
Preschoolers' usage of unstructured materials as play materials divergently

Elif Celebi Oncu

Kocaeli University, Faculty of Education, Primary Education Department, Division of Preschool Education, Umuttepe, Kocaeli, Turkey

Email address:

ecelebioncu@yahoo.com

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Abstract: The present study is designed to examine preschool children's (4-5 and 6 years old) attitudes toward unstructured materials and to take their divergent ideas about these materials. Paper napkin, a plastic bottle, bottle lid, toilet paper roll, a piece of white string, a plastic spoon and a 10x10x10 cm³ sized box were used as unstructured materials. 126 children (58 female, 68 male) were selected from four state preschools. For originality scores first an originality index was prepared. Children who gave similar answers scored as 1, children who gave answers that were rarely given by other children, scored 2 and children who gave answers that were not given by others, scored 3. Children's usage of materials and answers were analyzed as originality and fluency by two blind coders. It was found from the study that, most of the children preferred to use materials in usual and ordinary ways, only few children were found to use them creatively as play materials. The results showed that most of the children cannot be able to use the unstructured materials as play materials creatively. Gender difference was found significant in the usage of plastic spoon, box and bottle. Girls tended to use napkin and bottle lid creatively and symbolically as domestic play toy, on the other hand boys had a tendency to use the box and plastic spoon creatively and symbolically. The age factor was also found significant, older children tended to use the materials more creatively than the younger ones.

Keywords: Preschool, Creativity, Divergent Thinking, Unstructured Materials

1. Introduction

In today's world there is rapid, unpredictable and unstable change in every field such as technology, economy, education, environment etc... (e.g. Craft, 2011; Facer, 2011; Facer et al., 2011). In this context, perhaps the only certainty we could consider, could be called as change. Change must be understood as the necessary context for any endeavor that seeks to design and realize educational futures. As Kirton's (1989) definition of the feature of human is that, all the human beings are able to adapt (Hoicka, Bjovet-van der Berg, Kerr and Carberry, 2013). This is critical, as if we always imitate what has already been done, then we would likely not survive when changes hit our environment. Thus, it is crucial that we can come up with novel, creative ideas. It can be said that creativity and/or divergent thinking ability is one of the important factors in life success. Children have to find solutions for the problems they are facing, creatively and have to think divergently. Researching creativity is important because there are a lot of advantages. First such research would allow us to examine the emergence of creativity and the

factors effecting divergent thinking. Also these kinds of research could give important clues and ideas to teachers in educational process improving the facilities and designing activities for fostering creativity in students.

Creativity, as an overarching concept, has often been seen as largely the preserve of arts-based activities, such as dance, music, drama and art. This conception may be damaging to children's creative development (Prentice, 2000), as well as suggesting that only particular types of people can be creative. However, in recent years more emphasis has been placed upon creativity as a 'universal capability' (Siraj-Blatchford, 2007), and thus the idea that everyone has creative potential, had grown (Runco, 2003). At the same time, it is important to bear in mind Kaufmann's (2003), caution about seeing 'every little piece of change and novelty' as creative, particularly if we are to distinguish it from other ideas, and to have any possibility of shared understanding. So, whilst sharing Prentice's (2000) view that there may be multiple meanings and no universally accepted definition, it was valuable for us to identify some key

ideas. For that reason, starting point must be that all acts of creativity must, by their nature, involve some creative thinking (Cited from Robson, 2013). And in some acts of creativity; children have to interact with unstructured environments and materials and have a chance to play with many kinds of materials, in different situations.

The terms of creative thinking and divergent thinking are different from each others. As stated by Runco and Acar (2012) divergent thinking often leads to originality and originality is the central feature of creativity. For that reason actually creative thinking is the wide angled explanation due to divergent thinking. In the measurement of creativity so many kinds of tests and inventories can be used. Creative thinking tests mainly focus on the measurement of fluency, originality, flexibility and elaboration, but most of the divergent thinking tests only use fluency and originality as the indicator of divergent thinking (Runco and Acar, 2012; Hoicka, Bjovet-van den Berg, Kerr and Carberry, 2013; Robson, 2013). The well-known creativity test developed by Torrance was designed for children from kindergarten onwards, and used in more research than any other creativity test. But the Torrance Test of Creativity (TTCT) couldn't be appropriate for young preschool children aged four or five. In addition, whilst divergent thinking may be a component of creative thinking, the two are not interchangeable, and, as such, tests such as Torrance do not measure the full range of aspects of creativity or creative thinking (Hennessey, 2003).

Donaldson (1978), demonstrated that young children perform most effectively in contexts which make sense to them, and to which they can relate from experience. This suggests that focusing on young children as they are engaged in meaningful everyday activities may be more valuable in highlighting aspects of behavior that can be associated with creative thinking. Singer (1973), for example, views pretend play and make-believe of all kinds as facilitators for creative and flexible thinking (Cited from Robson, 2013).

When we want to improve creative thinking in children, recycled objects could be useful for that purpose. Using recycled items could improve a child's flexible thinking skills because recycled items may be used to produce so many different products, so, the child can use the items for her/his own purposes in creating a new product. This may be considered flexibility in generating multiple uses for an item. Children also practice their ability to generate multiple views of things as they engage with the item and examine them upside-down, cut them into pieces, rotate, or distort them in different ways. Engaging with unstructured materials supports divergent thinking, it stimulates criticism of the existing uses of everyday items and helps the student think of innovative ways to use or re-use objects (Rule, Zhbanova, Hileman, Evans, & Schneider, 2011). By using unstructured materials children could show their creative ideas and explicit samples of divergent thinking. For that reason the aim of the present study is to examine preschooler's divergent thinking abilities by using unstructured materials.

2. Methodology

2.1. Participants and Materials

The present study is designed to examine preschool children's (4-5 and 6 years old) usage of unstructured materials and to take their divergent ideas about these materials as play materials. 126 children (58 female, 68 male) were selected from four state preschools. Paper napkin, a plastic bottle, plastic bottle lid/ cap, toilet paper roll, a piece of yarn, a plastic spoon and a 10x10x10 cm³ sized box were used as unstructured materials.

2.2. Procedure

Children were taken individually to an empty small room with only a child size table, two child size chairs and a hidden camera facing the table and the chairs for observational recordings. The unstructured materials were placed into a basket and then the basket was hidden by the experimenter under the table. The experimenter requested from the child to sit while explaining the procedure to the child. All of the children were told that their ideas about the given objects were very important and valuable. In the beginning of the trial children were asked "if they had no toys to play with what would they prefer to play?" Therefore children's views about what kind of materials they would prefer to use for playing if they had no toys to play with were recorded. Every child's answers were recorded for a minute and these answers were considered as fluency abilities. After that the unstructured materials were shown one by one during the procedure and children were asked to show their ideas about the different (expected as creative) usage of these objects in limited time. Children were asked to give as many answers as possible in two minutes and answers given by children were scored as originality, symbolically or ordinary by two blind coders. Then children were asked to think that they had only one material to play with therefore they were asked to represent how they can use these objects as play materials. They were told to feel free to take their time and to manipulate the materials. Each of the materials was given in the same order and this procedure repeated during the study for all the participants and all the answers were recorded down on the observation form. In the process, one by one each of the unstructured objects were given and examined by the child, until the experimenter instructed that s/he should stop. All of the children were given approximately two minutes to observe, examine and play with each object, after which the object was replaced by a new one.

3. Data Collection

The answers children gave, were recorded on the index form by the experimenter, but for the reliability of the recordings also a hidden camera was used for observational recordings.

3.1. Data Analysis and Coding

In the study, each trial started from the moment the child sit in the room with the experimenter, and lasted approximately three minutes. For each child two different types of scores were calculated: fluency and originality score. The fluency score consisted of the number of answers and ideas the child gave. For fluency scores children’s answers were listed in a two minutes limited time and children who gave 7-9 different materials as play materials scored 3 and children who showed 6-4 different materials scored 2, and the less answers like 3-1 scored 1.

For originality scores, first, an originality index was prepared. Children’s usage of materials were grouped as symbolically, originally and ordinary. Children who gave similar answers scored as 1, children who gave answers that were rarely given by other children, scored 2 and children who gave answers that were not given by others, scored 3.

Next, a total originality score was calculated for each child by adding up the originality scores of all the answers or ideas that s/he had gave. An originality ratio score was also calculated by dividing the total originality score by the fluency score. Fluency scores were calculated by counting the number of different appropriate answers that a child gave. Originality scores were calculated for the appropriate answers in the index. Each separate response was given an originality score between 1 and 3. All scores were added up to provide a total originality score.

At first video recordings and written forms were compared by the researcher in order to control the validity of the data. The answers given by children as usage of materials as play

materials were grouped as the following:

1. Symbolic Usage- *Creative usage of the materials as symbolically instead of another object or a toy-* (For example usage of roll as a binocular or as a flute, usage of spoon as a begets or usage of plastic lid as a baby drinking glass etc...)
2. Original Usage-*Creative usage of the materials to form a totally different object or a toy-* (For example constructing a doll house with the box, a rocket with the bottle, a puppet with the roll etc...)
3. Ordinary Usage- *Non-creative usage of the materials like every day usage-* (Wiping mouth or nose with the napkin, feeding baby with the spoon and using yarn for tiding etc...)

For the inter-reliability of the coding, two different researchers also watched and compared the video recordings and the correlations between the three of researchers were found statistically relevant (94 %).

4. Findings

Table 1. Children’s fluency scores about the different materials to play with by gender.

	N	Mean	Min. (1 point)	Max. (3 points)	SD
Girl	58	2.36	3	9	0.66
Boy	68	1.94	1	7	0.77

In table 1 children’s fluency scores according to genders could be seen. In present study when asked about materials using in order to toys, boys were found to give answers less fluent than the girls.

Table 2. Preschool children’s preference of using unstructured materials according to gender.

		Girl		Boy		Total	
		n	%	N	%	N	%
Yarn $\chi^2 = 3,300; p > .05$	Symbolic usage	0	0.0	0	0.0	0	0.0
	Original usage	35	60.3	30	44.1	65	51.6
	Ordinary usage	23	39.7	38	55.9	61	48.4
	Total	58	46,0	68	54,0	126	100.0
Paper Roll $\chi^2 = 1,243; p > .05$	Symbolic usage	7	12,1	13	19,1	20	15.9
	Original usage	18	31,0	18	26,5	36	28.6
	Ordinary usage	33	56,9	37	54,4	70	55.6
	Total	58	46,0	68	54,0	126	100.0
Spoon $\chi^2 = 10,629; p < .05^*$	Symbolic usage	9	15,5	14	20,6	23	18.3
	Original usage	0	0.0	10	14,7	10	7.9
	Ordinary usage	49	84,5	44	64,7	93	73.8
	Total	58	46,0	68	54,0	126	100.0
Box $\chi^2 = 10,212; p < .05^*$	Symbolic usage	0	0,0	8	11,8	8	6.3
	Original usage	20	34,5	30	44,1	50	39.7
	Ordinary usage	38	65,5	30	44,1	68	54.0
	Total	58	46,0	68	54,0	126	100.0
Bottle $\chi^2 = 2,212; p < .05^*$	Symbolic usage	10	17,2	11	16,2	21	16.7
	Original usage	2	3,4	7	10,3	9	7.1
	Ordinary usage	46	79,3	50	73,5	96	76.2
	Total	58	46,0	68	54,0	126	100.0
Plastic Lid $\chi^2 = 7,609; p > .05$	Symbolic usage	13	22,4	4	5,9	17	13.5
	Original usage	17	29,3	21	30,9	38	30.2
	Ordinary usage	28	48,3	43	63,2	71	56.3
	Total	58	46,0	68	54,0	126	100.0

P<.05; significant

Findings about preschool children's preference of using unstructured materials according to gender exposed that girls tended to use the materials more original than the boys except spoon and box. In using of the box and the spoon boys ideas were found more original and it was found significantly statistical difference between genders. In examination of ideas for using spoon, children preferred to show ideas more ordinary, but the girls ordinary ideas were found higher than the boys and it was found statistically significant (Girls 84,5 %; Boys 64.7 %). Also in the using of bottle (Girls, 79,3 %, Boys, 73,5 %) and the box (Girls 65 %; Boys 44,1 %) children's ideas were found more ordinary.

Preschoolers' ideas about using unstructured materials according to gender were found statistically significant in

comparison of age. Four years old children were found to give ordinary ideas about using the materials, on the other hand, six years old children's ideas in using the unstructured objects were found more symbolic and original. Six years old children's ideas about using box were found 50,0 % and yarn 54,2 %, on the contrary of this finding four years old children's ideas were found 20,0 % for ideas of box and 30,0 % for ideas of yarn. Also in the ideas of using spoon, bottle and paper roll statistically significant findings were found. Four years old children's ideas were found ordinary about using bottle and the box was 90,0 %, than six years old children's ideas (66,7 % for spoon and 76,4 % for bottle). In the ideas of using paper roll, four years old children's ideas were found more ordinary (80.0 %) than five (54,5 %) and six (52,8 %) years old children.

Table 3. Preschool children's preference of using unstructured materials according to age.

		4 years		5 years		6 years		Total	
		n	%	N	%	N	%	N	%
Yarn $\chi^2 = 2.066; p < .05^*$	Symbolic usage	0	0.0	0	0.0	0	0.0	0	0.0
	Original usage	3	30.0	23	52.3	39	54.2	65	51.6
	Ordinary usage	7	70.0	21	47.7	33	45.8	61	48.4
	Total	10	7.9	44	34.9	72	57.1	126	100.0
Spoon $\chi^2 = 6.309 p < .05^*$	Symbolic usage	1	10.0	4	9.1	18	25.0	23	18.3
	Original usage	0	0.0	4	9.1	6	8.3	10	7.9
	Ordinary usage	9	90.0	36	81.8	48	66.7	93	73.8
	Total	10	7.9	44	34.9	72	57.1	126	100.0
Box $\chi^2 = 9.543 p < .05^*$	Symbolic usage	1	10.0	5	11.4	2	2.8	8	6.3
	Original usage	2	20.0	12	27.3	36	50.0	50	39.7
	Ordinary usage	7	70.0	27	61.4	34	47.2	68	54.0
	Total	10	7.9	44	34.9	72	57.1	126	100.0
Paper roll $\chi^2 = 3.085 p < .05^*$	Symbolic usage	1	10.0	8	18.2	11	15.3	20	15.9
	Original usage	1	10.0	12	27.3	23	31.9	36	28.6
	Ordinary usage	8	80.0	24	54.5	38	52.8	70	55.6
	Total	10	7.9	44	34.9	72	57.1	126	100.0
Bottle $\chi^2 = 7.611 p < .05^*$	Symbolic usage	0	0.0	6	13.6	15	20.8	21	16.7
	Original usage	1	10.0	6	13.6	2	2.8	9	7.1
	Ordinary usage	9	90.0	32	72.7	55	76.4	96	76.2
	Total	10	7.9	44	34.9	72	57.1	126	100.0
Plastic Lid $\chi^2 = 3.611 p < .05^*$	Symbolic usage	1	10.0	7	15.9	9	12.5	17	13.5
	Original usage	2	20.0	17	38.6	19	26.4	38	30.2
	Ordinary usage	7	70.0	20	45.5	44	61.1	71	56.3
	Total	10	7.9	44	34.9	72	57.1	126	100.0

$P < .05$; significant

5. Discussion and Conclusion

Present study is aimed to investigate preschooler's divergent thinking abilities by using unstructured materials. Children's ideas about preferring different materials in order to their toys, the number of ideas were counted as fluency scores. Findings showed that boys' fluency scores were less than the girls'. Fluency is one of the main abilities in creative thinking. In such research, although fluency is not seen as critical to creativity as originality, this cognitive ability does play a role in creative thinking. Therefore we should expect from anybody if s/he thinks fluently, s/he could also have a chance to think divergently, because of productivity. Findings in this research are also consistent with those of several studies

showing that people who are highly fluent are more likely than others to be original (Mouchiroud & Lubart, 2001). That is, productivity facilitates original responses. (Cited from Tsai-Ling Chu & Wei-Wen Lin, 2013). As like Dhingra and Shaina (2012) found, present research also showed that girls' fluency scores were higher than the boys'.

Brown (2003) suggests that children need flexibility in their environment to be pro-active in the play they create by themselves. He argues that a flexible environment creates a flexible child who can adapt and be resourceful in other situations. Therefore, when an environment has flexible potential, it is able to facilitate a child's potential for curiosity, problem solving and creative thinking. In the same way, Nicholson (1971) introduced a theory of 'loose parts' which linked the degree of inventiveness and creativity that children

engage within their environment to the different resources provided within it (Cited from Canning 2013) Therefore it could be mentioned that using unstructured materials in children's environments and games might play an important role in children's divergent ideas.

Findings about preschool children's preference of using unstructured materials according to gender exposed that girls tended to use the materials more original than the boys except spoon and box. In using of the box and the spoon boys ideas were found more original and it was found significantly statistical difference between genders. In examination of ideas for using spoon, children preferred to show ideas more ordinary, but the girls' ordinary ideas were found higher than the boys and it was found statistically significant. Reason for this finding could be female children's tendency to play socio-dramatic play like domestic play. Girls would like to play with dolls and pretend to be like their moms; they might carry, hug and feed them like their mothers do. For that reason girls could use the idea of spoon in its everyday usage, as a feeding utensil. Also in the using of bottle and the box children's ideas were found more ordinary.

In some research, girls were found to get higher scores in creativity tests and creative activities than the boys (McLoyd, 1983; Wolfradt and Pretz, 2001; Stephens, 2001; Matud, Rodriguez and Grande, 2007). These findings were also relevant with the findings in recent research.

People could be considered as creative, if they produce ideas that are different from those of others and ideas or solutions which are deviated from possible or ordinary ones are regarded as creative (Kharkhurin, 2014). And as Amabile (1989) referred about a creative product or response as if proper observers independently agree that it is creative (in Riga and Chronopoulou, 2014). Therefore we could count children's responses as well as considering their creative thoughts. In this study children sometimes showed their ideas and sometimes only told about their ideas. All the ideas were regarded as answers in showing their originality.

In the present findings girls were found to show more original or symbolic ideas. Preschoolers' ideas about using unstructured materials according to gender were found statistically significant in comparison of age. When children's age increase the symbolic and original thinking also found to increase. In a study conducted by Elder and Pederson (1978), they found that, in play sessions young children aged 2,5 years old tended to use different materials in ordinary ways, but the older children's usage were original. Another research also indicated that preschool children's symbolic usage of materials improves by age. (McLoyd, 1983).

It could be an indicator of developmental maturity to expose more creative ideas, when children get older. As mentioned by Benlliure, Melendez and Ballesteros (2013), creative potential can improve with age by increased knowledge and experience. In many studies, it was underlined that children's capacities to create original play scenarios improve when they get older. (Russ, 1996, Trevlas, Matsouka & Zachopoulou, 2003; Vig, 2007). Also playing children could be considered as more creative because many kinds of plays were found to be relevant

in fostering creativity (Russ, 1996, Moyles, 1992).

6. Implications

The findings of the study focused on the ideas of preschoolers' using of unstructured materials. The term of 'creativity' is largely considered to begin with the first symbolically mediated actions of the child. According to Gardner's (1982) theoretical views about symbolic activity, children have ability to pretend and symbolize. And it will be constructed all subsequent forms of play, including imaginative play (Cited from Glavenau, 2011). Robson and Rowe (2012), also highlighted children's exploratory play with materials and resources of all kinds and socio-dramatic play proved a strong context for their creative thinking. An important limitation for this study was to give children a very short time and children had little chance to really play with the materials. Playing, especially symbolic and pretend play, nurture the imagination and natural creativity in children and are important for the original thoughts of children. For that reason adults have to give children space, time and different kinds of materials (especially recycled, unstructured) for free-flow play. Children should be encouraged to use recycled materials not only in hands-on art activities, but also in order to make their own play materials, toys. This kind of materials and activities supports children's creativity and helps them think of innovative ways to use or re-use objects. In addition, using recycled items contributes to the economy and preservation of the environment by reducing the amount of raw materials needed to make new products. Through this approach, we could reinforce environmental awareness by using the items provided with recycled materials.

Present study is limited with small sample of materials and limited time. More detailed research is suggested to be planned for further findings. Especially children could be observed in groups and a comparison could be made within the groups by age, gender etc...

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