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The effect of computer aided education program on the development of concept in 48-60 months children

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Abstract

Children gain the most important basic concepts which help them understand and know about life, during preschool education. According to Manocha and Narang (2004) “concepts” are the basic units of all types of learning. Human beings from the infancy to old age learn new concepts and use old concepts in new situations of their daily life. Individuals differ in their level of concept formation depending on their age, intelligence and experience.

The aim of the present study was to examine the effectiveness of the computer aided education (CAE) in making 48-60 months children who attend preschool education institutions to gain the concept of “position in space”. 109 children, who were 48-60 months of age and who attended four different classes in two different primary schools in Istanbul, have participated to the study. In the study, a pre-test post-test control group design was used. Computer-aided education training program for teaching the concepts of position in space prepared by Uyanık Balat and Kanburoğlu (2009) was applied individually to each child in the study. To measure the development of concepts of position in space, BOEHM Test of Basic Concept (BOEHM-3) was applied to both groups before and after the computer-aided education program.

The study revealed significant difference between the pre-test and post-test scores for both of the experimental and control groups. The difference between the post-test scores of the experimental and control group are seen to be significant in favor of the experimental group. Accordingly it can be said that the computer aided education (CAE) is effective in making 48-60 months children to gain the concept of “position in space”. Results are discussed in line of other related researches.

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1. Introduction

In the preschool period, concept development of children is quite fast. Ministry of National Education's education program aims to develop the basic concepts of color, geometric shape, dimension, amount, direction, number/counting, sense, emotion, opposite concepts and time in children (MEB, 2013). Concept development of children aged 3-6 is considered to be an important indicator of both their language and cognitive development. Concept development is also crucial for children to identify and make sense of the world.

According to Üstün and Akman (2003), concept is an inner process symbolizing common feature of objects and events. This symbolization is generally done with a word or a noun. Therefore, children begin to learn the concepts when their abilities to regulate the perceptual stimulus improve. Even though concepts can be both concrete and abstract, children's concept development develops from concrete to abstract. According to Houglan (2000), children aged 3-4 years are developmentally ready to discover computer; therefore educators can create computer corners as learning corner. In the preschool and primary school period, a library created by appropriate software programs must be set up and making use of it should be encouraged.

Edwards (2005) mentioned that computers increasingly take place as teaching tools in preschool classes. Nonetheless, making use of computer in the class is a choice of the teacher because his/her competency in computer is one of the most influential factors in integration of computers to their preschool class. According to Arı and Bayhan (1999), first point related to computer aided education that should be paid attention by educators is "programs".

Computers are very useful in accessing to and transferring information. However it does not seem possible for computers to completely change the instructor-learner model which is implemented successfully to date. In other words, computerization is going to make accessing to and transferring information easier but for active use it cannot replace the instructors. Information society needs individuals who access to information easily, use this information in an effective way and produce information at the same time. Educating such individuals required by information society can be possible only if education environments guided by educators capable of using information and communication technologies are created (Büyükduman, 2002). Computer aided education is a teaching method in which students interact through using programmed teaching materials on computers, learn through computer programs and evaluate themselves by keeping track of their own learning (Senemoğlu, 2009).

Varol (1997) put forward that using computer for education purposes has many benefits. Some of these benefits for preschool period children can be stated as:

- Computers provide students opportunity for interaction.
- Computers help to maintain the quality standards in teaching through package programs.
- Computers provide flexible teaching for each student's individual learning needs. By doing so, they eliminate learning differences due to students' different needs, capacity and perception. Students can repeat computer programs as many as they want.
- Computers enable learning to be fast and permanent by using equipment (multimedia) such as sound, animation, color and drawing.
- Computers can be used as an educational environment.
- Computers enable their users to develop personal practices and teaching materials through appropriate software programs.
- Computers motivate students for the topic they study.
- Computers reinforce students' knowledge.

Individual differences among preschool children are quite diverse. Reducing the differences among development levels of children can be aimed by making use of software programs appropriate for children's age and their developmental characteristics in classrooms as part of computer aided education.

Nowadays, information technology is used by children actively in a controlled or uncontrolled way. Computed aided education is a good example of using these technologies in a controlled way. Use of software programs created

for sophisticated development of children under guidance of educators in a classroom environment should be become prevalent as one of the efficient use of information technology. There are not computer corners as learning center in Turkish public preschools. Computer aided education in preschool classrooms does not take place in the last preschool educational program of the ministry (MEB, 2013). When previously mentioned benefits of using computer in preschool classrooms are taken into consideration, it is clear that it can be benefited from using computer aided education programs in preschool education institutions. In the present study, it was aimed to examine the effectiveness of the computer aided education (CAE) in making 48-60 months children who attend preschool education institutions to gain the concepts of position in space.

2. Method

Population and Sampling: Sample of the research was chosen from the public schools of Ministry of National Education on the Anatolian side of Istanbul city. All children of three different preschool classrooms in two schools were included and 109 children participated to the research. The participants have an age mean of 4,94 years with standard deviation of 0.32. 56 of the children were in the control group and 53 of them were in the experimental group. There were 30 (56,6%) girls and 23 (43,4%) boys in the experimental group while there were 29 (51,8%) girls and 27 (48,2%) boys in the control group. All of the children were 5 years old. When looking at the education levels of the parents in the experimental group, it was found that 5,7% of mothers are primary school and 49,1% of mothers are middle school graduates, 5,7% of mothers high school degrees, 34,0% of mothers university degrees and 5,7% mothers have masters degrees. On the other hand, 43,4 of fathers are middle school, 17% of fathers have high school, 35,8% of fathers have university degrees and 3,8% of fathers have masters degrees. When looking at the education levels of the parents in the control group, it was found that 7,1% of mothers are primary school and 17,9% of mothers are middle school graduates, 5,4% of mothers high school degrees, 42,9% of mothers university degrees and 26,8% mothers have masters degrees. On the other hand, 7,1% of fathers are primary, 25,0% of fathers are middle school, 23,6% of fathers have high school, 50% of fathers have university degrees and 14,3% of fathers have masters degrees. When looking at the number of children in the families in experimental group, it was found that 7 (5,2%) of children haven't any siblings, 17 (12,6%) of them have one, 10 (7,4%) of them have three, 1 (0,7%) of them have four siblings. And also when looking at the number of children in control group, it was found that that 23 (41,1%) of children haven't any siblings, 25 (44,6%) of them have one, 8 (14,3%) of them have three siblings. Every child in the experimental group has computer at home while only one child in the control group does not have computer at home and 55 (98,2%) of them have computer at their home. In the experimental group, 23 (43,4%) children have a computer in their rooms whereas 30 (56,6%) children do not have one in their rooms. In the control group, 53 (94,6%) children have a computer in their rooms while 3 (5,4%) children do not have one in their rooms.

3. Data collection tools

Boehm Test of Basic Concept (BOEHM-3, 2000): The test was developed by Ann. E. Boehm and Boehm-3, 2000 revised version was used in this study (Boehm, 2001). The test can be applied to all children from preschool to primary school second grade (60-96 months). It consists of small booklets which include 50 basic concepts and aims to assess children's level of qualitative, spatial, quantitative concepts related to their language and cognitive development. During the attempts to translate the test into Turkish, the validity of E Form was found to be .002 and test repetition and test accuracy was found to be .879 (ICC); moreover, Croncbach Alfa was calculated as .862 and Spearman–Brown accuracy was calculated as .829 (Uyanık Balat, 2003; Uyanık Balat & Artan, 2004). To assess children in this study, "position in space" part of the test was used.

Information Form: In this form, there were questions related to parents' level of education, family's income level, children's gender, age and number of siblings, having or not a computer at home and in children's rooms.

Computer Aided Education Program for Teaching the Concepts of Position in Space: Three different programs, which are included in the BOEHM-3 test (2000) and created for teaching position in space concepts necessary for writing and reading skills of children, were developed in the study. Different pictures in Adobe Flash program presenting 25 different concepts were used. The program gives children chance to repeat as much as they want and

give feedback with appropriate voice over. As part of their Community Service course, students whose names were provided below contributed to the present study by helping to develop the program, conducting pre-implementation to evaluate the program with children and implementing the program to children individually in the schools. The concepts aimed to be taught in the program are: top, middle, side, end, top right, corner, last, far, above, separated, sequential, next to, under, in front of, furthest, similar, over, back, top left, between, bottom, jump, forward, backward...

Data Collection Procedure: Implementation of the study took eight weeks. At the first week, the educators met with children and the first implementation was conducted by using BOEHM-3 test's parts related to relevant concepts. In addition, the laptop mouse that will be used in the implementation was introduced to children and was provided to the children for their free use. All program implementations were conducted individually and children spent an average of 5-7 minutes in the program. Educators asked children the question related to the concept on the screen and wanted them to identify it. Children tried to find the correct concept by clicking the mouse and encouraged with voice and video responses of the computer such as "well done, very good, would you like to try again?". Examples are provided below. Three different programs were implemented throughout six weeks in which the first week's program was repeated at the fourth week, the second week's program was repeated at the fifth week and the third week's program was repeated at the sixth week. Post-test related to relevant concepts was implemented to the children at the last week.

4. Results

Findings related to the effectiveness of the computer aided education (CAE) in making 48-60 months children who attend preschool education institutions to gain the concept of "position in space" are represented in Table 1 to Table 4.

Table 1. Pre-test results related to comparisons of experimental and control groups' scores of position in space concept (BOEHM-3)

Group	X	N	S	t	sd	p
Experimental	,6875	53	,18828	-1,257	105,789	,212
Control	,7312	56	,17530			

As seen in Table 1, there is not a significant difference between the pre-test scores of children in the experimental group and those in the control group ($t(105,789)=-1,257$; $p>0,05$). Therefore, it can be stated that the experimental and control groups were equivalent in terms of their mean scores in concept of position in space before the study.

The mean scores of the position in space concept were calculated for children in both control and experimental groups. The comparisons between two groups' pre-test and post-test scores were calculated by using dependent t-test; the comparisons of two groups' post-tests scores were calculated by using independent t-test. Both results are presented in the tables below.

Pre-test and post-test mean scores of children in the control group were compared with dependent t-test and the results are represented in Table 2.

Table 2. T-test results related to comparison of pre-test and post-test scores of children in the control group for position in space concept (BOEHM-3)

Control	X	N	S	T	Sd	p
Pre-test	,7286	56	,17572	-8,725	55	,000
Post-test	,9550	56	,07076			

As seen in Table 2, there is a significant difference between the pre-test and post-test scores of children in the control group ($t(55)=-8,725$; $p<0,01$). This difference is in favor of post-test scores.

Due to the fact that the control group experienced a teaching process, an increase in the scores for the concepts of position in the favor of the post-test was expected.

Mean scores of the pre-test and post-test of children in the experimental group were compared with dependent t-test and the results are represented in Table 3.

Table 3. T-test results of comparisons between pre-test and post-test scores of the experimental group for the concept of position in space (BOEHM-3)

Experimental	X	N	S	T	Sd	p
Pre-test	,6875	53	,18828			
Post-test	,9879	53	,02429	-12,217	52	,000

As seen in Table 3, a significant difference is observed between the pre-test and post-test scores of children in the experimental group ($t(52)=-12,217$; $p<0,01$). This difference is in favor of post-test scores. As in the control group, due to the fact that experimental group also experienced a teaching process but with computers, an increase in success and a significant difference in favor of post-test scores was expected.

Mean scores of the post-test of children in the experimental and control group were compared with independent t-test and the results are represented in Table 4.

Table 4. T-test results of the comparisons between post-test scores of experimental and control groups for concept of position in space (BOEHM-3)

Group	X	N	S	T	Sd	p
Experimental	,9879	53	,02429			
Control	,9558	56	,07038	3,153	108	,002

As seen in Table 4, a significant difference is observed between the post-test scores of children in the experimental group and those in the control group ($t(108)=3,153$; $p<0,01$). Increase in the scores in favor of both experimental and control group is observed in the pre-test/post-test comparisons within the groups. This increase was expected due to the fact that both groups experienced a teaching process. Since determining effect of intervention to the experimental group is considered to be the main purpose of the study, independent t-test comparison results between groups have more importance. These results indicate an increase in favor of experimental group when mean scores of both groups after training were compared. In other words, computer aided education implemented to the experimental group enabled children to learn concepts of position in the space more successfully.

5. Discussion and suggestions

The present study aimed to examine the effectiveness of the computer aided education (CAE) in helping 48-60 month old preschooler gain the concept of “position in space”. A pretest posttest control group design was used in the study. The study revealed significant differences between the pre-test and post-test scores for both experimental and control groups. An expected significant difference was found in the scores of concept of position in space for the control group who did not receive computer aided education of concepts but education of concepts of position in space. The post-test scores of the experimental and control group were significantly different with experimental group having higher scores. Accordingly it can be said that the computer aided education program for position in space is the indicator of the effect in children’s concept development. Similarly, Aral and Bütün-Ayhan also examined the effectiveness of computer aided education on six year old children’s concept development by using the programs available on the market. They found meaningful differences in children’s concept of “position in space”. Kaçar and Doğan (2007) compared general education and computer aided education methods in terms of their effects on the development of the concepts of numbers and shapes with six-year-old children and they found out that children who had computer aided education were more successful in concept development. Moreover, data gathered from the families of children in the study revealed that families whose children participated in the research supported that computer aided education in preschool period is useful for their children.

In addition to increasing children’s successes, computer aided education helps higher level thinking skills which in turn enables them to learn by comprehending instead of memorizing (Renshaw & Taylor, 2000). Clements (2002) claims that the interaction of children with computer in early ages develop their critical thinking abilities, problem solving and decision making skills. In his research comparing the effectiveness of traditional and computer aided

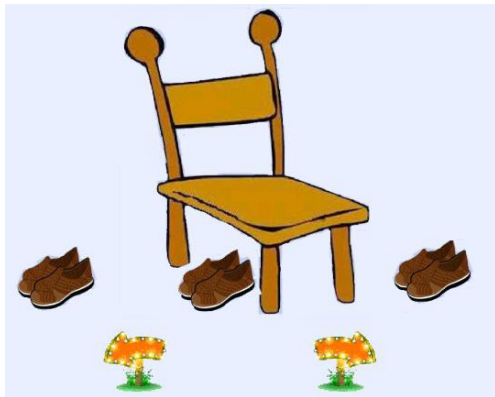
education in teaching children aged 3-4 the concept of color, Demir (2007) found out that children who had computer aided education were more successful in developing the concept of color.

In conclusion, findings of the present study demonstrate that computer aided education can be utilized in the preschool education programs. Educators can be encouraged to utilize computer aided education based on children's age and development levels. Moreover, preschool practitioners should improve themselves in computer aided education and they should be able to maximize their use of education technologies.

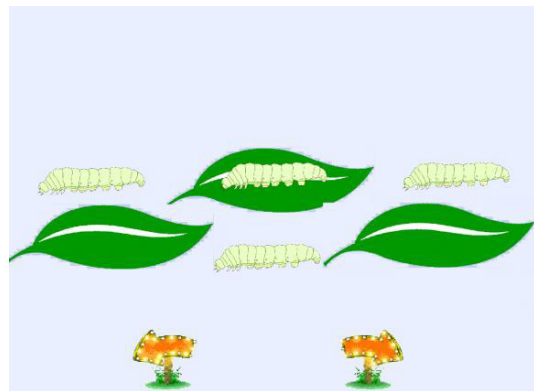
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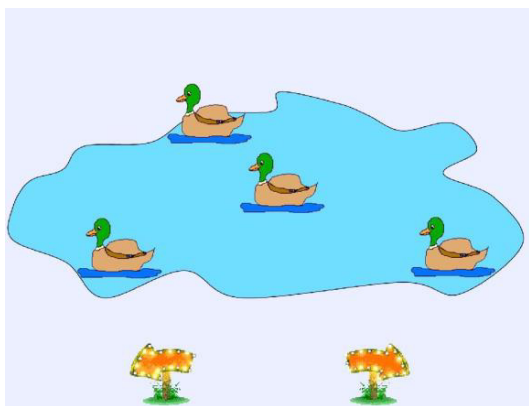
The Examples From The “ The Concept Of Position In Space” Computer Aided Programme



“Find shoes under the chair?”



Find the caterpillar on the leaf?



Find the duck in the middle of the lake?



Find the ant behind the vase?