Research Article

INVESTIGATION OF CONCEPTUAL UNDERSTANDINGS OF PRE-SCHOOL AGE CHILDREN ON LIVING AND NON-LIVING THINGS

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ABSTRACT

The aim of this study is to investigate the conceptual understanding of pre-school children on the living and non-living concepts along with the sources of these conceptual understandings. A descriptive pattern, which included quantitative and qualitative together, has been used in the study. The study group has been identified within the scope of the maximum variation sampling method, which is a type of purposive sampling. The study was conducted with 80 children aged between 4-6 years, who study in a pre-school institution located in Kırşehir. Living/Non-living things cards and interview questions were used as a data collection tool in the study. When the answers given by the children during the interviews were examined, it has been found that the conceptual understanding of living and non-living things is gathered in four categories; no conception, misconception, misunderstanding and correct understanding. Some of the children in the low-level of knowledge group were able to answer the names of the things they saw in the pictures partly. Based on the results of the study, it has been proposed to create educational environments that allow teachers, families and the media to convey existing concepts in a way that it will form correct meaning for the child which in turn will ensure the conceptual understanding of pre-school children.

Keywords: Science education, pre-school education, conceptual understanding, living/non-living things.

INTRODUCTION

The term “Scientific literacy” is referred as the vision of the program in many science programs of developed countries (Shamos, 1989). Although the scope of necessary features that a scientifically literate individual should have is expanding each day, one of the most basic features of a scientifically literate person is to have a basic knowledge about scientific concepts (Laugksch, 2000: 6). As in developed countries, the term scientific literacy has been started to use in Turkey since 2005. Turkey's national science education programs intended to educate all individuals as a scientific literate and for this purpose, it is clearly stated that individuals should be educated in biology, physics, chemistry, earth and environmental science and engineering applications (MEB, 2018).

The way science is taught (or not taught) within the preschool period has broad implications for science education. Science activities specifically designed for preschool children play a key role in children’s cognitive development and basic science concepts (Greenfield et al., 2009: 7-25). In addition to this, while pre-school science education increases the creativity of the children (Mirzaie et al., 2009: 7), it reduces social gender and socioeconomic inequality (Leibham, Alexander & Johnson, 2013. Because science education has developed children's curiosity and thinking skills, children will learn by experiencing scientific knowledge (Karaer & Kösterelioğlu, 2005).

In one study, it is noted that the children had the capacity to learn science subjects in the preschool period (Nayfeld et al., 2011). Cognitive psychologists have stated that pre-school children are able to think about abstract and concrete concepts, use a wide range of reasoning processes and they are eager to learn and curious about their environment (Phillips & Shonkoff, 2000). Some studies reveal that children get a lot of information about nature and physics even in the pre-school period and develop their theories about how nature works (Gopnik, Meltzoff & Kuhl, 1999). The early concepts that children have formed in their minds provide opportunities for children to test, adjust, revise and deepen their scientific ideas (Gropen et al., 2017: 2). Despite the fact that one of the aims of science courses is conceptual understanding, it seems like students of all ages have difficulty in understanding abstract, distant, inexperienced scientific concepts (Gobert & Clement, 1999: 2).

THEORETICAL FRAMEWORK

Conceptual Change

The first concepts are created through interaction with the environment, observation and intuitive ways within children. They develop some concepts about life, nature and science through their personal observations, social interactions and their education. These concepts operate as an information system that evaluates inputs and incoming information (Ozbas & Kilinc, 2015: 3). Cognitive development theory has been put forward by Piaget (2002) who conducted studies about concept development within children. According to this theory, cognitive development of the child occurs in successive periods. The new knowledge is being assimilated into

the current schemata. While the schemata go through these phases, if there is information that does not match with the current schemata then re-modification and formation process begin. However, every new thing disturbs the cognitive balance of the child. Therefore, this balance is restored with the processes of incorporation and adaptation. Existing behaviours are re-organized. Through organizing, the child protects and enhances the system in which he/she is in (Schunk, 2012). This conceptual formation also depends on the behavioural experience which is nourished from the cultural values of the child's surroundings (Vygotsky, 1980). Vygotsky and Piaget, who are the founders of social constructivist philosophy, have pointed out that the development of children is the result of a genetic and ecological interaction (Schunk, 2012). Bronfenbrenner (2009)'s ecological development theory that examines the influence of the environment on the child's concept development shows a basic partnership with Vygotsky (1980)'s zone of proximal development. In these two theories, it is emphasized that the individual is interacting with a socio-cultural context throughout his development and learning process and the individual is not separated from the socio-cultural context that involves the environmental factors such as family, school, peer, and media. Bronfenbrenner's ecological systems theory, which has been put forward in 1979, states that environment is a product of the environment while the individual is a product of the environment. According to ecological system theory, the conceptual development of the child is formed as a complex system which is the result of interaction with multiple environmental layers. These layers are given in Figure 1 below.

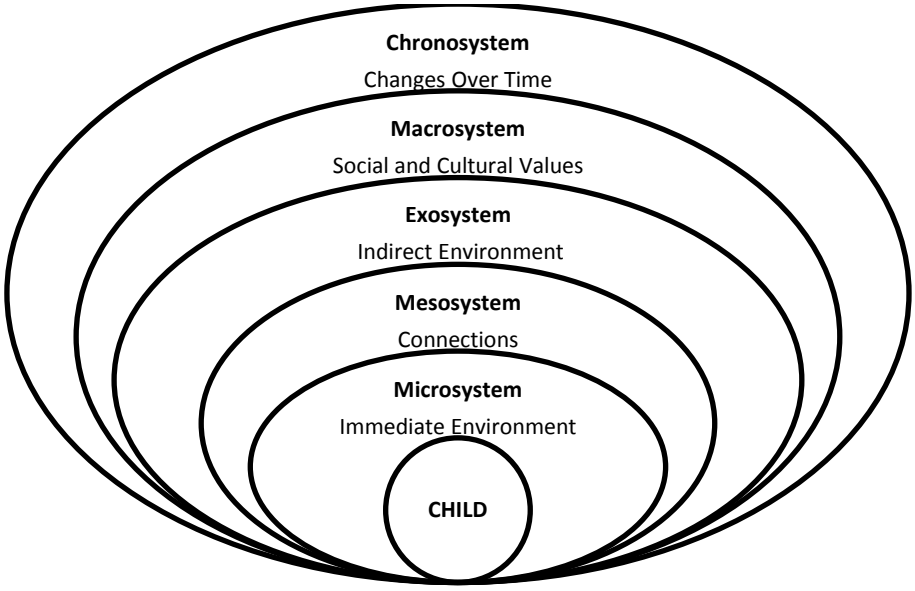


Figure 1. Bronfenbrenner's ecological systems theory

Microsystem: These are the closest environmental units to the child in which he encounters his first interactions. In this system, the child can have environmental elements such as parents, toys, room.

Mesosystem: The relationships between micro system and other systems. In this system, there may be elements such as the school, other family members and neighbourhood friends.

Exosystem: Environmental elements that indirectly influence the child even though that child is not directly involved with them. In this system, there may be elements such as media, laws, social beliefs, management.
Macrosystem: These are the elements belong to the environment in which the child lives in. In this system, there may be elements such as country, religion, history.

C**hronosystem:** There are useful dimension of time, which demonstrates the influence of both change and constancy in the child's environment. The chronosystem may include a change in family structure, address, family economy, in addition to immense society changes such as economic cycles and wars (Bronfenbrenner, 2009).

Conceptual Understanding

Conceptual understanding; can be defined as in-depth learning where similarities, differences and relationships can be established between concepts and these can be transferred to other environments and used to solve problems (Vosniadou, 2009). The conducted studies (Zoller, 1996: 1-2; Kilinc et al., 2013: 3-4) have shown that four types of conceptual understanding are formed in the minds of the students who face this difficulty.

1. Misconception (MC)
2. Misunderstandings (MU)
3. No conception (NC)
4. Correct understanding (CU)

Misconceptions can generally be described as scientifically inaccurate unique interpretations and meanings of children's ideas (Vosniadou, 2009: 22). A child with a misconception makes consistent but a false statement. Misconceptions are the constructs that are unique to the individual, devoid of scientific facts and constitute important obstacles in the learning process (Köse, 2008: 1). There isn't any consistent explanation in misconception. Therefore, misunderstandings can easily be removed by using goal-oriented intervention; however, misconceptions are resistant to change (Kilinc et al., 2013: 3). When there is no conception situation, the child either does not want to answer or repeat the question or the answer. In the correct understanding, the child gives the right answer in a consistent manner (Ozbas & Kilinc, 2015).

Children can make conceptual analysis by using their reasoning skills. This analysis helps children to learn new concepts (Üstün & Akman, 2003). According to Piaget (2011), the child feels the need of organizing his/her thoughts in logical chains. Since discernment skills of young children are low, they cannot express deductive and consistent statements. When Piaget examined the commitment types that the children describe with "because" conjunction, he has identified three commitment state including cause and effect commitment, logical commitment and psychological commitment. Causality commitment involves "because" statements based on the cause-and-effect relationship between two events or cases. Logical commitment involves "because" expressions based on the cause-and-effect relationship that links two ideas or two judgments. Psychological commitment, however, detects a target-outcome relationship between an action or a goal or two

psychological behaviours. If the commitment showed with "because" is not correct, it can be said that the child has a reasoning error (Borgerding & Raven, 2018).

The studies, which examine how children's familiarity with the objects influences their reasoning preferences, emphasize that the age range is important. Christidou and Hatzinikita (2006) conducted a study with children aged 4, 5 and 6 and they have found that children's familiarity with the subject affects their reasoning skills when describing two processes such as plant growth and rain formation. In a similar study conducted by Martinez-Losada, Garcia-Barros and Garrido (2014), it has been found that children can make scientific explanations about plant growth since they are more familiar with the growth of plants compared with rain formation. In another study conducted by Erickson, Keil and Lockhart (2010), it has been observed that children under age 5 can perceive the differences between the biological processes (growth and reproduction) and psychological processes (possessing desires and beliefs) of the things they are familiar with.

The Concept of Living/Non-Living Things

Like many concepts, living and non-living concepts are also shaped and acquired new meanings as children develop, learn, and interact with their environment. However, sometimes misunderstandings or imperfect knowledge can lead to the displacement of these concepts in the child's mind. In this case, the child may sometimes confuse about an object that he knows very well. When the children learn living/non-living concepts, they follow the path of perception by triggering the information they already have instead of making sense of what they read or hear. In this process, there is often confusion and obstacles arise in learning the concepts.

When the conducted studies are examined, it is determined that pre-school children have some perceptual problems about living, pre-existed, non-living-natural and artificial things. For example, Poling and Evans (2004) conducted a study and it indicates that those 3 and 4 years old children perceived the dying things as living. Venville (2004) conducted a study with children aged five and six, they found that children frequently used criteria such as learning, movement, death, luminance, body parts, fracture resistance, related with human and living in a home in order to determine whether an object is a living/non-living things. However, it is seen that the scientifically accepted living characteristics such as growth, nutritional needs and reproduction have not been used sufficiently in the obtained findings.

In the literature, it is seen that one of the concepts that children have difficulty in classifying is the plants. In the study conducted by Martinez-Losada, Garcia-Barros and Garrido (2014), it is determined that the majority of children aged 3, who participated in the survey, described human and animals as living organisms however they described the plants as a non-living thing. According to Gatt, Tunnicliffe, Borg and Lautler (2007), plants, in particular, are difficult for the children to comprehend as a living organism. It is determined that young children aged 4 and 5 know very little about plants and they usually perceive plants as small objects with thin stems, leaves and as a flower. In a study (Martinez-Losadaet et al., 2014: 3), which investigates the causes of this

situation, points out lack of movement, lack of body parts, and inability to make noise as the reasons for children to think plants as non-living. In studies conducted with children in their early childhood (Hatano et al., 1993), 92-100% of them identified the people as living, 92-99% of them identified animals as living, and 80-96% of them identified inanimate objects as non-living, and only 58-68% of them identified plants as living. Martinez-Losada, Garcia-Barros and Garrido (2014) found that 76% of children aged 7 can identify plants as living. In another study, the majority of children aged 7-8 described man-made goods and natural objects as non-living, while 10-15% of them thought rock and stalactite-stalagmites as living (Kampourakis et al., 2012).

As you can see from the literature review, although one of the aims of the science subjects taught in preschool period is the conceptual understanding, it can be seen that most of the children in this period have difficulties in understanding the scientific concepts. Especially pre-school children create broken structures called as misconceptions (alternative concept) and misunderstandings as a result of ill-structured the concepts in line with individual and the environment.

The Aim of the Research

The aim of this study is to examine the conceptual understanding of pre-school children on living and non-living things. For this purpose, answers to the following questions have been sought.

Sub-problems

Regarding pre-school children participating in the research;

1- What is their level of conceptual knowledge about living/non-living things?
2- What is their conceptual understanding of living/non-living things?
3- What are the sources of information leading them to conceptual understanding of living/non-living things?

METHOD

In this study, a descriptive research design, which included quantitative and qualitative data together, based on the research question and aim. The descriptive research design has three objectives: (1) to define variables; (2) to define the relationships between variables; and (3) to define distributions (Gall et al., 1996). The level of knowledge variable for living/non-living concepts was defined by using measures of central tendency (mean, median or mode) and variability (range and standard deviation) measures. It is used to describe the relationships between qualitative findings and the level of knowledge for living/non-living things and conceptual understanding variables. Distributions are defined by using frequency or percentage distributions; these are indicated by bar graphs.

Study Group

80 (f_{male}=36; f_{female}=44) children who study in a public pre-school in Kırsehir Turkey and whose age ranging from 4-6 years, were included in the study group. Face-to-face interviews were conducted with 10 children out

of this group. During the identification of the working group, one of the public preschool attached to National Education was selected randomly. The sub-sample for the qualitative stage was selected by maximum variation sampling method. Based on the children's answers to the concept test, two groups with 5 children were selected with having the most extreme values.

Class observations and interviews were conducted with 10 selected children and the data was collected from the children's answers regarding the object cards. Gender and age distributions of the children participating in the survey are given in Table 1 below.

Table 1. Age and Gender Distribution of Children

			Age			
			4	5	6	Total
Gender	Female	N	10	10	18	38
		%	%26.3	%26.3	%47.4	%100
	Male	N	10	17	15	42
		%	%23.8	%40.5	%35.7	%100
Total		N	20	27	33	80
		%	%25.0	%33.8	%41.2	%100

Data Collection Tools

In the study, 1- Living / non-living things working paper, 2- Interview questions used as means of data collection tools.

1- Living / non-living things cards (concept test): Cards are created by adapting the studies of Morrison, Chappell and Ellis (1997), Nguyen and Rosengren (2004), Hughes, Woodcock and Funnell (2005) and Umdu Topsakal (2013). In each cards, there are pictures of 10 living organisms (parrot, fish, ant, lion, cow, plant, cat, dog, mushroom and mold) and the picture of 8 non-living things (water, fire, television, car, sun, stone). All cards are distributed to the children one by one, and they are asked to colour the boxes underneath if the picture is a living thing (Appendix-1).

2- Interview questions: Four semi-structured interview questions were developed through question pool obtained from the investigated sources within the creative process of living/non-living objects cards. The interview questions are given below.

Interview Questions

1- What is the name of the thing that you see in the picture?

2- Is this thing you see in the picture is living or non-living?

3- Why is it living/non-living?

4- Where did you learn that from, who told you that?

The first question is prepared to determine whether the interviewed children are aware of the objects. The second question is designed to identify children's classification skills as living or non-living. The third question is

designed to determine the conceptual meaning of children. The fourth question is designed to identify the information sources affecting the formation of conceptual meanings of children.

During the development of measuring instruments following steps are; (1) identifying the problem: determining the goals and questions, (2) creating the draft form, (3) getting expert opinion and creating a pre-application form and (4) implementing the application. Pilot applications were made for both data collection tools in order to make the measurement instruments ready for the main application. In a pilot application, the students are asked to paint the box located in the cards in red paint if the picture is a living thing and paint the box in blue if the picture is a non-living thing. After that, they were asked whether the pictures were understood or not. Thinking aloud strategy is believed to be the most basic strategy in terms of ensuring structure validity of the measuring instruments (Patton, 2002). It has been determined that the students could not understand the mouldy cheese and grass in the pictures and those were replaced with potted flower and mouldy bread. In addition, cartoon and drawing objects were removed and real photos were used instead. Afterwards, an interview was conducted with the student and the interview questions were checked if they were suitable for the age level. The cards were revised with the feedbacks of the student and the reliability of the items and the interview questions were examined in the context of the Kendall tau-b correlation coefficient. Therefore, leading research experts investigated pictures of things in cards and interview questions. Scores were made on the basis of the evaluations made on each item in the measuring instruments. This score was calculated by scoring as "appropriate (3)", "improvement required (2)" and "not appropriate (1)". According to the obtained results, it was seen that the coefficient of concordance among experts is over .81 for each item. Accordingly, it was seen that the correlation values of the expert opinions obtained for each item are high (Kalaycı, 2010). According to these results, it can be seen that the items included in the measurement tools can be used within the scope of the research.

Analysis of Data

1- Quantitative Dimension

Following descriptive statistics used during the analysis of the data obtained from the tests; frequency (f), per cent (%), mean ($\overline{X}$) and standard deviation (SD). In order to determine the comparable groups, "$\overline{X}$-1SD (Low Level) < Medium Level < $\overline{X}$+1SD (High Level)" formula is used.

2- Qualitative Dimension

In the present study, category analysis, which is one of content analysis, is used to analyse the data. In this context, following steps are; *(1)* coding of the data, *(2)* finding the themes, *(3)* organizing the codes and themes, and *(4)* identification and interpretation of the findings.

In the research process, two researchers independently performed the analysis of data within the framework of these steps. Later, the researchers compared the findings of research questions with each other. The necessary evaluations have been carried out until 100% compliance is achieved on the findings and after that,

the findings were finalized. The analysis made by Ozbas and Kilinc (2015) is used in the qualitative analysis of the collected data for the third question of the interview. In this analysis, the answers of the children are termed as follows; "Correct understanding" if the children responded correctly to living/non-living question in a logical way, "Misconception" if the children gave the wrong answer but they expressed it with a consistent reason, "Misunderstanding" if the children explained the wrong answer with inconsistent justification, "No conception" if the children had no valid reason whether it was a living/non-living things, or if they repeated the questions or the answers every time.

FINDINGS

Quantitative Findings

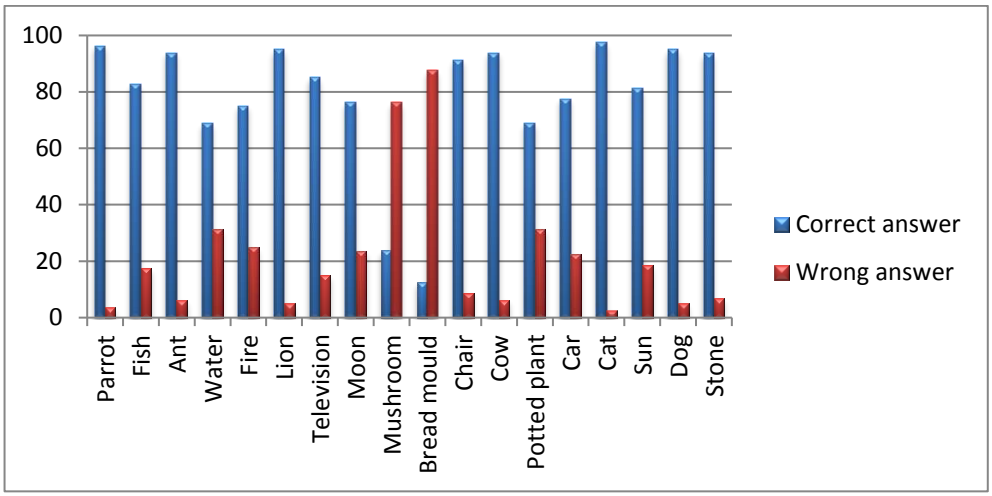
Findings related to the answers given by the children to the concept test

In Table 2 below indicates the response frequencies and percentages of the children in living/non-living concept test.

Table 2. Descriptive Data on Answers Given by Children to Flash Cards

Things	Answers	f	%	Things	Answers	f	%
1.Parrot	Living	77	96,2	**10.Bread mould**	Living	9	11,3
	Non-living	3	3,8		Non-living	71	87.7
	Total	80	100		Total	80	100
2.Fish	Living	65	81,2	**11.Chair**	Living	8	10
	Non-living	15	18,8		Non-living	72	90
	Total	80	100		Total	80	100
3.Ant	Living	75	93,2	**12.Cow**	Living	74	92,4
	Non-living	5	6,8		Non-living	6	7,6
	Total	80	100		Total	80	100
4.Water	Living	23	28,8	**13.Flower**	Living	55	68,7
	Non-living	57	71,2		Non-living	25	31,3
	Total	80	100		Total	80	100
5.Fire	Living	20	25	**14.Car**	Living	17	21,3
	Non-living	60	75		Non-living	63	78,7
	Total	80	100		Total	80	100
6.Lion	Living	76	95	**15.Cat**	Living	78	97,5
	Non-living	4	5		Non-living	2	2,5
	Total	80	100		Total	80	100
7.TV	Living	10	12,8	**16.Sun**	Living	16	20
	Non-living	70	87,2		Non-living	64	80
	Total	80	100		Total	80	100
8.Moon	Living	19	23,8	**17.Dog**	Living	77	96,2
	Non-living	61	76,2		Non-living	3	3,8
	Total	80	100		Total	80	100
9.Mushroom	Living	18	22,4	**18.Stone**	Living	5	6,8
	Non-living	62	77,6		Non-living	75	93,2
	Total	80	100		Total	80	100

Graph 1 was created to make the findings in Table 2 clearer.



Graph 1. Demonstration of Correct/Wrong Answers by Children on Things

When the Graph 1 was examined, about %93 of children included animals (Parrot, fish, ant, lion, cow, cat and dog) in the living group while about %7 of children included those in the non-living group. About 69% of children classified the potted plant in the living thing whereas 31% classified it as non-living. While %34 of children grouped mushroom as a living thing, about %76 of children grouped those as a non-living thing. Approximately %27 of children grouped bread mould as a living thing whereas %87 of children groped it as non-living. While about %27 of children included non-living things such as water, fire, television, moon, chair, car, sun and stone in the living group, %73 of them included those in the non-living group.

Qualitative Findings

80 children participated in the study and out of these children 5 with the most accurate answer and 5 with the least right answer to flash cards were selected. The number of correct answers to the test of age, gender and living / non-living objects and the children's knowledge levels were given in Table 3 below. The name of the children was not indicated for ethical reasons but code names were used instead.

Table 3. Characteristics and Levels of Content Knowledge of Children

Participants	Content Knowledge Level	Correct number of answers	Gender	Age
K1	High Level	16	Female	6
K2		16	Female	6
K3		16	Female	6
K4		16	Male	6
K5		16	Male	6
K6	Low Level	11	Male	4
K7		11	Male	4
K8		12	Female	5
K9		12	Male	4
K10		8	Male	4

Findings of the Children Regarding the first Interview Question (What is the Name of the Thing That You See in the Picture?)

When the answers of the children in the high-level group regarding the first question were examined, it was evident that nearly all of the children named the things correctly without any hesitation. In this group, only K2 coded child could not name the mould on the bread. When the children in the low-level group were examined, some of the children indicated that they do not know the name of mushroom and mould shown in the picture. When the response of K7 coded child, who is in the low-level group was examined.

Researcher: *All right, what do you see there?*

K7: ……. (No reply)

Researcher: *Well, sometimes there are green things on the stale bread. Do you know what are they?*

K7: *I don't know.*

Findings of the Children Regarding the Second Interview Question (Is This a Living or a Non-Living Thing That You See in the Picture?)

10 children interviewed in this second interview question and they were asked if the things shown on the cards were living or non-living. When the answers of the two groups were examined, it was observed that there were some differences between those two groups.

When the answers of children, who scored high scores in the conceptual test, were examined, they frequently classified water, fire, fungus, sun wrongly. When the answers of children who scored low in conceptual tests, were examined, K6 and K7 coded children seemed to have no idea whether the things were living or non-living. The children in this group frequently classified fish, moon, fungus, mould, potted plant, and sun wrongly.

Findings of the Children Regarding the Third Interview Question (Why is it a Living or a Non-Living Thing?)

In the third interview question, children asked why these things are living / non-living and asked to indicate the reasons. When the answers of the two groups were examined, it was seen that there were some similarities and differences between these two groups. The answers given by the children are shown in Table 4 below.

Table 4. Conceptual Understanding of Children's

Things	High Level Group					Low Level Group				
	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
Parrot	CU	CU	CU	CU	CU	NC	MU	MC	CU	NC
Fish	CU	CU	CU	CU	CU	CU	MU	NC	CU	MC
Ant	CU	CU	CU	CU	CU	NC	NC	NC	CU	CU
Water	NC	MU	CU	MC	MC	NC	NC	NC	CU	CU
Fire	MC	CU	CU	MC	MC	NC	NC	NC	NC	NC
Lion	CU	CU	CU	CU	CU	NC	NC	NC	CU	NC
T.V	MC	CU	CU	CU	CU	MU	NC	NC	NC	NC
Moon	CU	CU	MC	CU	MC	MU	NC	NC	NC	NC
Mushroom	MC	CU	MC	MC	MC	MU	NC	MC	NC	NC

Mould	CU	MC	CU	NC	CU	NC	NC	NC	NC	NC
Chair	CU	CU	CU	MU	MU	MU	NC	NC	NC	NC
Cow	CU	CU	CU	CU	CU	NC	NC	NC	CU	NC
Plant	CU	CU	CU	CU	CU	NC	NC	NC	NC	NC
Car	CU	CU	CU	CU	MC	NC	NC	NC	NC	NC
Cat	CU	CU	CU	CU	CU	CU	NC	CU	CU	NC
Sun	MC	CU	MC	CU	MC	MC	NC	NC	NC	NC
Dog	CU	CU	CU	CU	CU	NC	NC	CU	NC	NC
Stone	CU	CU	CU	CU	CU	NC	NC	NC	NC	NC

When Table 4 was examined, it was seen that most of the children in the high-level group correctly understood the concepts, whereas those in the low-level group did not understand the concepts. The qualitative expressions of both groups were examined in detail in order to clarify the causes of this situation.

When the reasons of the children in the high-level group regarding the conceptual information on living / non-living things are examined, they tend to think that things which are "movable", "human-like (able to eat, grow, walk, talk and have sense organs", "spontaneous", "effect (harm) mankind", are living. As a result of such conceptual structure of the children, some of them developed correct understanding, some developed misconceptions, some developed misunderstandings and some developed no conception at all towards the concept.

The K3-coded child in this group answered the question whether the fire is living or non-living thing as a non-living thing when the correct understanding of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K3: *Fire*
Researcher: *Is fire a living thing or a non-living thing?*
K3: *Non-living*
Researcher: *Why is that?*
K3: *Because it doesn't move, just burns there.*
Researcher: *Okay, where do you see that fire is non-living, who told you that?*
K3: I saw that in a movie.
Researcher: *How, can you tell us more?*
K3: *The fire was burning but it doesn't move.*
Researcher: *When the wood burns, fire moves up and down. It shows that it is moving, doesn't it?*
K3: No

The K5-coded child in this group answered the question whether water is living or non-living thing as a living thing when the misconception of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K5: *Water*
Researcher: *Is water a living thing or a non-living thing?*
K5: *Living*
Researcher: *Why is that?*
K5: When we open the tap it flows. It moves like that and comes in waves.

The K1-coded child in this group answered the question whether water is living or non-living thing as a living thing when no conception of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K1*: Water*
Researcher: *Is water a living thing or a non-living thing?*
K1: *Living*
Researcher: *Why is that?*
K1: …….. [No reply]

The K4-coded child in this group answered the question whether the chair is a living or non-living thing as a living thing when the misunderstanding of this response is examined,

Researcher: *What is the name of the thing that you see in the picture?*
K2*: Chair*
Researcher: *Is chair a living thing or a non-living thing?*
K2: *Living*
Researcher: *Why do you think like that?*
K2: *Because we sit on it.*

When the reasons of the children in the low-level group regarding the conceptual information on living / non-living things are examined, they tend to think that things which are "movable," "effect mankind", and "human-like (able to eat, walk, talk and have movable organs" are living. As a result of such a conceptual structure of the children, some of them developed correct understanding, some developed misconceptions, some developed misunderstandings and some developed no conception at all towards the concept.

The K9-coded child in this group answered the question whether the cow is a living or non-living thing as a living thing when the correct understanding of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K9: *Cow*
Researcher: *Is cow a living thing or a non-living thing?*
K9: *Living*
Researcher: *Why do you think like that?*
K9: *Because it gives milk and also eats grass*

The K10-coded child in this group answered the question whether water is a living or non-livingthing as a non-living thing when the misconception of this response is examined;

Researcher: *Do you know what this thing that you see in the picture is?*
K10: *Fish*
Researcher: *Is fish a living thing or a non-living thing?*
K10: *Non-living*
Researcher: *Why is that?*
K10:.*Because it doesn't have feet.*
Researcher: *I see. And what else?*
K10: *They just swim.*

The K6-coded child in this group answered the question whether the moon is a living or non-living thing as a living thing when the misunderstanding of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K2*: Moon*
Researcher: *Okay, is moon a living thing or a non-living thing?*
K2: *Living*
Researcher: *Why is that?*
K2: *Because it is up in air.*
Researcher: *Why else do you think it might be a living thing?*
K2: *Nothing*

The K7-coded child in this group answered the question whether the mushroom is a living or non-living thing as a non-living thing when no conception of this response is examined;

Researcher: *What is the name of the thing that you see in the picture?*
K1*: Mushroom*
Researcher: *Is mushroom a living thing or a non-living thing?*
K1: *Non-living*
Researcher: *Why is that?*
K1: *…. (Laughs)*
…..
Researcher: *All right, do you know what this thing that you see in the picture is?*
K7: *Cow*
Researcher: *Is cow a living thing or a non-living thing?*
K7: *Non-living*
Researcher: *Why is that?*
K7: *… [Laughs]*

Findings of the Children Regarding the Fourth Interview Question (Where Did You Learn That? Who Told You That?)

In the fourth interview question, children were asked about where they saw those living or non-living things and who taught those concepts. With these questions, it is aimed to find out the information sources of the concepts. When the answers of the two groups are examined, it is seen that there are some similarities and differences between these two groups.

When the information sources of the children in the high-level group regarding the conceptual information on living / non-living things are examined, information sources such as "on their own", "parent", "teacher", "doctor", "visual media" are used from home environment, school, village, zoo, hospital and neighborhood.

The K1 coded child in this group pointed the zoo and the teacher as the source of information in response to the whether the dog is a living or non-living thing.

Researcher: *What is the name of the thing that you see in the picture?*
K1: *Dog*
Researcher: *Is dog a living thing or a non-living thing?*
K1: *Living*
Researcher: *Why is that?*
K1: *Because it walks and eats meat*
Researcher: *Where did you see a dog?*
K1: *In the zoo*

Researcher: *Who took you to the zoo?*
K1: *My teacher. I saw it there.*

The K5 coded child also in this group pointed television as the source of information in response to the whether the sun is a living or non-living thing.

Researcher: *What is the name of the thing that you see in the picture?*
K5: *Sun*
Researcher: *Is sun a living thing or a non-living thing?*
K5: *Living*
Researcher: *Why is that?*
K5: *Because it radiates light.*
Researcher: *Who told you that, where did you see it?*
K5: *I saw it on television. It was talking.*

When the information sources of the children in the low-level group regarding the conceptual information on living/non-living things are examined, information sources such as "on their own", "parent", "teacher", "visual media" are used from home environment, school, village and neighbourhood. It is seen that while some children misunderstand living/non-living concept or some do not have those concepts, others do not have information sources.

The K5 coded child in this group pointed out his observation as the source of information in response to the whether the cat is a living or non-living thing.

Researcher: *What is the name of the thing that you see in the picture?*
K9: *Cat*
Researcher: *Is cat a living thing or a non-living thing?*
K9: *Living*
Researcher: *Why is that?*
K9: *Because it runs*
Researcher: *Where did you see that?*
K9: *I know because we caught a kitten in the backyard*.

The K6 coded child in this group pointed out the family member as the source of information in response to whether the sun is a living or non-living thing.

Researcher: *What is the name of the thing that you see in the picture?*
K6: *Sun*
Researcher: *Is sun a living thing or a non-living thing?*
K6: *Living*
Researcher: *Why is that?*
K6: *I don't know*
Researcher: *Okay, who told you that the sun is a living thing? Where did you learn that from?*
K6: *My brother told me.*
Researcher: *What did he tell you?*
K6: *He said that the sun is a living thing.*
Researcher: *Did you ask your brother why the sun is a living thing?*
K6: *Because it protects us from cold.*

CONCLUSION AND DISCUSSION

Knowledge Level

When the knowledge levels of participating children about living and non-living things are examined, children included mould and mushroom in the non-living group and nearly half of them included water in the living group. When the answers of the children regarding living (animals, plants, microorganisms, mushrooms) and non-living (water, fire, television, moon, chair, car, sun, stone) things are examined, 93% of the children classified the animals correctly and 7% of them classified wrongly. While nearly 69% of the children classified potted plants as a living thing, 31% of them classified those as a non-living thing. Approximately 24% of the children classified mushrooms as a living thing whereas 76% of them classified those as a non-living thing About 13% of the children classified bread mould as a living thing and 87% of them classified those as a non-living thing While about 73% of the children classified non-living things correctly, 27% of them classified wrongly. As it can clearly be seen from the findings of the research, pictured animals are classified correctly to a large extent whereas mushroom and mould are classified wrongly. The child could be familiar with that specific object as a result of his interaction with the environment and this could be an important factor in this situation. However, they classified bread mould and mushroom as a non-living thing since they could not observe bread mould on the microscope and could not watch the mushroom growing in the soil. Erickson et al. (2010) conducted a study with pre-school children and they found that the children have an adequate intuition about processes they are familiar with and can distinguish processes from each other. Martinez-Losada et al. (2014), who noted the morphological similarity in the children's correctly separating the objects, found that the majority of children aged 3 years participated in the survey described animals as a living thing whereas they mostly described the plants as non-living. As a result of an in-depth study with children, the underlying reasons for this situation explained as the morphological characteristics of animals are similar to those of humans whereas plants do not resemble humans.

Children can group the animals they directly interact with their immediate surrounding and come across frequently from television and classroom activities.

Conceptual Understanding

In interviews with children, it is observed that some children knew the names of things, and even though they know the names of the living/non-living things, they still struggle to point out why they were living/non-living things. This situation is especially evident in the children of the low level group. The fact that the children cannot justify by using logical reasoning may suggest that they may still be in egocentric period. Piaget (2011) stated that the children are not in need of since they do not need to socialize their thinking. Piaget (2011) stated that children do not feel the need of persuading or proofing like adults since they do not need to socialize their thinking. Some children in the low-level group appear to have repetitive expressions in their answers. Piaget explained this situation with the concept of imitation. According to him, when some objects

are explained to the children and when they are asked to explain it again, they imagine that all the objects they said are found by themselves. Children feel the pleasure of repeating the words although there is no harmony. This may also explain how children see themselves as a source of information. It is observed that some of the children in both groups give a justification to classify a thing as a living one; it should have eyes and mouths. This can be explained by Piaget's theory of mental development. Piaget stated that people have natural organization and adaption tendencies. According to him, regarding organizing tendency, the child strives to unify the concepts and incidents consistent with each other. When the child encounters a new situation, he tries to explain it with the schemata in his mind, in other words he tries to incorporate. If the schemata in his mind is not enough to explain the new situation, the child will try to adjust his mind to the situation, in other words, he will try to adapt. When the child encounters new concepts, he tries to classify them as living or non-living by placing those in human schemata and this is called incorporation; then adapting those concepts to new situations is related with adjustment. For example, K2-coded child used “This is not living because it is not doing anything. It doesn’t have an eye or a mouth expression as an answer to whether the mould is a living/non-living thing. It appears that the child’s incorporation tendency cannot pass through to adaptation tendency and the phenomenon of balancing does not occur. This situation may have arisen from a number of factors such as maturation, life, cultural (social transfer), balancing (individual differences) and conceptual knowledge as stated by Piaget (2002). Research findings indicate that there is a relationship between conceptual knowledge and correctly understanding of concepts. When research findings are examined, it is seen that children in the high-level group tend to have a more correct understanding, while children in the low-level group tend to perceive no conception (see Table 4). In other words, as the interaction with the environment (experience/life) increases, awareness also increases. Thus, concepts are structured in the child's mind. As it can be seen, as the knowledge about the concept increases, the level of correct understanding also increases.

Information Source

When the effect of information source on conceptual meanings of the children is examined, it is found that most of the children in both groups showed themselves as a source of information. This situation may arise from their genuine curiosity and observation characteristics and their egocentric characteristics. Children strive to make sense of the things around their surroundings with the sense of curiosity and observation. However, this self-effort can sometimes lead to the creation of broken concepts in their minds when there isn’t any correct orientation. For example, K6 coded child in the low-level group of conceptual information stated that he learned from his brother that the sun is a living thing. As it can be seen from this example, child's social environment has an important place in the concept development. Vygotsky (1980) pointed out the role of the teacher, peer and his interaction with others in the concept development with the zone of proximal development theory.

Vygotsky argues that children are in need of more knowledgeable people in order to gain high-level mental functions such as symbolic thinking, memory, attention, and reasoning skills. As stated in Bronfenbrenner's Ecological Systems Theory, the entire ecological system, in which the child grows, must be considered in order to understand the conceptual development of the child. While this system supports the conceptual development of the child, it also guides this development. When the data obtained from interviewed children are examined, especially family, which is in child's micro system; schools, teachers, large family members, which is in child's mesosystem and media (Bronfenbrenner, 2009), which is in child's ecosystem, are the important social elements in conceptual understanding as a source of information.

SUGGESTIONS

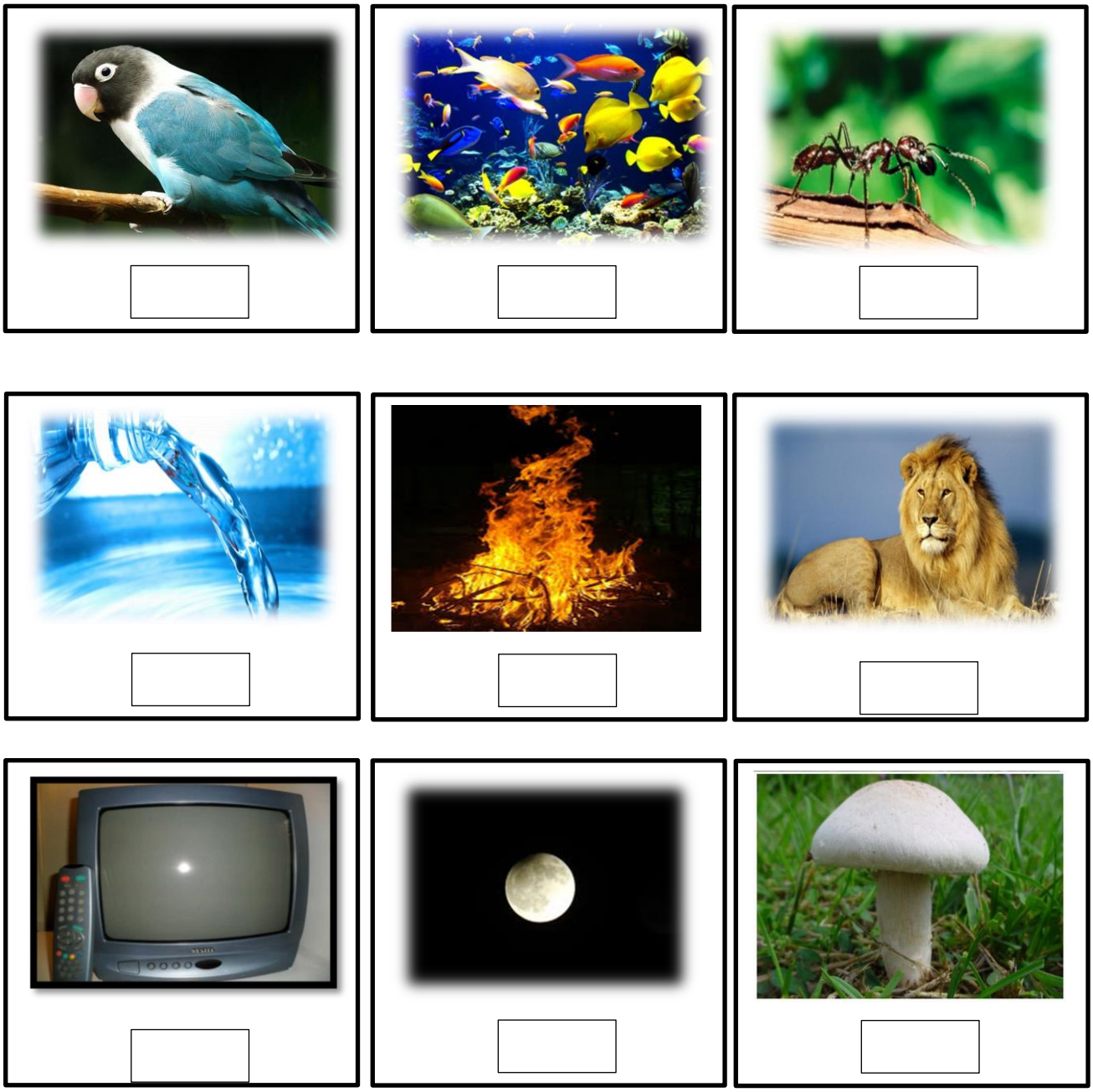
In the study, it is seen that there are some mistakes in the grouping of the things shown on the cards to children, although they correctly named those as living or non-living. While the children correctly grouped the things that they are especially in direct interaction with their immediate surroundings, they grouped the distant concepts incorrectly. It is suggested that the children should interact with more things in preschool period and use of non-class learning environments more.

When conceptual understandings of interviewed children are examined, it is determined that the children with the high level of concept knowledge correctly understood living / non-living things and the children with the low level of conceptual knowledge did not understand those concepts. In the pre-school period where science concepts are taught for the first time in a programmatic way, it is necessary to give information to the children about these concepts in order to provide conceptual understandings. In the study, especially the media, family and teacher are seen as the reason for the children's misconception and no conception. In order to prevent misconceptions, it is necessary that families and teachers should have accurate information about concepts and should relay this information correctly. Besides, it is also suggested that cartoons and magazines should be reviewed from the conceptual point of view before they are presented to the children.

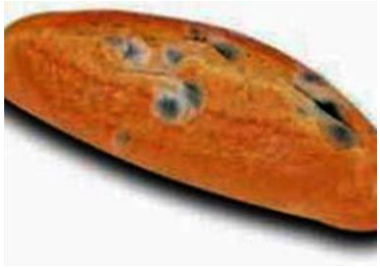
Language is not just a symbol system for the child, but it also creates a new reality, a verbal reality in his/her comprehension and this verbal reality added to the reality that is derived from emotions. The child accepts some irrationality as a verbal planer when he/she rejects the concrete. This situation is obvious in the study. The child rejects some tangible irrationality whereas he/she tends to accept if those are in a verbal plan. Although some of the children responded correctly to the concept test, they also indicated unreasonable expressions in the interviews. New studies on the conceptual situation of children, the family and teacher views about the child's conceptual situation can be taken along with verbal or card-like data collection tools.

Appendix-1: Living/Non-living Flash Cards (Concept Test)

Yönerge: *Canlı olanların altındaki kutucuğu boya* "(**Instruction:** Paint the box under the live things)"



Demiral, Ü. (2018). Investigation of Conceptual Understandings of Pre-School Age Children on Living and Non-Living Things, International Journal of Eurasia Social Sciences, Vol: 9, Issue: 33, pp. (1860-1882).









Demiral, Ü. (2018). Investigation of Conceptual Understandings of Pre-School Age Children on Living and Non-Living Things, International Journal of Eurasia Social Sciences, Vol: 9, Issue: 33, pp. (1860-1882).

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