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The Effect of Science Activities on Concept Acquisition of Age 5-6 Children Groups*

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Abstract

Present research aims to determine the effect of science activities on concept development of preschool period age 5–6 children groups. Parallel to research objective, qualitative research pattern has been the selected method. Study group comprises of collectively 48 children from 5–6 age group attending to a private education institution in city of Antalya. Prior to conducting the research literature scan has been performed to identify "the Earth, Sun and Moon" relevant concepts corresponding to the age level of participants. Parallel to the science-related concepts activities such as "Do you know our Solar System?", "Do the planets move?", "How are the movements of the Earth, Sun and Moon?", "What are the phases of Earth, Moon?", "How does night and day occur?", "How does the Earth look like from the Space?" have been implemented for a period of six weeks. In line with selected science-relevant concepts participants have been asked to draw pictures before and after the science activities while at the same time the researchers have recorded in writing what participants aimed to narrate via pictures. At the end of research it has been manifested that science activities is an effective technique in the acquisition of basic concepts related to "the Earth, Sun and Moon" as much as they positively affect development of already-existing concepts in children.

Key Words

Science Teaching, Concept Teaching, Science Activities, Preschool Education, Earth, Sun and Moon.

Parallel to their development stages children tend to demonstrate high sensitivity towards certain types of learning during different stages of age. In this stage which is also termed as critical period children demonstrate further awareness towards environmental effects and can gain the kind of learning experiences prepared around their environment in a faster way. During preschool years on the other hand psycho-social, cognitive and language developments possess critical value (Senemoğlu, 2011). Since it is acknowledged that children possess different developmental characteristics than adults it is necessary to render them the kind of education addressing to the developmental characteristics of their own period (Vaivre Douret, 2011). During preschool ages children's mental-linguistic, social-emotional, psycho-motor and physical development and personality formation is completed to a large extent. Supporting this process via rich stimulants positively affects full development of the child (Draper, Achmat, Forbes, & Lambert, 2012). Conducted researches underline that in order to raise qualified and healthy individuals performing desired behaviors it is deemed necessary to start education at quite early ages (Patrick, Mantzicopoulos, Samarapungavan, & French, 2008). Preschool education that backs up education and development phases at home is one

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of the significant processes that prepares the child to primary education and has a positive effect in reaching achievement while receiving further education and effectively solving daily life problems (Stylianides & Stylianides, 2011). Preschool education is doubtless to say greatly important. That is largely related to the reason that learning mode is rather fast during early years of life, all knowledge and experiences gained during those years leave persistent effects in further stages that might also affect next phases in a child's life (Dursun, 2009; Karalis, 2009). Indeed as demonstrated by a good number of international exams such as PISA 2009 it has been proved that children with preschool educational background are compared to the ones with no preschool education much more successful (OECD, 2010).

A new born child is expected to possess required knowledge and skills to sustain his/her life. One of the biggest challenges that need to be overcome is learning and understanding the world lived in. That is the reason why individuals are naturally curious and strive to explore everything around (Dağlı, 2007). As a consequence, in order to learn about their surrounding children obtain information through researches, tests and explorations (Akman, Üstün, & Güler, 2003). The first six years of life is the best period to enforce observation and learning skills through exploring the environment and experiences (Anlıak, Yılmaz, & Beyazkürk, 2008; Kol, 2012). During these years children explore their surrounding, acquire pieces of knowledge as a result of certain experiences hence they establish a basis to learn new things and the better they explore their environment the better they manage to develop certain concepts (Ministry of national Education, 2011). Concept is defined as a formation identified by an exclusive name or symbol created by certain objects, symbols or events that share common features (Aral, 2006). On the basis of concept learning lies top-level abstraction skill. When a concept is mentioned what is actually meant is an abstraction. Abstraction involves forceful separation, recognition, elimination and selection (Karataş Coşkun, 2011). Via these concepts which are appropriately acquired prior to primary education and the development of such concepts enable the individuals to start primary education with a union of certain explorations and knowledge (Akman, 2002; Odluyurt & Batu, 2009). In addition it has also been detected in a number of researches covering Turkey that children with preschool education have higher levels of concept acquisition ratios compared to children with no preschool education (Arı, Üstün, Akman, & Etikan, 2000; Uyanık Balat & Güven, 2006).

As science is a way of comprehending and interpreting the world learning and classifying science concepts take place at quite early ages. It is agreed that preliminary concepts on science are provided by preschool educational institutions and further information is built on top of these concepts (Üstün & Akman, 2003). Despite that science is mostly neglected during preschool period; this negligence is attributed to the formal perception and presentation of science, abstract concepts involving science and negative attitude towards science (Kıldan & Pektaş, 2009). It is also acknowledged that a number of science concepts though they are simple can be acquired by many students only a few years after primary school (Wilson, 2004). Additionally it has also been witnessed that freshmen students in primary education possess synthesis mental models which are not fully compatible with science relevant academic data (Chang et al., 2007; Kubiatko & Prokop, 2007; Kurnaz & Değermenci, 2012; Özgür & Pelitoğlu Çıldır, 2008; Turgut & Gürbüz, 2011). On accounts of all these reasons and related causes researchers point out that science concepts need to be acquired, developed and children must be assisted in this direction at early stages (Bütün Ayhan, & Aral, 2007; Tao, Oliver, & Venville, 2012; Taşkın & Şahin, 2008). By means of science concepts learnt accurately and thoroughly at early stages and through their development the individuals employ these concepts in new learning strategies and remembering their past knowledge, in the following years they reach success in science and scientific fields (Akbaba Altun, & Çakan, 2008; Gallenstein, 2005; OECD, 2010; Sezer, 2008). Thus in this world we live in the owners of future can be equipped with basic skills of life, the way to protect himself/herself and others, ability to deal with increasingly growing global problems and possess top notch thinking skills (Eshach & Fried, 2005).

It is rather hard for preschool children to learn abstract science concepts since they are in preprocessing period (Günay Bilaloğlu, 2005). That is because during this period concept development in children follows a path from physical to abstract and concrete thinking to abstract thinking. During this period it is required to present abstract concepts by associating with concrete concepts (Smolleck & Hershberger, 2011). While gaining science concepts to children activities that demand active

participation, providing experience through living and concretizing the concepts should be practiced (Hadzigeorgiou, 2002). Science activities in early childhood educational program also can be defined as the kind of activities which by manipulating natural curiosity of children assist them to make environmental observations and researches, to demonstrate their own thoughts, to develop their scientific process skills and through concretizing abstract concepts employing them in daily life, enabling active participation and allowing children to reach success in their future educational years (MONO, 2011; Ravanis & Pantidos, 2008; Saçkes, Trundle, Bell, & O'Connell, 2011; Tsai & Liang, 2009). The environment where science activities are conducted bears great significance in familiarizing and endearing the child with natural surrounding (Özdemir & Uzun, 2006). Through science activities it would be possible to allow further communication of children and through concretizing the concepts they would structure them on top of this knowledge (Brenneman & Louro, 2008; Dere & Ömeroğlu, 2001). Associating science activities at early ages with science concepts in children's world is also contributive to developing positive attitudes towards science (Patrick et al., 2008). Additionally through science concepts gained and developed at early stages it is possible to prevent synthesis mental models which are not adequately compatible with scientific knowledge occurring in primary education years so that individuals can reach better success in scientific fields (Fleer, 2009).

"The Earth, Sun and Moon" has been a topic of research that intrigued scientists in the past and present day. As researches on astronomy and space conducted abroad are examined it is possible to witness a steady increase in the number of relevant studies (Venville, Louisell, & Wilhelm, 2012). However in Turkey related researches on "The Earth, Sun and Moon" are quite few in comparison (Doğru, Gençosman, Ataalkın, & Şeker, 2012). It has also been ascertained via researches on "The Earth, Sun and Moon" conducted amongst primary education students that students possess synthesis mental models that are not sufficiently compatible with students' scientific knowledge on astronomy field (Kurnaz & Değermenci, 2012; Küçüközer, Küçüközer, Yürümezoğlu, & Korkusuz, 2010). "Earth, Sun and Moon" related topic has always been a matter of interest for preschool students since in daily life children have the opportunity to constantly observe Earth, Sun and Moon and watch abundant numbers of cartoons on these concepts addressing to their age level. In that case students' curiosity towards Earth, Sun and Moon is promoted. Besides children can easily picture the concepts they create in their minds (Anlıak et al., 2008; MONO, 2011). In present research the aim has been to detect the effect of science activities on concept development of "Earth, Sun and Moon" in preschool period 5–6 age group children.

Method

Research Model

Present research aims to seek answer to the question "Do science activities have any effect on concept development of preschool period age 5–6 children groups?" In line with research objective, comprehensive and in-depth data gathering tools and qualitative research approach has been employed to identify individual perceptions, experiences and perspectives of participants as well as comprehending and explaining current status (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2010). Qualitative research is described as a research type which employs qualitative data gathering methods such as survey, interview and document analysis. This research aims to manifest perceptions and events in their natural environment in a realistic and holistic formation. The most evident feature of qualitative case study is that one or several cases are explored in depth. Factors relevant of one case are analyzed in a holistic approach and the focus is directed on the way they affect relevant situation and the way they are affected from that situation itself.

Study Group

Study group of current research comprises of collectively 48 students 28 girls and 20 boys from 5–6 age group in a private preschool educational institution in Antalya city Konyaaltı district. This institution has been the selected school since it possessed appropriate physical conditions to perform science activities and school administration, teachers and children were cooperative and volunteering to participate. In designating study group, particular care has been paid to select normally developing children whose parents are alive and not separated.

Data Gathering Tool

A good number of methods can be utilized to uncover the concepts resident in children's minds.

Drawing is one of these methods (Anlıak et al., 2008). Drawing, painting and three-dimensional construction activities are physical indicators of the child's emotion, thought, perception, concept, reaction and skills. The child feels him/herself free while drawing (Ayaydın, 2011). The child reflects through drawing the concepts already existing within him or her mind (Artut, 2004).

In this research, data have been gathered via drawing method which is appropriate to the age level of preschool children and aiming to manifest the concepts in their minds related to "the Earth, Sun and Moon".

Process

Through employed science activities it has also been aimed to gain a variety of experiences to preschool period 5–6 age group children in addition to providing them with concept acquisition and development. Through these diversified experiences the objective has been to assist children in establishing cause effect relation, supporting scientific process skills, realizing their own talents and limitations, freely expressing their feelings and thoughts.

During the stage of activity preparation relevant literature has been scanned, the views of four field specialists on preschool period and science education and teachers from application school have been received. In line with relevant literature and specialists' views; six different activities have been prepared by researchers which are applicable to gain and develop target concepts via questions which are in line with children's developmental characteristics on "the Earth, Sun and Moon" to uncover the concepts in children's minds. These questions and activities have been presented to the approval of specialists on preschool period and science education and modifications have been performed accordingly. The prepared activities in final formation have been limited to 20–25 minutes since it is hard for this age group to concentrate on something too long (AP.-1).

Each of these six specific activities is influential in the acquisition and development of concepts. Thus every week prior to activity questions have been directed to unveil the concepts existing in children, pictures have been drawn to answer these questions and it has been recorded by researchers what children aimed to narrate via these pictures. The same process has been repeated in the aftermath of activity as well.

These activities have been performed by researchers; class teachers have provided assistance to the researchers during performance. In the first week question "Do you know our solar system?" has been asked before and after the activity and science activity to gain related concepts has been performed. In the second week before and after the activity question "Do the planets move?" has been asked and science activity to gain related concepts has been performed. In the third week before and after the activity question "How are the movements of the Earth, Sun and Moon?" has been directed and science activity to gain related concepts has been performed. In the fourth week before and after the activity question "What are the phases of Earth and Moon?" has been asked and science activity to gain related concepts has been performed. In the fifth week before and after the activity the question "How does Night and day occur?" has been asked and science activity to gain related concepts has been performed. In the sixth and last week before and after the activity the question "How does the Earth look like from the Space?" has been asked and science activity to gain related concepts has been performed.

Before and after the performance, questions that have been identified to uncover the concepts in participants' minds have been directed to the participants and participants have been asked to draw pictures that reflect their answers and researchers have recorded in writing what participants aimed to narrate via pictures. Each activity has lasted 1 week. During this process children have been provided with flexible length of time to draw pictures. In that way participants have been eager and comfortable in performing the activities (Howe & Jones, 1998).

Data Analysis

In the analysis of research data, context analysis technique which is one of the qualitative research methods has been employed. Context analysis is a technique that enables working on human behaviors via indirect ways. This technique is implemented to determine the existence of particular words or concepts within a group consisting of one or several texts. It makes inferences as regards the message in text. Context analysis is not limited to the texts alone, it also extends to the analysis of pictures (Büyüköztürk et al., 2010). In context analysis first it is needed to conceptualize the data then organize in a logical manner according to surfacing

concepts then determine the themes. During this process the stages are encoding data, theme formation, code and theme organization, identification and interpretation of findings (Aslan, 2009).

To simplify analysis of pictures and participants' explanations and prevent confusion, participants have been provided with codes. Participants have been identified via codes K1, K2,…...K48. In the analysis of research findings data obtained from pictures and explanations have been listed and the most frequently encountered data have been detected. In accordance with frequently encountered data subthemes and main themes containing these subthemes have been prepared. However in situations when participants all agree main themes have been directly prepared with no need to establish subthemes.

Validity and Reliability

To the end of increasing internal validity of research it has been enabled to provide a unity between main themes and subthemes constituting main themes and between every single main theme. Aside from that during performance particular importance has been paid to integrate within the research participants' class teachers next to researchers and also accurate reflection of data the real condition by securing the mutual trust between participants and researchers.

In order to elevate internal reliability of research pictures and direct quotations from participants' explanations have been provided. Direct quotations aim to reflect participants' views to the reader in a more effective way. Besides researchers have prepared separate themes, next they reached a consensus by comparing these themes. The themes obtained in the end have been checked by two academicians specialized in the field of qualitative research.

Findings

Findings obtained from data analysis have been separately tabulated for the particular six activities and in these tables main themes prepared for every single activity have been presented.

In the first activity titled as "Do you know our Solar System?" context analysis of the pictures drawn by participants to identify their views on Solar System is provided in Table 1. Main theme titled as "Responses on the characteristics of Sun" consists of subthemes "Sun heats us", "Sun enlightens us" and "Sun rises in the morning and/or sets down at night". Main theme titled as "Responses on what is seen at sky" consists of subthemes "There are clouds in the sky", "There are birds in the sky", and "There is Sun and/or Moon in the Sky". Main theme titled as "Responses on the existence of planets in Solar System" consists of subthemes "There are planets in our Solar System" and "There are stars in our Solar System". Main theme titled as "Drawing pictures of planets different from each other" consists of subthemes "Different sizes of planets" and "Different colors of planets".

Table 1.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "Do You Know Our Solar System?" Before and after the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
Responses on the characteristics of Sun	22	45.8	8	16.7
Responses on what is seen at sky	11	22.9	-	0.00
Responses on the existence of planets in Solar System	39	81.3	45	93.8
Responses on the fact that planets are different from each other	32	66.7	43	89.6

As Table 1 is analyzed in-depth it surfaces that prior to the activity on the question "Do you know our Solar System?" participants have exhibited maximum level of participation with 81.3 percent to the main theme "Responses on the existence of planets in Solar System" whereas they exhibited minimum level of participation with 22.9 percent to the main theme "Responses on what is seen at sky". At the end of activity performance however participants have exhibited maximum level of participation with 93.8 percent to the main theme "Responses on the existence of planets in Solar System" while they did not participate to the main theme "Responses on what is seen at sky". It has been detected that science activity conducted at the end of analysis has been influential in familiarizing students with Solar System. Compared to the pictures and explanations of students before the activity there is quite an evident positive rise in the pictures and explanations of students in particular who before the activity believed that Solar System was restricted to their observations in sky (Figure 1).

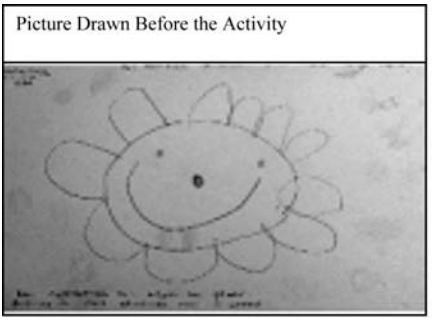

Figure 1. *Before and after the Activity Pictures Drawn by K7 Student as a Response to the Question "Do You Know Our Solar System?"*

As Figure 1 is examined it becomes evident that before the activity K7 student has answered the question "Do you know our Solar System?" this way: "It is a huge Sun that enlightens us. The clouds move around it and they are too many" and after the activity they have commented "I know the Sun, Saturn and the Earth". Likewise before the activity K40 student has answered the question "Do you know our Solar System?" this way: "It exists to enlighten us and make us see" but after the activity s/he added the statement "While planets revolve around Sun the Moon revolves around the Earth".

In the second activity titled as "Do the planets move?"context analysis of the pictures drawn by participants to identify their views on the movements of planets is as given in Table 2. "Yes they move" main theme comprises of subthemes "Planets move by rotating", "Planets revolve around the Sun", "Planets move slowly" and "Planets move around themselves". "No they do not move" main theme consists of "They do not move since they are not alive" and "Planets do not move" subthemes.

Table 2.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "Do the Planets Move?" Before and after the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
Yes they move	25	52.1	48	100
No they do not move	23	47.9	-	-

As Table 2 is analyzed in-depth it surfaces that prior to the activity on the question "Do the planets move?" participants have exhibited maximum level of participation with 52.1 percent to the main theme "Yes they move" and at the end of activity performance participants have exhibited maximum level of participation with 100 percent to the main theme to the main theme "Yes they move". It has been detected that science activity conducted at the end of analysis has been influential in teaching students that planets are moving. Compared to the pictures and explanations of students before

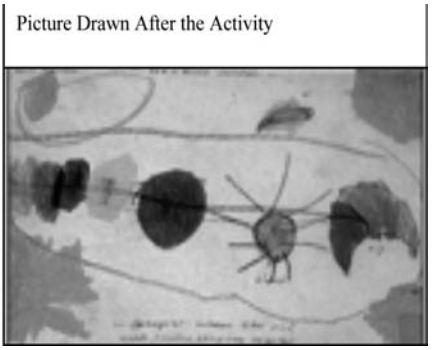

Figure 2. *Pictures Drawn by K23 Student as a Response to the Question "Do the Planets Move?"In Pre Performance and Final Performance*

the activity there is quite an evident positive rise in the pictures and explanations of students in particular who before the activity believed that planets on accounts of not being alive did not move (Figure 2).

As Figure 2 is examined it becomes evident that before the activity K23 student has answered the question "Do the planets move?" this way: "No because they have no feet" and after the activity the same student has said "Yes they revolve around the Sun". Likewise before the activity K28 student has answered the question "Do the planets move?" as "No they do not" but after the activity s/he added the statement "Planets move. They themselves revolve around the Sun".

In the third activity titled as "How are the movements of the Earth, Sun and Moon?" context analysis of the pictures drawn by participants to identify their views on the movements of the Earth, Sun and Moon is provided in Table 3. Main theme titled as "The Sun moves" consists of subthemes "It revolves around the Earth" and "It revolves around the other planets". Main theme titled as "The Earth moves" consists of subthemes "The Earth revolves around the Sun", "The Earth revolves around itself" and "The Earth moves slowly". Main theme titled as "The Moon moves" consists of subthemes "The Moon revolves around the Earth", "The Moon revolves around the Sun" and "The Moon revolves slowly". Main theme titled as "The Sun does not move" implicates that Sun does not revolve around the planets in our Galaxy.

Table 3.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "How are the movements of the Earth, Sun and Moon?" Before and after the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
The Sun moves (Around the Earth and other planets in Galaxy).	10	20.8	9	18.8
The Sun does not move (It stays fixed, revolves only around its own axle).	7	14.6	25	52.1
The Earth moves	30	62.5	44	91.7
The Moon moves	19	39.6	37	77.1
The Moon does not move	4	8.3	4	8.3

As Table 3 is analyzed in-depth it surfaces that during the pre-performance on the question "How are the movements of the Earth, Sun and Moon?" participants have exhibited maximum level of participation with 62.5 percent to the main theme "The Earth moves" and in the final performance after the activity participants have demonstrated 91.7 percent of participation. In addition to that before the activity participants have performed 39.6 percent of participation to the main theme "The Moon moves" and in the aftermath of activity they have exhibited 77.1 percent of participation. As regards the movement of Sun in before activities participants have exhibited 14.6 percent of participation to the main theme "The Sun does not move" but in the aftermath of activity participants have exhibited 52.1 percent of participation. At the end of analysis it has been concluded that performed science activity is effective in teaching the students the movements of Earth, Sun and Moon. Compared to the pictures and explanations of students before the activity there is quite an evident positive rise in the pictures and explanations of students in particular

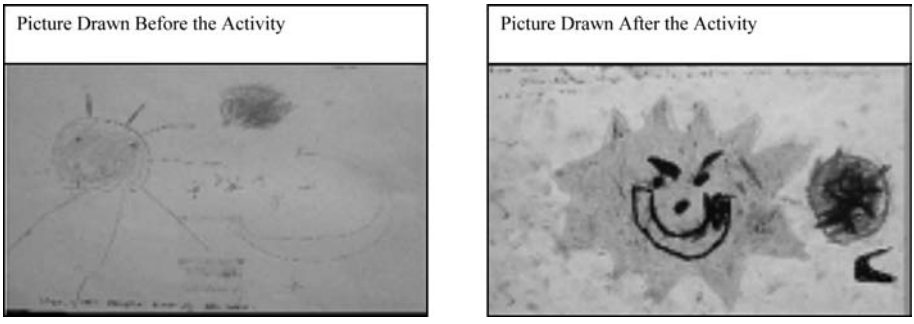

Figure 3. *Before and after the Activity Pictures Drawn by K12 Student as a Response to the Question "How Are The Movements of the Earth, Sun and Moon?"*

who before the activity failed to draw pictures on the movements of Sun and Moon and/or interpret the picture (Figure 3).

Figure 3 manifests that in before activity K12 student has answered the question "How does the Earth, Sun and Moon move?" this way "The Earth revolves around the Sun. The Moon scatters light" but in the last performance after the activity s/he commented that "The Sun does not move. Earth revolves around the Sun. Moon revolves around the Earth". Likewise during pre-performance K38 student has responded to the question "How does the Earth, Sun and Moon move?" this way; "The Earth revolves" and in the final performance after the activity s/he has added the explanation "The Earth and Moon revolves slowly but the Sun does not move".

In the fourth activity titled as "What are the phases of Moon?" context analysis of the pictures drawn by participants to identify their views on the phases of Moon is as shown in Table 4. Main theme titled as "responses on the phases of Moon as crescent, full moon and quarter " represents the students who can picture crescent, full moon and quarter collectively as a response to the question "What are the phases of Moon?" or provide a similar verbal explanation.

Table 4.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "What are the phases of Moon?" Before and After the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
The phases of Moon are full moon	25	52.1	40	83.3
The phases of Moon are crescent	27	56.3	36	75.0
The phases of Moon are quarter	6	12.5	26	54.2
The phases of Moon are crescent, full moon and quarter	6	12.5	26	54.2

A detailed analysis of Table 4 indicates that prior to the activity on the question "What are the phases of Moon?" participants have performed maximum level of participation with 56.3 percent to the main theme "The phases of Moon are crescent" and they performed minimum level of participation with 12.5 percent to the main theme "The phases of Moon are quarter" and "The phases of Moon are crescent, full moon and quarter". In the aftermath of activity however in the final performance on the question "What are the phases of Moon?" participants have performed maximum level of participation with 83.3 percent to the main theme "The phases of Moon are full moon" and they performed minimum level of participation to the main themes "The phases of Moon are quarter" and "The phases of Moon are crescent, full moon and quarter". Data analysis reveals that all participants who pictured and/or interpreted four phases of Moon were able to picture and/or interpret crescent and full moon phases. It has also been witnessed that although a great majority of participants who drew pictures of crescent and full moon before the activity represented phases of Moon with magnified then minimized form of crescent and full moon that was not seen at all in the aftermath of activity. At the end of analysis it has been agreed that performed science activity has been helpful in teaching students phases of Moon. A comparison between pictures drawn before and after the activity and students' explanations openly indicate that particularly students who before the activity drew pictures or provided explanations that phases of Moon were crescent and/or full moon were able to learn quarter concept after the activity (Figure 4).

An analysis of Figure 4 shows that before the activity K33 student answered the question "What are the phases of Moon?" as "Circle" but in the aftermath of activity the student commented "The Moon re-

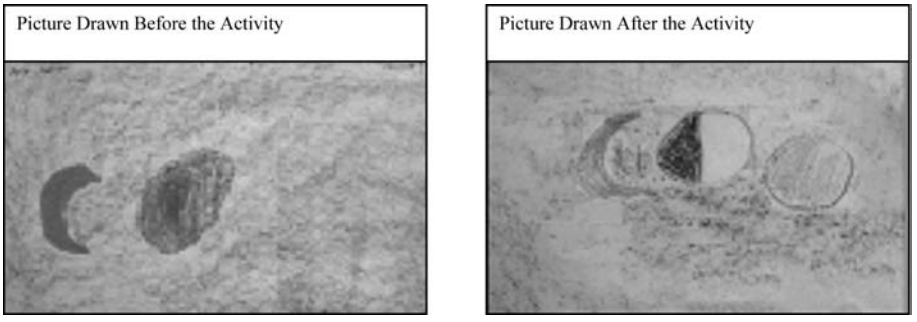

Figure 4. *Pictures Drawn by K33 Student in Pre-Performance and Final Performance as a Response to the Question "What Are The Phases of Moon?"*

volves around the Earth. In that case there emerges quarter occasionally". Likewise prior to the activity K11 student answered the question "What are the phases of Moon?" as "The place where Moon is seen becomes night. It becomes day when it is not seen and it gets dark" and in the aftermath of activity "First quarter has become Moon. Then last quarter. When it covers the front of Earth there is Lunar Eclipse. When it becomes circle and moves away there emerges full moon".

Table 5.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "How does night and day occur?" Before and After the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
Responses on that it is day if there is Sun, night if there is Moon	33	68.8	19	39.6
Responses on that night and day occur when the Earth revolves around the Sun	6	12.5	29	60.4
Responses on that one part of Earth is night, one part is day	7	14.6	21	43.8

In the fifth activity titled as "How does night and day occur?" context analysis of the pictures drawn by participants to identify their views on the formation of day and night is as shown in Table 5. Main theme titled as "Responses on if there is Sun it is day, if there is Moon it is night" comprises of sub themes "It becomes enlightened when there is Sun", "It gets dark when there is Moon" and "When the Sun moves it becomes night when it comes it becomes day".

Detailed analysis of Table 5 manifests that prior to the activity on question "How does night and day occur?" participants have exhibited maximum level of participation with 68.8 percent to the main theme "Responses on that it is day if there is Sun, night if there is Moon" while they exhibited minimum level of participation with 12.5 percent to the main theme "Responses on that night and day occur when the Earth revolves around the Sun". In the aftermath of activity last participants have performed maximum level of participation with 60.4 percent to the main theme "Responses on that night and day occur when the Earth revolves around the Sun" while they demonstrated minimum level of participation to the main theme "Responses on that it is day if there is Sun, night if there is Moon". At the end of analysis it has been detected that performed science activity is effective in teaching students the formation of night and day. It is obvious from the pictures and explanations of students that students who in pre-performance attributed the formation of night and day to the existence of Sun tried to associate after the activity formation of night and day with the movements and positions of Earth, Sun and Moon (Figure 5).

Figure 5 manifests that before the activity K2 student responded to the question "How does night and day occur?" as "When the Sun sets down Moon rises, when Moon sets down the Sun rises" and in the aftermath of activity the same student commented that "Day and night occurs when the Earth revolves because Moon is the satellite of the Earth". Likewise prior to the activity K45 student responded to the question "How does night and day occur?" as "It gets dark at night" and added that "The Earth revolves, that is how it happens".

In the sixth activity titled as "How does the Earth look like from space?" context analysis of the pictures drawn by participants to identify their views on the way Earth looks like from space is as given in Table 6.

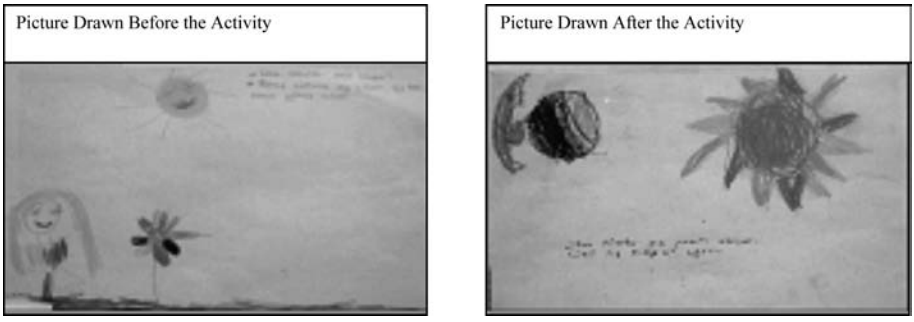

Figure 5. *Pictures Drawn by K2 Student as a Response to the Question "How Does Night And Day Occur?" Before and after the Activity*

Table 6.
Context Analysis of the Data in the Pictures Drawn as a Response to the Question "How does the Earth look like from the space?" Before and After the Activity

Themes	Before the Activity		After the Activity	
	N	%	N	%
Earth looks dark from space	4	8.33	10	20.9
Earth looks blue from space	21	43.8	21	43.8
Earth looks bigger from space	9	18.8	2	4.16
Earth looks smaller from space	5	10.4	-	0.00
Earth looks distant from space	6	12.5	-	0.00

Detailed analysis of Table 6 manifests that prior to the activity on question "How does the Earth look like from the space?" participants have performed maximum level of participation with 43.8 percent to the main theme "Earth looks blue from space" while they performed minimum level of participation with 8.3 percent to the main theme "Earth looks dark from space". In the aftermath of activity on the other hand participants have performed maximum level of participation with 43.8 percent to the main theme "Earth looks blue from space" while they performed no participation to the main themes "Earth looks smaller from space" and "Earth looks distant from space". At the end of analysis it has been ascertained that performed science activity is effective in teaching students how the Earth looks like from space. It is clearly evident from the pictures and explanations of particularly the students who failed to make deduction on space in pre performance that after the performance they found out not only the way Earth looks like from space but also concept of space (Figure 6).

Figure 5 demonstrates that before the activity K35 student has answered the question "How does the Earth look like from the Space?" as "Big" and in the aftermath of activity the same student provided the explanation "Dark, big and blue". Likewise K16 has answered before the activity the question "How does the Earth look like from the Space?" as "It looks tiny" and in the aftermath of activity s/he added that "It looks deep blue".

Discussion

It is a must to have an idea of what concepts dwell in people's minds so as to supply them with better education. Most of the times learning takes place through transferring previous life experiences to new situations. Science activities play significant role in assisting participants to create new concepts, correct the misconceptions and participate in learning process (Greenfield et al., 2009; Oğuz, 2007). Children's knowledge on basic science is built upon basic science concepts learnt during early childhood. Via science activities concepts are learnt accurately, concepts are developed and cognitive development is supported. In that way people learn about events and things in their surrounding and daily life through performance and experience, their observation skills are improved, they become more sensitive to the environment and their problem solving skills are boosted (Şimşek & Çınar, 2008). During preschool period which plays vital role in concept acquisition and development accurate acquisition and development of science concepts is bound to a high quality education. In this quality preschool education, development stages of children plays critical role. Considering the fact that since preschool children's activity level is high they cannot concentrate on an activity for long unless the activity grabs their attention it is necessary

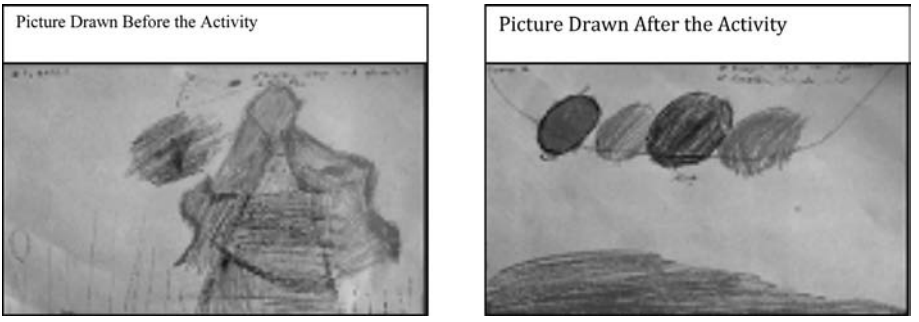

Figure 6. *Pictures Drawn by K35 Student during Pre-Performance and Final Performance as a Response to the Question "How Does The Earth Look Like From The Space?"*

to present science activities as interesting activities in order to obtain positive results in learning experience of preschool children (Senemoğlu, 2011). Indeed in current research covering a preschool educational institution as percentage ratios of drawings and concepts prepared before the activity to uncover "Earth, Sun and Moon" related concepts and drawings and concepts prepared after the activity are contrasted it surfaces that there has been a positive rise in the concept acquisition and development of science activities. In similar studies too it has been determined that quality science activities are positively effective in cognitive development and science concepts acquisition skills of participants (Akman et al., 2003; Ayvacı, 2010; Brenneman & Louro, 2008; Chang, 2012; Kallery, Psillos, & Tselfes, 2009; Şahin, 2006; Tsai & Liang, 2009; Urbančič & Glažar, 2012).

In the research of Genç Kumtepe, Kaya, and Kumtepe's (2009) study belonging to 4490 primary education students has stated that the two most effective factors in primary education third grade students' science success are science achievement in preschool period and reading success. The frequency of science activities during preschool period has been identified as the most effective variable. Hence preschool science activities have great influence in children's science achievement during primary education years. Ogelman's (2012) research covering preschool 5–6 age groups is related to land project and all concepts regarding land. In this experimental research it has been stated that project activity covering preschool period children has positively affected children's achievement and concept acquisitions.

According to Saçkes et al. (2011), science activities enable children to have physical experiences for the acquisition and development of science concepts. Children become more curious during this process. In science teaching to ensure concept acquisition and development the experience must be at first hand. In active learning children acquire and develop such concepts through self implementation and interpretation of their direct observations. In some data collected before performance certain conceptual errors have been witnessed and some concepts have been missing. Literature scan also shows that primary education students have synthesis mental models that are not sufficiently compatible with scientific knowledge on "the Earth, Sun and Moon" (Kurnaz & Değermenci, 2012; Küçüközer et al., 2010). One of the reasons accounting for this conclusion is that teachers are in charge of all decision taking processes hence children's mental performance becomes passive as they fail to exchange views because science is a learning field that can be learnt only through experimenting, experiencing, performing, researching and exploring (Ayvacı, 2010).

As reported in previous researches too proper acquisition of science related concepts via preschool educational programs would be helpful in training children who shall be aware of their own skills and limitations, proper learning and development of science concepts in primary education and further education thus raising children who can be successful in science related fields, utilize scientific process skills by establishing cause and effect relation, possess top notch thinking skills, able to solve problems, peacefully live surrounding world and free to express his/her feelings and thoughts.

Suggestions

It has been ascertained in this research that preschool children are unaware of certain concepts related to "the Earth, Sun and Moon" and as regards some concepts they possess synthesis mental models that are not sufficiently compatible with scientific knowledge. Driven from these findings it is feasible to suggest that during preschool education period acquisition and development of science-relevant concepts should be initiated at early ages. In present research it has also been detected that science activities are effective in gaining science relevant concepts and correct synthesis mental models that are not sufficiently compatible with scientific knowledge. Positive outcomes of science activities during preschool period shall affirmatively influence future academic achievement of children thus it is feasible to suggest that during preschool period science activities should be recurrently performed. In the activities that shall be performed to develop existing science-relevant concepts in children it is advised that children's needs and interests be prioritized and activities not exceed their attention span. In addition it is suggested that researchers or teachers produce original works aiming to develop science related concepts. To sum up it can be argued that to ensure cognitive development of children, acquisition and development of science related concepts bears importance and accordingly the environment that the child interacts with should be enriched in a way allowing the acquisition and development of science related concepts.

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Ap.-1.
Objective and implementation of six-week activities

ACTIVITY	OBJECTIVE	PERFORMANCE
Activity – 1: Do you know our Solar System?	Recognizing Solar System, Earth and planets and preparing a Solar System model.	Planets in Solar System are- in the order of their size- drawn on a cardboard and a model is formed. Through this model children are informed about the sizes of planets and a discussion is executed. Next children are asked to draw these planets on their own cardboards and paint according to the model. Trimmed cardboards are hung on a straight string in the order of their distance from Sun.
Activity – 2: Do the planets move?	Comprehending that planets revolve around themselves as well as Sun and animating the movements of planets in Solar System.	Solar System model is examined with children and circles around Solar System are drawn. It is noted that circle in the center is Solar System. Balloons reflecting the size of Solar System planets are inflated then distributed to children. The balloon signifying the Sun is selected as yellow. Next children are positioned around circles in the order of Solar System and they move slowly.
Activity – 3: How are the movements of the Earth, Sun and Moon?	Grasping the movements of the Earth and Moon around the Sun.	On yellow paper Sun picture, on blue paper Earth picture, on white paper Moon picture are stuck then distributed to children. Children are talked about the movements of Earth and Moon. Next Sun is put into the center and the movements of Earth and Moon are played by children.
Activity – 4: What are the phases of Moon?	Observing and understanding various phases of Moon.	Half part of a white balloon is painted black. A circle is formed in class. In the center of class a child holding a black and white balloon stands. Children in the circle are asked to draw white part of balloon. Starting with the child who paints moon full dark the pictures are collected and hung on a string. It is concluded that the shape of Moon remains constant and the shape is changed because of Moon's rotation around the Earth.
Activity – 5: How does night and day occur?	Explaining that the reason of the occurrence of day in one part and night in other part of the world with the rotation of world around the Sun.	The curtains are drawn in class and a dark atmosphere is created. Earth model is brightened by a torch. It is concluded that as the Earth revolves one part of the world gets dark while the other part is day.
Activity – 6: How does the Earth look like from space?	Analyzing world model.	A car model is presented to children. It is underlined that in reality the car is much bigger than model. Then an Earth model is shown to the child and it is emphasized that in reality Earth is much bigger. The reason why some parts of the world are blue some parts are brown is asked. Then it is concluded that the world is blue since a vast portion of the world is covered with waters.