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THE EFFECT OF GENDER AND COMPUTER USE VARIABLES ON RECOGNATION OF GEOMETRICAL SHAPES IN PRESCHOOL CHILDREN

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ABSTRACT

In this study it is aimed to search the geometrical shapes recognition levels of pre-school children. This is a descriptive study which uses screening model. The study group of the study consists of total 192children (60-72 months) chosen from the nursery classes of elementary schools subject to National Educational Ministry in Giresun city centre and from independent nursery schools by "*random sampling*" method. As a data gathering tool, "Recognition of Geometrical Shapes Test", developed by Aslan (2004), was used in the study. Recognition of Geometrical Shapes Test consists of four dimensions as triangle, square, circle and rectangle. The date was analyzed in SPSS for Windows program. Percentage and frequency values are used. As a result of this study it is found out that the recognition level of the geometrical shapes varies in a meaningful way according to gender and computer use at home.

Key Words: Preschool, geometry, gender, computer.

INTRODUCTION

Geometry consists of four basic shapes including triangle, square, circle and rectangle (Clements, 1998; MEB, 2006). Geometry teaching is more important in pre- school period, when first critical geometrical observations are made, instincts develop and concept and information is acquired, than the other periods following it (Develi and Orbay, 2003). The pre-school children have some misconceptions about these four geometrical shapes. The children may develop these misconceptions according to their *location, oblateness, and deformity* (Clements, 1999). Location, oblateness, deformity and size affect the children's classification decisions and as a result of this they cannot make a reliable decision. That is they can recognize the shape when it is in its classical location, however, they cannot recognize the same shape when the location changes (Aslan and Aktas Arnas, 2004). This situation results from the geometrical thinking abilities of the pre- school children. Van Hiele divides geometrical reasoning into five levels and mentions that pre-school children are in *'visual level'* which is the first level. In this level, the children perceive the shapes as a whole and make classifications by comparing the shape with a prototype (Bennie, 1998; Jami and Gutierrez, 1994). According to Van Hiele's theory, geometrical reasoning levels can be improved if individual is supported with education (Van Hiele, 1986). In recent years researches show that appropriate curriculum can improve numerical and geometrical knowledge in pre-school children. Teachers can reinforce children's mathematical thinking by asking questions as 'Have you tried to do it in this way?', 'What would be if it happens?', 'Do you think you can do this?' (Clements, 2001). Clements and colleagues examined the tendencies and styles of preschool children in understanding geometrical shapes. As a result it is defined that 96% of the children could fully recognize circles. Although the children consider equilateral quadrangle as a square, 87 % could fully recognize squares. It is put forth that little children are less

successful in recognizing triangles (60%), this level is even lower in rectangles (54%) and children also have the tendency to define parallel edges as rectangle. Another study conducted by Clements and colleagues (1999) concludes that children's rectangle recognition levels are lower than the other shapes. In a study conducted in Turkey by Kesicioglu and colleagues (2011b) similar findings are presented and it is observed that pre-school children made mistakes while recognizing the triangle, square, rectangle and circle shapes and their distractors.

The aim of pre-school education is to support all development fields of a child. Computers are symbols of modern technology. Children need to have early experience with the developing tool (Coskun, 1990). It must be provided that the child learns within the game via computers. Also it is an attractive tool for the child. One way of developing mathematical knowledge is through usage of appropriate technology. The child's interaction with computer leads to positive results while learning geometrical shapes concept (Dwyer, 2002). The child obtains different shapes and results on the screen by using certain keys of the computer. For instance, finding two similar shapes and inserting one shape into another are games for the child; however, he learns to differentiate different geometrical shapes at that moment (Arıcı and Demir, 2009). An activity in Building Blocks software aiming to improve mathematical skills of children enables children to draw pictures by using special tools related to geometry. Via this software, awareness levels of children about geometrical shapes are enhanced (Clements, 2001). In a similar study completed by Kesicioglu (2011a) computer use has important effects on children's learning geometrical shapes, eliminating misconceptions and permanency of the knowledge.

It can be seen that one of the factors affecting mathematical abilities of individuals mentioned in literature reviews is *"gender"*. Gender difference in mathematics is one of the most mentioned issues not only for Turkey but also for other countries and it brought about studies focusing on gender difference (Duru, 2002). Later, the factors influencing the gender difference in mathematical success were studied (Alkhateeb, 2001). According to the researches, socio- cultural factors such as biological differences, abstract thinking differences between genders, attitudes towards mathematics, families' and teachers' expectations from student define the differences (Alkhateeb, 2001; Duru, 2002). However, there are little research on mathematical skills and gender in preschool period (Unutkan, 2007; Guven,2007), there are no studies directly aiming children's geometrical levels. The literature touches upon the necessity to improve pre-school children's geometrical skills. Along with this, since pre-school period is the most critical period for mathematical skills as well as most of the skills and there are not enough researches in Turkey on this field, this study aims to investigate the geometrical skill levels of pre-school children. In order to reach this aim answers to the following sub-problems were sought;

1. Do the recognition levels of geometrical shapes in pre-school children vary meaningfully according to gender?
2. Do the recognition levels of geometrical shapes in pre-school children vary meaningfully according to whether they use computer at home or not?

METHOD

This section consists of research model, study group of the research, data gathering tools, research process and statistical techniques used in data analysis.

Research Model

The research is de descriptive study which uses screening model. Screening model is a research approach aiming to describe a situation as it was or as it still is. Individual or object subject to research is tried to be defined in its conditions and as it is. There is no attempt to change or affect them by any means (Karasar, 2002). In descriptive screening model, answers are sought to the research problem or problems by the analysis of the data gathered from multiple experimental subjects or objects in a period of time (Arseven, 2001).

Study Group

Data gathering tool was applied to 272 (60-72 months) children by the researcher; however, the children *"who have computers at home"* were included to the study group of the research. The study group of the study consists of total 192 children (60-72 months) chosen from the nursery classes of elementary schools subject to National Educational Ministry in Giresun city centre and from independent nursery schools. In simple random sampling, every element forming the universe has the equal chance to be the sample. Therefore, the weight to be given will be the same for every element while calculating (Arıkan, 2004). The children constituting the sample consist of 115 boys and 77 girls.

Data Gathering

Data gathering tool was applied to pre-school children taken into study group in 2012-2013 educational years by the researcher. The scale was applied to the children one by one in order not that they influence each other. Four test were given to the children in order and instructions such as tick the triangle, tick the rectangle, tick the square and tick the circle were given. All children were given the same instruction which enabled the objectivity of the research for all the children. Time for data gathering for each child lasted approximately 30 minutes. As a part of the research, information on whether the child had computer at home or not was gathered from the children's parents. The answers "yes" and "no" to the questions "there is a computer/there are no computers at home" and "my child actively uses computer" were required from the parents.

Data Gathering Tool

In the study, "Recognition of Geometrical Shapes Test" developed by Aslan was used as a data gathering tool. Recognition of Geometrical Shapes Test consists of four dimensions as triangle, square, circle and rectangle. There are totally 12 items in triangle recognition test which are 6 triangle shapes and 6 distractors, 12 items in rectangle recognition test which are 5 rectangle shapes and 7 distractors, 12 items in square recognition test which are 4 square shapes and 8 distractors, 12 items in circle recognition tests which are 5 circle shapes and 7 distractors. The maximum points that can be obtained from each sub dimension is '12' points and it is '0' points at minimum. There are total 48 items. The maximum points that can be obtained from whole test is '48' points and it is '0' points at minimum. In order to determine the validity- reliability of Aslan's (2004) testing tool, each item's strength and differentiating indexes were calculated by considering item and test analysis. It is observed that there is no item below .15 in terms of differentiating and item strength varies between .32 and .99. As a result of the reliability study conducted by Aslan (2004), KR 20 alpha values was defined as .80 for triangle recognition test, .88 for rectangle recognition test, .81 for square recognition test and .77 for circle recognition test. Taking these results into consideration it can be said that this test have enough reliability level to be used. As a result of the reliability test conducted for this research the values were found as .76 for triangle recognition test, .82 for rectangle recognition test, .77 for square recognition test and .71 for circle recognition test.

Data Analysis and Evaluation

The data was analyzed in SPSS for Windows 18 program. Percentage and frenquency values were used. By taking dimensions constituting the scale into consideration while evaluating the data, for the items forming each dimension, these items average point was found and afterwards general average point was obtained. Statistical comparison (t test) was conducted with average points obtained for each sub dimension of the scale. In order to test the meaningfulness of average points obtained from the scale dimensions and the statistical difference according to gender and computer use at home variables, "t test" was used. While evaluating the differences between the groups arithmetic average and meaningfulness values were taken into consideration depending on analysis results (Büyüköztürk, 2006).

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FINDINGS

The results of the study completed in order to find out the relationship between geometrical shapes recognition level of pre-school children and gender and computer use variables are presented below.

Findings related to first sub problem: Do the recognition levels of geometrical shapes in pre-school children vary meaningfully according to gender?

Table 1: T test results of geometrical shapes recognition level of pre-school children in terms of gender.

Dimensions	Gender	n	$\bar{x}$	S	Sd	t	P
Triangle	Girl	77	8.87	1.47	190	2.69	.59
	Boy	115	9.52	1.72			
Rectangle	Girl	77	8.18	1.63	190	7.22	.01*
	Boy	115	10.01	1.77			
Square	Girl	77	7.93	1.69	190	4.47	.01*
	Boy	115	9.86	2.05			
Circle	Girl	77	8.68	1.65	190	8.2	.24
	Boy	115	8.93	2.35			
Total	Girl	77	33.66	4.27	190	8.22	.00*
	Boy	115	38.32	5.07			

*p<0.01

When Table 1 is analyzed, it can be observed that rectangle and square sub dimensions of the geometrical shapes recognition test in pre-school children and their total points vary meaningfully in statistical terms in gender for boys. Triangle and circle sub dimensions of the geometrical shapes recognition test in pre-school children do not statistically reflect a meaningful variation in terms of gender.

Findings related to second sub problem: Do the recognition levels of geometrical shapes in pre-school children vary meaningfully according to whether they use computer at home or not?

Table 2: T test results of geometrical shapes recognition level of pre-school children in terms of whether they use computer at home or not .

Dimensions	PC use at home	N	Gender		$\bar{x}$	S	Sd	t	P
			Boy	Girl					
Triangle	Yes	139	96	43	8.55	1.44	190	3.90	.00*
	No	53	19	34	7.49	1.76			
Rectangle	Yes	139	96	43	10.90	1.59	190	8.20	.00*
	No	53	19	34	6.66	1.72			
Square	Yes	139	96	43	9.68	1.64	190	7.25	.00*
	No	53	19	34	7.52	2.27			
Circle	Yes	139	96	43	10.06	1.44	190	6.69	.62
	No	53	19	34	10.04	2.69			
Total	Yes	139	96	43	39.20	3.79	190	10.89	.00*
	No	53	19	34	31.73	5.27			

*P<0.01

When Table 2 is analyzed, it can be observed that triangle, rectangle and square sub dimensions of the geometrical shapes recognition test in pre-school children and their total points vary meaningfully in statistical terms in terms of their computer use at home in favor of the children who have a computer at home. Circle sub dimension of the geometrical shapes recognition test in pre-school children does not statistically reflect a meaningful variation in terms of computer use or not.

RESULT AND DISCUSSION

When the findings of the research is analyzed, it can be observed that rectangle and square sub dimensions of the geometrical shapes recognition test in pre-school children and their total points vary meaningfully in statistical terms in terms of gender for children. Beginning from this information it can be concluded that there is a relationship between gender and geometrical shapes recognition test in pre-school children. It can also be observed that there is no statistically meaningful variation in terms of gender in triangle and circle sub dimensions of the geometrical shapes recognition test in pre-school children. There is not any study that deals with geometry skills and gender relationship in pre-school level. Nevertheless, when the studies on older age groups examined, it is seen that there are differences for boys parallel to the findings of this study (Hanna, 1990, Battista, 1990; Knodel, 1997; Ubuz, 1999, Livatidis and et al, 2003). We reach more informative findings when these results and the findings related to the second sub problem are evaluated together. If we consider the number of the children who use computer at home, it can be seen that the of the boys is “96” and girls is “43”. It is obviously seen that the boys use computer more at home. When the literature was reviewed, it was found out that boys use computer at home more than girls (Lipinski et al, 1986; Seng, 1997). If the findings of the second sub problem are examined, it is seen that boys geometrical shapes recognition is higher. In this case, it can be said that since boys use more computer, their geometrical shapes recognition levels are in favor

of boys. On the contrary, Unutkan (2007) could not find a meaningful relationship between mathematical skills and genders of the children in pre-school period.

When the research findings are analyzed, it can be observed that triangle, rectangle and square sub dimensions of the geometrical shapes recognition test in pre-school children and their total points vary meaningfully in statistical terms in terms of their computer use at home in favor of the children who have a computer at home. No statistically meaningful variation in terms of computer use was found in circle sub dimension of the geometrical shapes recognition test in pre-school children. When the literature is reviewed, it is defined that children have misconceptions especially about rectangle and triangle shapes and they have the least misconception about circle shape (Clements and et all, 1999; Clements and et all, 2000; Kesicioğlu and et all, 2011b). As a result of this study, there are no meaningful relationships between the children's recognition levels of the circle shape and their computer use at home, which may result from that the children have already known this shape. Again when the literature is taken into consideration, it is seen clearly that their computer use at home has a positive effect on their recognition levels of other geometrical shapes (triangle, square, and rectangle). With reference to this situation, it can be put foth that there is a positive relationship between the computer interaction of the children in pre-school period and their recognition level of geometrical shapes. Moreover, it can be added that computer games and educational software have beneficial effects on children's recognition of shapes (Kesicioglu, 2011a, Clements, 2002, Battista, 2002). This situation brings about the impact of computers on children's geometrical shape concepts; however, it must be considered that there can be other factors can influence the result. If it is considered that the children who have a computer at home have families higher in socio- economical situations than the other children, it can be assumed that the children encounter more stimulants. Many researches put forward that socio- economical level have effects on mathematical skills and; therefore, children with a higher socio- economical level are more successful (Clements et all., 2001; Thompson et all, 2005). Parallel to the findings of this study, Roorda (1994) and Olgun (2003) mention that the stimulants and concrete experiences provided to the child in early childhood affects the child's geometry skills in a positive way. In the literature view it is seen that the computer use of the child at home provides great opportunities for child's learning and teacher- parents cooperation, but parents have some drawbacks about computer use at home (Haughland, 1997). In order to eliminate these drawbacks, the pre-school teacher have some important duties.

SUGGESTIONS

1. As a result of the research, pre-school period children's recognition levels of geometrical shapes statistically differ in a meaningful way in favor of boys. It is suggested to present different variables by conducting further researches defining the causes of this situation.

2. In the conclusion part of the research, it is put forward that pre-school period children's recognition levelf of geometrical shapes differ in a meaningful way in favor of the children who have a computer at home when computer use at home is taken into consideration. It is suggested that factors and variables to affect this situation such as socio- economical level of the child must be studied and the causes of differences in computer use in boys and girls must be explained.

3. It is suggested that the families are given educational seminars about how to provide their children with educational benefits via computer in pre-school period.

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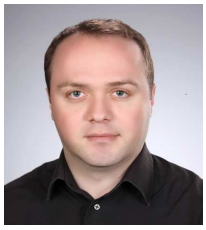

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