ISSN:1306-3111
e-Journal of New World Sciences Academy
2010, Volume: 5, Number: 3, Article Number: 1A0098

ENGINEERING SCIENCES
Received: May 2009
Accepted: July 2010
Series : 1A
ISSN : 1308-7231

Ahmet Ömer Kacar
Nurettin Doğan
Gazi University
ndogan@gazi.edu.tr
http://w3.gazi.edu.tr/~ndogan/
Ankara-Turkey

THE ROLE OF COMPUTER AIDED EDUCATION IN PRE-SCHOOL EDUCATION

ABSTRACT

Comparison of Computer Aided Education (CAE) and Traditional Education (TE) in the field of acquiring the concepts of numbers (from 1 to 10), shapes (square, circle, triangle, rectangle) to the children in the kindergarten at the age of six and determining the role of CAE in this matter have been the subject of this study. In this study for the children at the age of six going to the kindergartens of primary schools in Afyonkarahisar Central District, the role of CAE has been studied giving the education of geometric shapes and the concepts of numbers by the means of CAE and TE.

Keywords: Computer Aided Education, The Role of Computer Aided Education, Pre-School Education, Computer Education at Pre-School Education, Computer Aided Education at Pre-School Education.

OKULÖNCESİ EĞİTİMDE BİLGİSAYAR DESTEKLİ EĞİTİMİN ROLÜ

ÖZET

Bu çalışmanın amacı okulöncesi eğitim kurumlarına devam eden altı yaş çocuklarına sayı(1'den 10'a kadar) ve şekil (kare, daire, üçgen, dikdörtgen) kavramlarını kazandırmada Bilgisayar Destekli Eğitim(BDE) ve Geleneksel Eğitim(GE) yöntemlerinin etkililiğini karşılaştırmak ve bu konudaki BDE'in rolünü saptamaktır. Bu çalışma Afyonkarahisar İli Merkez İlçesi, İlköğretim Okullarında anasınıfına devam eden altı yaş çocuklarına BDE ve GE yöntemiyle geometrik şekil ve sayı kavramı eğitimi verilerek BDE'in bu konudaki rolü araştırılmıştır.

Anahtar Kelimeler: Bilgisayar Destekli Eğitim, Bilgisayar Destekli Eğitimin Rolü, Okulöncesi Eğitim, Okul Öncesi Eğitimde Bilgisayar Eğitimi, Okulöncesi Eğitimde Bilgisayar Destekli Eğitim.

1. INTRODUCTION (GİRİŞ)

Rapid changes in science and technology have led us call our age first "Electronic Age", then "Space Age" and lastly "Computer Age". These concepts which are the indicators of the development level of our century also shape the way of today's social life. It is no doubt that these advancements in science and technology are the consequences of educational activities. All sorts of knowledge, skills, behaviors and attitudes acquired through education have been transferred from one generation to another. Consequently, education, which has been a discussion topic from past to present and which has always been an important role in human life, has gained a new dimension with computers becoming the indispensable part of our everyday lives.

Advancements in science and technology, which have brought about new necessities, also provide new opportunities for educational practices. Without a doubt, computers are at the top of these opportunities. Computers began to be used by many people with different interest and for different purposes in various fields. They have even become an integral part of daily life. Now, the question of "How can we efficiently use computers in education?" has replaced that of "Do we need to use computers in education?" The fact that computers become more widespread day by day in the lives of individuals and society gives us a clue that tomorrow will be much more different, complicated and advanced than today. In order for people to adapt to the new world, they need to know computer well and have the skill to use it. This is only possible by getting familiarized with computers at an early age and through a planned computer education. The most appropriate period for getting to know computers and undergoing computer education can be preschool years (Yaşar and Namlı, 2004).

To this end, this study has been planned and implemented in order to compare computer aided education and traditional education in respect of their efficiency in gaining the concepts of numbers and geometric shapes to the children in the kindergarten at the age of six with the concept, to help teachers in comprehending the role of computer aided education and gaining the concepts of numbers and geometric shapes to children in preschool period, to provide information about preschool education and computer aided education, and to increase success in computer use.

- **Computer Aided Education in Preschool Period (Okulöncesi Dönemde Bilgisayar Destekli Eğitim)**

One of the fundamental elements of education is teaching and learning activities. The effectiveness of teaching processes for educational purposes depends largely on the teacher as well as the materials (all sorts of equipment) and methods used by the teacher. Education, which is one of the most important processes in human life, should be equipped and organized with the advanced technological resources in order to meet today's requirements. Use of computers in education is a necessary step taken to this end.

Computers become more widespread day by day in the educational life as they are being used in the other areas in our lives. However, one of the topics under discussion is when to introduce children to computers. Preschool period is probably appropriate as during this period, children are quite curious and eager to learn. Some precautions must be taken in the application of computer aided education in preschool period. Disability of reading and writing of the children in preschool period can be given as an example for this situation. By the way, computer should be a tool, not a purpose in itself for education. Also computers must not replace teachers and they should be used as an assistant tool which increases the

effectiveness of education in the computer aided education. The teacher should be a guide and an assistant in this educational process. Otherwise, computer may be harmful for the development of a child. Moreover, the discussions as to the questions of how much time a child needs to spend with computer, whether this will create addiction or not, and if computer monitor is harmful should also be taken into consideration.
According to the researchers the children must be over three years old for giving computer aided education in preschool period (Karabaş, 2001) (Yaşar and Namlı, 2004).

Computers strengthen children and provide ways of learning with pleasure. However, how to use a computer is an important thing, too. What principles should be taken into account while using computers? It is important to choose computer software and websites appropriate for development of children.

Comparison of Computer Aided Education (CAE) and Traditional Education (TE) in the field of acquiring the concepts of numbers (from 1 to 10), shapes (square, circle, triangle, rectangle) to the children in the kindergarten at the age of six and determining the role of CAE in this matter have been the subject of this study. In this study for the children at the age of six going to the kindergartens of primary schools in Afyonkarahisar Central District, the role of CAE has been studied giving the education of geometric shapes and the concepts of numbers by the means of CAE and TE. In this study 80 students (consisted of 38 girls and 42 boys from two primary schools) have participated. The children were divided into an experimental group and a control group. The education of numbers and shapes was given to the experimental group via CAE while it was given to the control group via TE. The "Geometric Shape Recognition Form" and the 'Piaget's Test of Conservation of Numbers' were applied as pretest and posttest. "The Questionnaire Form for Parents" have been applied to parents, "The Form of Interview with the Child" have been applied to the children participating in the study for the purpose of determining their opinion about computers.

The aim of this study is to emphasize the importance and effectiveness of computer aided education in preschool period.

2. RESEARCH SIGNIFICANCE (ÇALIŞMANIN ÖNEMİ)

The subject of this study is to analyze the efficiency of computer aided education and traditional education methods in gaining concepts of number and shape to children going to kindergarten at age six and to determine the role of computer aided education. For this purpose, an experimental research design has been formed.

This research consists of experiment and control groups, and has been designed as an experimental pretest and posttest design with repeated measures. In this design, there are two groups, namely the experimental group which was provided with computer aided education and the control group which was provided with traditional education. The two groups were compared to see if there is any difference in the results between computer aided education method and traditional education method. Moreover, under the scope of this study, the opinions of kindergarten children and their parents on computer aided education in preschool institutions were taken. To this end, kindergarten children were asked to fill in an interview form and their parents were asked to fill in a survey sheet.

2.1. Universe of the Study (Araştırmanın Evreni)

Universe of the study consists of children at the age of six who attend to the kindergarten of the Primary Schools under Ministry of

Education in Afyonkarahisar Central District. They all have normal and healthy development and come from the same socio-economic level.

During scientific studies, experiments are made not with the whole universe of the study but with subjects selected objectively to represent these participants. In this way, researchers collect the necessary data from the selected subjects. However, the main objective here is to make assumptions about or know the universe of the study based on statistics calculated in accordance with the collected data (Büyüköztürk, 2002).

2.2. Subjects of the Study (Araştırmanın Örneklemi)

Subjects in this study were 80 children selected from the Primary Schools in Afyonkarahisar Central District. During the selection, firstly the list of the Primary Schools with kindergartens within Afyonkarahisar Central District was obtained. Then the researchers randomly selected the schools with computer laboratories from the list of these Primary Schools. After necessary permissions were taken, experiment was put into implementation.

80 students from the kindergartens of Hoca Ahmet Yesevi Primary School and 27 Ağustos Primary School in the Central District participated in this study. The participants were divided into two groups. The first group of 40 children would be given computer aided education and the second group of 40 children would be given traditional education. Special attention was given to select equal numbers of boys and girls. Distribution of subject children according to their schools and genders is shown in Table 1.

Table 1. Distribution of subject children according to their schools and genders
(Tablo 1. Örneklemi oluşturan çocukların devam ettikleri okullara ve cinsiyetlerine göre dağılımı)

Group	Primary Schools								TOTAL	
	27 Ağustos Primary School				Hoca Ahmet Yesevi Primary School					
	Group A		Group B		Group C		Group D			
	M	F	M	F	M	F	M	F	M	F
	N	N	N	N	N	N	N	N	N	N
Computer Aided Education	*8*	*12*	–	–	–	–	*9*	*11*	*17*	*23*
Traditional Education	–	–	*10*	*12*	*11*	*7*	–	–	*21*	*19*

2.3. Data Collection Tools (Veri Toplama Araçları)

In order to collect data in line with the aims of this study, three different data collection tools have been applied to the children and in order to determine the opinions of the parents of the children under the scope of this study about computer-aided education, the parents were asked to fill in questionnaire form.

To the children;

- "Geometric shape recognition form" was applied to determine their level of recognition of geometric shape ",
- "Piaget's test of conservation of numbers" was applied in order to determine their level of recognition of numbers",
- "Form of interview with the child" was applied in order to learn their opinion about computer aided education.

To the parents;

- Questionnaire form for parents" was applied in order to learn the opinion of the parents about computer aided education.

2.3.1. Geometric Shape Recognition Form (Geometrik şekil kavrama formu)

With the geometric shape recognition form, it was aimed to reveal the information of the children about square, circle, triangle and rectangle. It was composed of four pages.

2.3.2. Piaget's Test of Conservation of Numbers (Piaget'in Sayı Korunumu Testi)

With the Piaget's test of conservation of numbers, it was aimed to measure the information of the children about the numbers from one to ten. This test was composed of nine pages. The first page was composed of conservation of numbers, the other pages were composed of matching the pictures with the same number by marking, counting, telling the symbol of the number, matching the picture with the symbol of the number, writing the symbol of the number. One score was given for the answer "available" of the child to the page of the test about conservation of the number and zero score for the answer "unavailable". The pages of the test concerning the symbol of the numbers were evaluated by giving "one" score for "the recognized number" and "zero" score for "the unrecognized number" for each of the numbers on the test pages.

2.3.3. Form of Interview With the Child (Çocukla Görüşme Formu)

With an aim to determine the opinion of the children about computer aided education, a form of interview with the child was prepared by literature screening. The form of interview with the child was composed of some information to be given by the researcher such as the name of the school and the date the interview took place, the number, class, name and surname, gender, birth date of the child and the number of the year the child attended to the day-care center and open ended questions to be answered by the child such as "Do you like using computer?", "What do you do with the computer?" "From whom do you get help when using computer?" and "What do you think about using computer in the class?"

2.4. Data Collection Technique (Veri Toplama Tekniği)

Going to the schools within the scope of the study, the school directors, kindergarten teachers and parents were provided with information about the study then the pretests were started to be applied.

For the application of the pretests, the children were put one by one in a separate division or a study room which was luminous, quiet, at proper temperature, far from stimulants, and during application, the students were asked to sit in a desk suitable for their body shapes facing the researcher. A proper environment was established for the child to fill in the geometric shape recognition form and take Piaget's test of conversation of numbers then the application began.

The completion of pretest took approximately four weeks. After the completion of pretests, the researcher began to give education to the children under the scope of the study. The researcher gave education for nine weeks with every week consisting of one full-time, three part-time days. Educations were given particularly on Fridays. On the other days of the week, special and personal attention was paid to the children who could not attend to school in order to provide what is missing in their education. In this way, equality was achieved in all children's availability in the education.

Before the computer aided education was given, children were asked if they used computer or not, what they did with computers and

then computer was briefly introduced to them. It was observed that some children used computer while the others did not. In order to get the children who did not use computer familiarized with computer and particularly with using the mouse and learning how to move it, preparatory education was provided for these children with software material other than the CD programs and software materials used in the education. This additional software material was the CD called "Bilmiş'in Bilim Evi" (CD-1) prepared by Edmark Ltd. Şti. for preschool children. A number of games included in the CD were played. In addition, animation programs (CD-2) were used, which were prepared using Macromedia Flash MX in accordance with the children's levels and curriculum by the researcher and Ayşe ATALAY, who is a lecturer in Gazi University Faculty of Education Department of Primary School Division of Preschool Education.

In computer aided education, games were played from "Bambam'ın Matematik Dünyası-1 (CD-3)" (Bambam's Maths World) and "Cingöz'ün Sayılar Evi (CD-4) (Cingöz's House of Numbers)" prepared by İnteraktif Bilgisayar Eğitim Ltd. Şti. in order to teach numbers and geometric shapes such as square, circle and rectangular.

During computer aided education activities, the instructor selected the games to be played for each day, and before each game, computer's instructions were listened. The instructor further explained what to do whenever necessary. Whenever the children did right, they were given verbal award such as "well done", "well done, you did it right", "good for you", "you made it", "congratulations". When the children failed, there were encouraged by giving feedbacks such as "try again", "no, that is not right", "no, try again". When the child failed, he/she was asked to try again. When the child failed again, he/she was given help, allowed him/her to make it and proceed to the next game. However, the child who failed the game the following week was allowed to replay without any help.

While giving education to the traditional method group, the children were provided with models, the instructor decided what the children would do, which material the children would use and how. The instructor showed how the activity would be done by first performing it himself and then asked the children to do it in the same way. The child who needed help during the activity was given verbal and physical help. The traditional education was planned as desk activities, group games and preparatory works for reading and writing. The concepts of shape and numbers were taught stage by stage.

2.5. Data Analysis (Verilerin Analizi)

Data analysis is one of the key steps of study process. The data analysis requires study efficiency, comprehension of logic of statistics, being efficient in statistical methods and techniques. The data analysis can be described as the process during which results having scientific validity are deduced from data by using proper statistical techniques. With a broader sense, the data analysis can be described as the process during which the data is collected, regulated and giving meaningful decisions by applying statistical operations and deducing valid consequences (Büyüköztürk, 2002).

In this context, within the scope of our study, after data about the study were collected, by using S.P.S.S. for Windows 14.0 (Statistical Packet for Social Sciences) statistical packet program and by forming database in the computer, statistical operations were conducted.

In analyzing data of the geometric shape recognition form and Piaget's test of conservation of numbers; the methods of "Paired

student's t-test", "Student's t test" and "Two-factor analysis of variance for the repeated measures on one factor" were used.
In the data used for the analysis;

- For the Average Scores of the Geometric Shape Recognition Form,
- For the Average Scores of the Piaget's Test of Conservation of Numbers,

"Two-Factor Analysis of Variance for the Repeated Measures on One Factor", "Paired student's t-test" and "Student's t test" were applied. Moreover, all of the comparisons in the analyses were tested at significance level 0.05.

In this model, in accordance with the study design, in addition to the tests which were applied for the significance of the basic effects of group (experiment and control) and measure (pretest and posttest), group x measure collective effects tests were applied, which tested the significance of the difference between the variance ratio in the pretest and posttest attitude scores of the two groups. Collective effects test is about whether the experimental operation is effective in the analysis or not (Büyüköztürk, 2001).

Therefore, only the collective effects test results were interpreted in the ANOVA analysis made under this study.

The information determining demographic features of parents and their opinions about computer aided education was obtained through questionnaire applied to the parents of the children who were given education. The information concerning the parents who did not return the questionnaire was obtained through the personal information forms of the students with the help of kindergarten teachers. In addition, the frequency and percentage distribution of the findings were also obtained.

3. FINDINGS (BULGULAR)

Findings concerning the evaluation of the data obtained as a result of the study have been presented after a two-stage examination.

3.1. Findings Obtained from Geometric Shape Recognition Form (Geometrik Şekil Kavram Formundan Elde Edilen Bulgular)

Table 2 shows the average and standard deviation values of all the pages in the geometric shape recognition form.

Table 2. The average and standard deviation values of all the pages in the Geometric Shape Recognition Form
(Tablo 2. Grupların geometrik şekil kavrama formunun tüm sayfalarının ortalaması ve standart sapma değerleri)

GROUP	PRETEST			POSTTEST		
	N	X	SD	N	X	SD
EXPERIMENT	40	13,63	3,90	40	22,68	2,37
CONTROL	40	13,60	4,11	40	20,53	3,00

As it is seen from the Table 2, while the pretest average score of the experimental group provided with computer aided education was 13.63, their posttest average score after the education increased to 22.68. According to this, the attained score of the experimental group after the education was 9.05. While the pretest average score of the control group provided with traditional education was 13.60, their posttest average score after the education increased to 20.53. According to this, the attained score of the control group after the education was 6.93.

ANAVO test was applied in order to find out whether the changes observed between the pre-education and post-education of the students in experiment and control groups concerning the average scores of all the pages in the geometric shape recognition form were significant or not. The results are showed in the Table 3.

Table 3. ANOVA results of the pretest and posttest average scores of all the pages in the geometric shape recognition form
(Tablo 3. Geometrik Şekil Kavram Formunun tüm sayfalarının öntest-sontest ortalama puanlarının ANAVO sonuçları)

Source of Variance	SS	DOF	MS	F	P
Inter-subjects	1286.694	79			
Group (Experiment/Control)	47.306	1	47.306	2.977	.088
Mistake	1239.388	78	15.890		
Intra-subjects	3177.5	80			
Measure (Pretest-Posttest)	2552.006	1	2552.006	343.001	.000
Group*Measure	45.156	1	45.156	6.069	.016
Mistake	580.338	78	7.440		
Total	4464.194	159			

As it is seen from the Table 3, there is a significant difference in the all pages of geometric shape recognition form from the pre-education to post-education between the groups of computer aided education and traditional education [$F(1,78)=6.069$, $p<.05$]. This finding supports the research hypothesis which suggests that the experimental group students who are provided with computer aided education will have an increased level of shape recognition compared to the control group students who are provided with traditional education.

Table 4. Table of difference between the pretest and posttest scores and groups' average scores of geometric shape recognition for the Hoca Ahmet Yesevi Primary School in terms of educational method
(Tablo 4. Grupların geometrik şekil kavrama formu ortalama puanının eğitim yöntemi bakımından Hoca Ahmet Yesevi İlköğretim Okulu için öntest-sontest puanları arasındaki farklılık çizelgesi)

MEASURE	METHOD	N	X	SD	DOF	t	p
PRETEST	CAE	20	14.25	3.93	36	0.33	0.743
	TE	18	13.78	4.87			
POSTTEST	CAE	20	23.1	2.40	36	3.15	0.003
	TE	18	20.3	3.01			

As it is seen from the Table 4 and Table 5, there is not a significant difference between the pretest scores of Hoca Ahmet Yesevi Primary School and 27 Ağustos Primary School in terms of educational methods [$p>.05$]. It means that the initial states of the students in these schools are at the same level. However, it has been found out that there is a significant difference between the posttest scores of the students from the same schools in terms of educational methods [$p<.05$]. The different levels of learning of the students result from the educational methods. It means that the difference between the computer aided education method and traditional education method is significant. This finding supports the research hypothesis which suggests that the experimental group students who were provided with computer aided education would have an increased level of geometric shape recognition compared to the control group students who were provided with traditional education in Hoca Ahmet Yesevi Primary School and 27 Ağustos Primary School.

Table 5. Table of difference between the pretest and posttest scores and groups' average scores of geometric shape recognition for the 27 Ağustos Primary School in terms of educational method
(Tablo 5. Grupların geometrik şekil kavrama formu ortalama puanının eğitim yöntemi bakımından 27 Ağustos İlköğretim Okulu için öntest-sontest puanları arasındaki farklılık çizelgesi)

MEASURE	METHOD	N	X	SD	DOF	t	p
PRETEST	CAE	20	13.00	3.87	40	0.401	0.690
	TE	22	13.45	3.47			
POSTTEST	CAE	20	22.25	2.31	40	1.864	0.004
	TE	22	20.68	3.05			

Table 6. Table of comparison of the pretest and posttest scores and the average scores of geometric shape recognition form between schools in terms of computer aided education
(Tablo 6. Grupların geometrik şekil kavram formu ortalama puanının okullar arasındaki bilgisayar destekli eğitim yöntemi bakımından öntest-sontest puanlarının karşılaştırma çizelgesi)

MEASURE	SCHOOL	N	X	SD	DOF	t	p
PRETEST	H.A.Y.	20	14.25	3.93	38	1.014	0.317
	27 A.	20	13.00	3.87			
POSTTEST	H.A.Y.	20	23.10	2.40	38	1.139	0.262
	27 A.	20	22.25	2.31			

As it is seen from the Table 6 and Table 7. difference in terms of pretest and post test scores at Hoca Ahmet Yesevi (H.A.Y.) and 27 Ağustos (27A.) Primary Schools is not significant [Pretest p>.05 and Posttest, p>.05]. This finding shows that both of these schools under the scope of the study are at the similar socio-economic environment. Moreover, it was found out that among the effects of the differences stemmed from the application of the computer aided education and traditional education methods in the study there was not the effect of the school. This means that the initial levels and average intelligence levels of the students at the schools are at the same level and the findings under the scope of the study did not stem the fact that the schools are different.

Table 7. Table of comparison of the pretest and posttest scores and the average scores of geometric shape recognition form between schools in terms of traditional education
(Tablo 7. Grupların geometrik şekil kavram formu ortalama puanının okullar arasındaki geleneksel eğitim yöntemi bakımından öntest-sontest puanlarının karşılaştırma çizelgesi)

MEASURE	SCHOOL	N	X	SD	DOF	t	p
PRETEST	H.A.Y.	20	13.78	4.87	38	0.245	0.808
	27 A.	20	13.45	3.47			
POSTTEST	H.A.Y.	20	20.33	3.01	38	0.362	0.719
	27 A.	20	20.68	3.05			

3.2. Findings Obtained From the Piaget's Test of Conservation of Numbers (Piaget'in Sayı Korunumu Testinden Elde Edilen Bulgular)

Table 8 shows the group's average and standard deviation values of all the pages in the Piaget's Test of Conservation of Numbers.

Table 8. Group's average and standard deviation values of all the pages in the Piaget's test of conservation of numbers
(Tablo 8. Grupların Piaget'in sayının korunumu testi tüm sayfalarının ortalaması ve standart sapma değerleri)

	PRETEST			POSTTEST		
GROUP	N	X	SD	N	X	SD
EXPERIMENTAL	40	28,38	6,31	40	40,60	1,79
CONTROL	40	30,48	4,33	40	38,08	2,70

As it is seen from the Table 8, while the pretest average scores of the experimental group who are provided with computer-aided education before the education was 28.38, their posttest average scores after education increased to 40.60. Accordingly, the attained score of the experimental group after the education is 12.22. While the pretest average score of the control group who were provided with traditional education before the education was 30.48, their posttest education score after the education increased to 38.08. Accordingly, the attained score of the control group after the education is 7.60.

Whether the said differences in the average scores of the students in experiment and control group of all of the pages in geometric shape recognition form before and after education was significant or not, was tested by ANOVA. The test results are available in Table 9.

Table 9. The ANOVA outcomes of the groups' pretest and posttest average scores of all pages of Piaget's test of conservation of numbers.
(Tablo 9. Grupların Piaget'in sayının korunumu testinin tüm sayfalarının öntest-sontest ortalama puanlarının ANOVA sonuçları)

Source of the variance	SS	DOF	MS	F	p
Inter-subjects	1925.244	79			
Group (Experiment/Control)	1.806	1	1.806	0.073	0.787
Mistake	1923.438	78	24.659		
Intra-subjects	5120.5246	80			
Measure (Pretest- posttest)	3930.3306	1	3930.306	314.010	0.000
Group*Measure	213.906	1	213.906	17.090	0.000
Mistake	976.288	78	12.517		
Total	7045.7686	159			

As it is seen from the Table 9, there is a significant difference in the all pages of Piaget's test of conservation of numbers from the pre-education to post-education between the groups of computer aided education and traditional education [$F(1,78)=17.090$, $p<.05$]. This finding supports the research hypothesis which suggests that the experimental group students who are provided with computer aided education will have an increased level of number recognition compared to the control group students who are provided with traditional education.

As it is seen from the Table 10 and Table 11, there is not a significant difference between the pretest scores of Hoca Ahmet Yesevi Primary School and 27 Ağustos Primary School in terms of educational methods [$p>.05$]. It means that the initial states of the students in these schools are at the same level. However, there is a significant difference between the posttest results of the students at the same school in terms of education method [$p<.05$]. This situation shows that the fact that the students in these schools learn at different levels stems from the education method. It means that difference between the computer-aided education method and the traditional education method

is significant. This finding supports the research hypothesis which suggests that the experimental group students who are provided with computer aided education in Hoca Ahmet Yesevi and 27 Ağustos Primary School will have an increased level of number recognition compared to the control group students who are provided with traditional education.

Table 10. Table of difference between the pretest and posttest scores and groups' average scores of Piaget's test of conservation of numbers for the Hoca Ahmet Yesevi Primary School in terms of educational method
(Tablo 10. Grupların Piaget'in sayının korunumu testi ortalama puanının eğitim yöntemi bakımından Hoca Ahmet Yesevi İlköğretim Okulu için öntest-sontest puanları arasındaki farklılık çizelgesi)

MEASURE	METHOD	N	X	SD	DOF	t	p
PRETEST	CAE	20	29.35	5.78	36	0.564	0.577
	TE	18	30.39	5.55			
POSTTEST	CAE	20	40.55	1.98	36	2.662	0.012
	TE	18	38.28	3.19			

Table 11. Table of difference between the pretest and posttest scores and groups' average scores of Piaget's test of conservation of numbers for the 27 Ağustos Primary School in terms of educational method
(Tablo 11. Grupların Piaget'in sayının korunumu testi ortalama puanının eğitim yöntemi bakımından 27 Ağustos İlköğretim Okulu için öntest-sontest puanları arasındaki farklılık çizelgesi)

MEASURE	METHOD	N	X	SD	DOF	t	p
PRETEST	CAE	20	27.40	7.56	40	1.73	0.096
	TE	22	30.55	3.14			
POSTTEST	CAE	20	40.65	1.63	40	4.50	0.000
	TE	22	37.91	2.29			

Table 12. Table of comparison between the pretest and posttest scores and groups' average scores of Piaget's test of conservation of numbers between schools in terms of computer-aided educational method.
(Tablo 12. Grupların Piaget'in sayının korunumu testi ortalama puanının okullar arasındaki bilgisayar destekli)

MEASURE	SCHOOL	N	X	SD	DOF	t	p
PRETEST	CAE	20	29.35	5.78	38	0.917	0.365
	TE	20	27.40	7.56			
POSTTEST	CAE	20	40.55	1.98	38	0.174	0.863
	TE	20	40.65	1.63			

Table 13. Table of comparison between the pretest and posttest scores and groups' average scores of Piaget's test of conservation of numbers between schools in terms of traditional educational method.
(Tablo 13. Grupların Piaget'in sayının korunumu testi ortalama puanının okullar arasındaki geleneksel eğitim)

MEASURE	SCHOOL	N	X	SD	DOF	t	p
PRETEST	H.A.Y.	18	30.39	5.55	38	0.106	0.916
	27 A.	22	30.55	3.14			
POSTTEST	H.A.Y.	18	38.28	3.20	38	0.425	0.673
	27 A.	22	37.91	2.29			

As it is seen from the Table 12 and Table 13, there is not a significant difference in terms of the pretest scores of Hoca Ahmet Yesevi (H.A.Y.) Primary School and 27 Ağustos Primary School (27A.) in terms of educational methods [pretest $p>.05$ and posttest $p>.05$]. This

finding shows that both of these schools under the scope of the study are at the similar socio-economic environment. In addition to this, it was found out that among the effects of the differences stemmed from the application of the computer aided education and traditional education methods in the study, there was not the effect of the schools. It means that the initial levels and average intelligence levels of the students in these schools are at the same level. And this shows that the findings under the scope of the study do not stem from the fact that the schools are different.

4. CONCLUSIONS (SONUÇLAR)

Comparison of Computer Aided Education (CAE) and Traditional Education (TE) in the field of acquiring the concepts of numbers, shapes to the children in the kindergarten at the age of six and determining the role of CAE in this matter have been the subject of this study. In this study 80 students (consisted of 38 girls and 42 boys from two primary schools) have participated. The children were divided into an experimental group and a control group. The education of numbers and shapes was given to the experimental group via CAE while it was given to the control group via TE. The "Geometric Shape Recognition Form (GSRF)" and the "Piaget's Test of Conservation of Numbers (PTCN)" were applied as pretest and posttest. After evaluating the results of GSRF statistically, significant differences were observed on the shape recognition level of the groups of CAE and TE between the pre and post education ($p<0.5$). When the total scores including all pages of PTCN were evaluated statistically, it was found that there was a meaningful difference between groups of CAE and TE ($p<0.5$). The group which had been given CAE was more successful than the one had been given TE. It is pointed out that CAE gives more successful results than TE in preschool period.

ABBREVIATIONS (KISALTMALAR)

Abbreviation	Explanation
27 A.	27 Ağustos Primary School
CAE	Computer Aided Education
CD	Compact Disk
DOF	Degree of Freedom
F	Female
GSRF	Geometric Shape Recognition Form
H.A.Y.	Hoca Ahmet Yesevi Primary School
M	Male
MS	Mean Squares
N	Number
p	Significance of the p Value
PTCN	Piaget's Test of Conservation of Numbers
SD	Standard Deviation
S.P.S.S.	Statistical Packet for Social Sciences
SS	Sum of Squares
TE	Traditional Education
X	Arithmetic Mean

REFERENCES (KAYNAKLAR)

1. Arı, M. ve Bayhan, P., (2002)."Okul Öncesi Dönemde Bilgisayar Destekli Eğitim", *Epsilon Yayıncılık*, İstanbul.
2. Bandura A., Pastorellli C., Barbaranelli C., and Cappara G.V., "Self-Efficacy Pathways to Childhood Depression", *Journal of Personality and Social Psychology*, 76, 2, 1999, 258-269.
3. Büyüköztürk, Ş., (2001)."Deneysel Desenler Öntest-Sontest Kontrol Grubu Desen ve Veri Analizi", *Pegem Yayıncılık*, Ankara.

4. Büyüköztürk, Ş., (2002).“Sosyal Bilimler İçin Veri Analizi El Kitabı”, *Pegem Yayıncılık*, Ankara.
5. Demirel, Ö., Seferoğlu S.S., (2001) “Öğretim Teknolojileri ve Materyal Geliştirme”, *Pegem Yayıncılık*.
6. Ertürk, S., (1979). “Eğitimde Program Geliştirme”, *Yelkentepe Yayınları*, No:4, Ankara.
7. Karabaş, Z., (2001) “Ailenin Tutumu Önem Taşıyor. Bilgisayarınızın Çocuğunuzun Sosyal Gelişimine Artı Bir Değer Kattığını Biliyor muydunuz?”,*Bebeğim Dergisi*, Sayı:59, 10.
8. Küçükturan, G., (2003). “Okul Öncesi Fen Öğretiminde Bir Teknik: Analoji”, *Milli Eğitim Dergisi*, Sayı:157, 1.
9. Ömeroğlu E., (1997).“M.E.B. Halk Eğitimi Merkezlerinde Uygulanan Anne Eğitimi Kurslarına Genel Bir Bakış”, *Gazi Üniversitesi Meslekî Eğitim Fakültesi Çocuk Gelişimi ve Ev Yönetimi Eğitimi Bölümü,* Ankara.
10. Skemp R., (1986). “The Psychology of Learning Mathematics”, *Penguin Books*, New York.
11. Şimşek, A., (1999). “Yeni Öğrenme Modeli ve Eğitimde Bilişim Teknolojileri: Bilgisayar Destekli Eğitim Raporu”, *Koç Üniversitesi,* İstanbul, 1-19.
12. Tuğrul, B., (2005).“Çocuk Gelişiminde Anaokulu Eğitiminin Önemi”, *Bilim ve Aklın Aydınlığında Eğitim Dergisi*, Sayı:62, 1-3.
13. Turan, F., (2004).“Okul Öncesi Eğitim Kurumları Yönetmeliği ve Programının Değerlendirilmesi”, *Milli Eğitim Dergisi,* Sayı:162, 1.
14. Yaşar, Ş. ve Namlu, A.G., (2004).Okulöncesi Eğitimde Bilgisayar Öğretimi, *Anadolu Üniversitesi Yayınları,* Eskişehir.
15. Yılmaz, A., (2005).“Eğitim Yönetiminde Bilgisayarlardan Faydalanmanın Avantajları ve Dezavantajları”, *Milli Eğitim ve Sosyal Bilimler Dergisi*, Sayı:166, 1-7.
16. Yürütücü, A., (2002). “Bilişim Toplumunda İlköğretim Sürecindeki Eğitim Teknolojileri”, *I.Uluslararası Eğitim Teknolojileri Sempozyum ve Fuar Bildirisi,* 5-37, Sakarya Üni.