sayı

1. İki ayrı takımdaki nesneleri sayıca karşılaştırarak hangisinin "daha çok," "daha az" ya da "aynı sayıda" olduğunu belirleme
2. İki ayrı takım nesneyi bire bir eşleme yaparak düzenleme
3. Nesneleri sayma

Alan

1. Doldurma ve boşaltma
2. Nesneleri birbirine takıp sökme
3. Nesneleri yeniden düzenleme ve biçimlendirme (katlama, bükme, germe, üst üste yığma, çevreleme)
4. İnsanları, yerleri ve nesneleri değişik alansal açılardan gözleme
5. Konumlar, yönler ve uzaklıklarla ilgili, oyun alanında, bina içerisinde ve yakın çevrede, deneyim edinme ve tanımlama
6. Çizim, resim ve fotoğraflardaki alansal ilişkileri yorumlama

Zaman

1. Bir eylemi bir sinyale göre başlatma ve durdurma
2. Hareketin farklı hızlarıyla ilgili deneyim edinme ve tanımlama
3. Zaman aralıklarıyla ilgili deneyim edinme ve bunları karşılaştırma
4. Olayların sırasını önceden görebilme, hatırlama ve tanımlama

Appendix C: Monthly Plan of the Institution

AYLAR	YILLIK PLAN			
	TEMEL DENEYİMLER			
KASIM	5/9 KASIM 2012 **KONU:** SONBAHAR	**DİL VE OKURYAZARLIK: HEPSİ** **İNSİYATİF ALMA VE SOSYAL İLİŞKİLER:**6) Başkalarının duygularına,ilgilerine ve gereksinimlerine duyarlı olma/ 7)Çocuklarla ve yetişkinlerle ilişkiler kurma		
	12/16 KASIM 2012 **KONU:**HAYVANLAR	**HAREKET:** 2)Lokomotor olan biçimlerde hareket etme/4)Harekette yaratıcılığı ifade etme/6)Hareket yönergelerine uyma **TEMSİL:2)**Hareketleri ve sesleri taklit etme/4)Hayali oyun oynama ve rol yapma/ **SINIFLANDIRMA:** 1)Nesnelerin niteliklerini,benzerlik ve farklılıklarını araştırma ve tanımlama/4)Nesneleri değişik biçimlerde kullanma ve tanımlama/7)Nesnelerin taşımadıkları özellikleri ya da ait olmadıkları bir sınıfı		
	19/23 KASIM 2012 **KONU:** SAĞLIĞIMIZ VE ÖZBAKIM	**İNSİYATİF ALMA VE SOSYAL İLİŞKİLER:3)**Kendi gereksinimlerini karşılama/ **6)**Sosyal çatışmalarla başa çıkabilme		
	26/30 KASIM 2012 **KONU:** HABERLEŞME VE İLETİŞİM	**TEMSİL:2)**Hareketleri ve sesleri taklit etme/4)Hayali oyun oynama ve rol yapma/5)Kil,blok ve benzeri materyallerden model yapma/6)Çizme ve boyama/**DİL: 1)**Kişisel olarak anlamlı deneyimler hakkında başkalarıyla konuşma 2)Nesneleri,olayları ve ilişkileri tanımlama/4)Çeşitli biçimlerde yazma/5)Çeşitli biçimlerde okuma/6)Birinin söylediklerinin yazıya geçirilerek okunması		
	KAVRAMLAR	**BELİRLİ GÜN VE HAFTALAR**	**AİLE KATILIMI**	**ALAN GEZİLERİ**
	*DAİRE /ÜÇGEN/KARE *AĞIR/HAFİF *SICAK,SOĞUK,ILIK *SAYILAR *BÜYÜK-KÜÇÜK *TATLI,TUZLU,ACI,EKŞİ	*29 EKİŞM-4 KASIM KIZILAY HAFTASI *10-16 KASIM ATATÜRK HAFTASI *24 KASIM ÖĞRETMENLER GÜNÜ	*ÖĞRETMENİN PLANINA GÖRE AİLE KATILIM PROGRAMI *KONULARA İLİŞKİN ÇALIŞMA SAYFALARI	*ORMANA GEZİ *ŞİŞLİ ATATÜRK EVİNE GEZİ *REVİRE GEZİ *POSTANEYE GEZİ

Appendix D: Bulletin Sample

OKULUMUZDA BU AY

KÜÇÜK GRUP ZAMANINDA DESTEKLENEN ANAHTAR DENEYİMLER | **BERABER SAAT KONULARINI DESTEKLEYEN ETKİNLİKLER** | **GEZİ, TİYATRO, DENEY**

(Not: Her öğretmen kendi yaş grubuna uygun büyük grup zamanı ve beraber saati daha geniş kapsamlı uygular. Aşağıda programın özeti bulunmaktadır.)

01-05 NİSAN 2013 ***Sınıflandırma 1)-Nesnelerin niteliklerini, benzerliklerini ve farklılıklarını araştırma ve tanımlama*** ***4)- Nesneleri değişik biçimlerde kullanma ve tanımlama.*** ***5)Hepsi ve bazıları arasındaki ayrımı yapma.*** ***Sıralama 1)-Nitelikleri karşılaştırma*** ***-Ormana gezi sırasında çocukların topladıkları materyaller(kozalak,palamut,yaprak çeşitleri,dal parçaları...) sınıfta incelenir.Bu materyallerin benzerlik ve farklılıkları konuşulduktan sonra istedikleri gibi bir çalışma yapmaları istenir.Hangisi büyük,hangisi küçük?Hangisi parlak,hangileri mat ? ..Daha sonra yaptıkları çalışmalar sergilenir.*** ***-Her çocuk kendi ağacını tasarlar; ağacın özellikleri hakkında konuşulur. Ağaç yapmak için kullandığı malzemeleri anlatır. Daha sonra çalışmasını sergiler.***	*AĞAÇ TÜRLERİ* Ağaç denilince aklınıza neler geliyor? -Toprağa düşen tohumdan önce fide meydana gelir. Fide bir yıl sonra fidan halini alır. Hücrelerinin çoğalmasıyla dal ve yapraklar, gövde ve kök olarak üç parçadan ibaret bir ağacın küçük bir modeli olur. Her yıl ağacın dallarında ve köklerinde yeni sürgünler çıkarken, gövdede de bir tane yıllık halka meydana gelir. Okul bahçesine gezi düzenlenerek ağaçların türlerinin tanıtılması sağlanır. Ağaç çeşitleri hakkında konuşulur, resimleri çekilip pano oluşturulur. Ağaç çeşitlerini(Dendroloji, ağaçları inceleyen bilim dalı) inceleyen bilim insanı olup ormandaki farklı ağaç dalları, ağaç kökleri... İncelenir. Ağaç köklerinin üzerine resim kâğıtlarından baskı çalışması yapılır. -Tutkal hamuru ile ağaç yapımı; yapılan ağaçların boyama çalışması yapılır. -Gazete kâğıtları ile kağıt hamuru yapılır ve hazırlanan hamurdan orman proje çalışması yapılır. -Kurabiye hamurundan orman ve ağaç şekilli kurabiye yapılır. -Ağaçlardaki sincaplar oyunu; Bütün çocuklar 7-8 kişilik gruplara ayrılırlar. Her grup el ele tutarak bir daire yapar. Bir kişi ortada bulunur. Birisi de ebe olarak dışarıdadır. Daireyi oluşturan çocuklar bir ağacı temsil eder. Dairenin ortasındaki öğrenciler sincaplardır. Ebe olan öğrenci de sincaptır. Öğretmenin düdüğü ile sincaplar, kendi dairesinden çıkar ve başka daireye giderler. Bu sırada ebe olan sincap da kendisine bir ağaç bulur. Dışarıda kalan ebe sincap olur. (Öğretmen bütün çocuklara sincap olma olanağı vermelidir.) *-Makarna çam ağaçı; Huni şeklinde katlanmış karton kağıtlar,düdük makarnalar,tutkal,yeşil elişi kağıtları kullanılır.*	***04 Nisan Perşembe günü,Demir Demirgil tiyatro salonunda,çocukların aktif olarak katılıp rol alacağı'Ormanın Bekçileri'adlı tiyatro oyunu izlenir.***
08-12 NİSAN 2013 ***Yaratıcı Temsil Etme 5) Kil, blok ve benzeri materyallerde model yapma.*** ***Alan 3)-Nesneleri yeniden düzenleme ve biçimlendirme*** ***-Teller verilir ve bunları büküp, uzatıp, katlayıp istedikleri modelleri oluşturmaları istenir.*** ***-Haşlanmış spagettiler ile serbest çalışma yapılır. Her çocuk yaptığı çalışmayı arkadaşlarına anlatır.*** ***-Dal parçaları kullanılarak bu parçalarla istedikleri modelleri oluştururlar.*** ***Örn; bebekler, ağaçlar, hayvanlar...***	*AĞAÇTAN YAPILAN EŞYALAR* Okulumuzda ahşaptan yapılan eşyalar nelerdir? Etrafımızı inceleyelim bakalım neler görebileceksiniz... Ahşap olan malzemeler; masa, sandalye, kitaplık,dolap, kağıt vs. Kampüse gezi düzenlenir; ağaçlardan yapılan ağaç evler incelenir,resimleri çekilir. Ağaç oymacılığı ne demektir?Aklınıza neler geliyor? Ağaçtan yapılan heykelleri incelemek Herşey ağaçtan olsaydı ne olurdu? Geri dönüşümü olmayan naylon, plastik poşet kullanımının doğaya zararı konusunda bilinçlendirme ve çevreyi bez torba kullanmaya teşvik konularında sohbet edilir. -Talaş kullanılarak çim adam yapılır.(talaş,çim,ince çorap,düğmeler,tabak) -Ahşapları kullanarak orman evi yapılır.	***Nezahat Gökyiğit Botanik Bahçesi'ne gezi düzenlenir.***

15-19 NİSAN 2013 *Sınıflandırma 3)-Gruplara ayırma ve eşleştirme* *-Kartona çizilmiş hayvan resimleri ,uzun ip ,büyük ve küçük poşetler.Sınıfa asılan ipe kartondan hayvan modelleri asılır,çocuklar aynı özellikte olan hayvanları poşetlere toplarlar.Daha sonra poşetten çıkarıp özellikleri hakkında konuşurlar.Kolaj çalışması ile sonlandırılır.* *Alan 4)-İnsanları ve yerleri değişik alansal açılardan gözleme* *-Büyük karton kutunun etrafına değişik boyutlarda delikler açılır,çocuklardan içine girerek sınıfta gördüklerini anlatmaları istenir.Daha sonra resimlerini çizip sergilerler.* *-Bahçede kaydırağın üstüne çıkarak bahçeye ve arkadaşlarına bakmaları istenir.Nasıl gördüklerini tarif ederler. Bahçedeki tahtaya tebeşirle gördüklerini çizerler.*	AĞAÇLARDA YAŞAYAN HAYVANLAR Ormanda yaşayan hayvanlar nelerdir,bu hayvanlara örnekler vererek konumuza değinelim . -Ormanda hangi hayvanlar yaşar?Nasıl yaşarlar?Neyle beslenirler? Nasıl çoğalırlar?Özellikleri nelerdir?...konu hakkında sohbet edilir.. Örneğin;Sincaplar ağaç kovuklarında yaşar.Maymunlar da kuşlar gibi ağaçlarda yaşarTavşanlar ormanlarda yaşar. Ağaçkakanlar kaktığı ağaçların kovuğunda yaşarlar.Pandalar ormanlarda yaşar ve ağaç altında yatıp kalkarlar. Çocuklara tepegözde konu ile ilgili asetatla hikaye anlatılır.Anlatılan hikaye yapılan elişi etkinlikleri ile pekiştirilir. Hayvanlarala ilgili bilmeceler sorulur, çocuklar tarafından bilmeceler oluştururlur. -Ağaç gövdesindeki kavukta yaşar Cevizi fındığı çok sever Tüylü kıvrık kuyruğu ile Çabuk çabuk gide .(Sincap) -Dalda durur elde durmaz.(Kuş) Ağaç hazırlanır,ağaçta yaşayan hayvanların resimleri incelenir, yapıştırılır. Konuyla ilgili kitaplar okunur.	*Konuya uygun geziler yapılır.*
22-26 NİSAN 2013 *Hareket 4)-Harekete yaratıcılığı ifade etme* *6)-Hareket yönergelerine uyma.* *Bahçede bahar dansı yapılır. Çocuk hareketli müzik eşliğinde kendi dans figürlerini oluşturur.* *-Çocuklara kuklalarla ilgili bir oyun oynayacağız söylenir,şimdi kuklacı ne yaparsa sizde aynısını yapacaksınız.* *Yaratıcı Temsil 3) Hayali oyun oynama ve rol yapma.* *-Farklı kültürlerin maskeleri boyanır,maskeler takılıp taklit yapılır.Daha sonra müzik eşliğinde dans edilir*	ÜLKELER-DÜNYA ÇOCUKLARI(ÇOCUK BAYRAMI) *Hangi ülkede yaşıyoruz? Dünya küresinde üzerinde yaşadığımız ülke haritası bulunur.Başka ülkelerin dünya üzerindeki yerleri,isimleri incelenir.* Dünyada bir çok ülkenin bulunduğu her ülkenin farklı özelliklere sahip olduğu anlatılır.Örneğin, Afrika slayt ile anlatılır, Afrika'nın özellikleri , iklimi ,orada yaşayan hayvanları isimleri öğrenilir. Afrikalı insanların bizlerden fiziksel olarak farklılıkları olduğunu ten renklerinin, taktıkları çeşitli takıların, her kabilenin farklı takılar taktıkları anlatılır. *Yaşadığımız ülkenin bayrağı ve farklı ülkelerin bayrakları incelenir.* *Siz bir bayrak tasarlasaydınız nasıl olurdu,artık materyaller kullanılarak bayraklar oluşturulur.* *Farklı ülkelerin müzikleri dinlenir.* *Farklı ülkelerin kıyafetleri incelenir.Çocuklar istediği ülkenin kıyafetlerini tasarlayarak defile gösterisi yapılır.* Konu hakkında kitaplar incelenir,okunur. Sınıflarda 23 Nisan etkinliği ve kostümlü balo düzenlenir.	***23 Nisan Ulusal Egemenlik Çocuk Bayramı kutlanır.***

APPENDIX E: Timetable for Four Years Old Children

YUVA
4 Yaş Grubu Günlük Plan

08:30	Yuvaya geliş
08:30-08:50	Aileden biriyle sakin bir faaliyet (Her çocuğun annesinin ya da babasının en az ayda bir kez katılmasını istiyoruz.
08:50-09:00	Temizlik
09:00-09:30	Kahvaltı
09:30-09:40	Temizlik
09:40-10:00	Beraber Saat – Jimnastik
10:00-10:10	Planlama zamanı
10:10-10:40	Çalışma zamanı
10:40-10:50	Hatırlama zamanı
10:50-11:00	Temizlik, giyinme
11:00-11:50	Bahçe Zamanı
11:50-12:00	Temizlik, Giyinme
12:00-12:30	Yemek
12:30-12:40	Temizlik
12:40-13:00	ÇEP Zamanı
13:00-14:45	Hikaye- Dinlenme Zamanı
14:45-15-00	Temizlik
15:00-15:20	İkindi kahvaltısı
15:20-15:30	Temizlik
15:30-16:00	Anahtar Deneyimler
16:00-16:15	Grup Oyunları Zamanı
16:15-16:30	Temizlik Giyinme
16:30-17:00	Bahçe ve gidiş

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