

## THE EFFECT OF COMPUTER ASSISTED AND COMPUTER BASED TEACHING METHODS ON COMPUTER COURSE SUCCESS AND COMPUTER USING ATTITUDES OF STUDENTS

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### ÖZET

Bu araştırmanın amacı, bilgisayar destekli ve bilgisayar temelli öğretim yöntemlerinin, öğrencilerin Bilgisayar dersindeki başarılarına ve bilgisayar kullanmaya yönelik tutumlarına etkisini belirlemektir. Altı hafta süren çalışmanın örneklemini Trakya Üniversitesi Eğitim Fakültesi Sınıf Öğretmenliği Bölümü (I. Öğretim) 2. sınıfa devam eden 94 öğrenci oluşturmuştur. Öğrenciler öntest-sontest kontrol grup deseni ile kontrol ve deney grubunu oluşturacak şekilde dağıtılmıştır. Veri toplamak amacı ile bir bilgisayar tutum ölçeği, seviye belirleme testi ve uygulama sınavı kullanılmıştır. Elde edilen veriler SPSS 12.00 programında t testiyle analiz edilerek değerlendirilmiştir. Elde edilen sonuçlara göre bilgisayar destekli öğretim yöntemiyle Bilgisayar dersi alan öğrenciler, uygulama sınavında, bilgisayar temelli öğretim yöntemiyle dersi alan öğrencilerden daha yüksek başarı elde etmişlerdir. Buna karşılık her iki yöntem açısından, öğrencilerin bilgisayar kullanma tutumlarında anlamlı bir fark bulunamamıştır.

**Anahtar Kelimeler:** Bilgisayar destekli öğretim, bilgisayar temelli öğretim, Dick ve Carey modeli.

### ABSTRACT

The purpose of this research was to investigate the effects of the computer-assisted and computer-based instructional methods on students achievement at computer classes and on their attitudes towards using computers. The study, which was completed in 6 weeks, were carried out with 94 sophomores studying in formal education program of Primary Teaching Department of Education Faculty at Trakya University. The participants were distributed into experimental and control groups by pre-test post-test control group design. A computer attitude scale, a level-designation test and a practice test were used to collect the data. To evaluate the data, t test was used in the program of SPSS 12.00. According to the study results, the students receiving computer-assisted instruction during their computer classes showed higher success on the practice test than the students taking classes with computer-based instructional methods. Additionally, a considerable difference has not been seen in the attitude of the students towards using computers from the other standpoints of the study.

**Key words:** Computer Assisted Education, Computer Based Education, Dick and Carey Model.

### INTRODUCTION

Scientific and technological developments started a new period called “Information Age”. In this period information production has gained importance compared to goods and service by using information technologies profoundly. With changing conditions, present target of societies which are in competition and search in order to keep pace with new conditions is to be information society (Akkoyunlu, 1998). In contemporary societies called as “Information Societies” the way of individuals to reach information, their styles of learning and styles of applying information have rather changed compared to traditional societies.

In the last quarter of the 20th century, important developments seen in data processing, rapid changes that can be called as computer revolution have caused education systems to undergo a complete transformation taking but traditional forms. Education has the leading role among social institutions which will be most affected by increasingly changing process of information society (Yiğit, 2003).

Computers which are an important part of our daily life and which are very essential for many people, institutions and establishments and also which are made use of in education considerably, are important tools for schools. In addition, computers are professions which people try to obtain for the future and their importance has increased more and more (Bozkurt, 2000).

Computers have become the basis of data processing technologies used in realizing information production, manipulating, storing, sharing and distributing processes. Since they address to more senses compared to other technological tools and make abstract and complicated concepts concrete digitally because of their extensive

multimedia properties, they are one of the most important technological tools which are made use of in educational and instructional process. At the same time they play an influential part in accomplishing many pedagogical functions such as measuring and evaluating knowledge and giving feedback, observing activities and performances of students, being independent from time and environment, providing students with motivation and participation to the lesson, considering individual differences regulating education level according to existing knowledge and progress of the students, and supporting instruction with such materials as graphics, pictures, animation and sound (Şahin and Yıldırım, 1999). In traditional teaching perspectives, they are tools which enable us to control many variables that are uncontrollable and effective in human learning. All these features of computers result from the fact that they are not only multifunctional display accessories which support the lesson such as overhead projectors, video or slights, but also they can be used as the basis of a method which focuses on students.

With contemporary teaching perspectives, some differences have occurred in teachers' roles. Teaching principles in which learning is emphasized as a basis considering individuals learning and teaching is emphasized as a basis considering the person teaching have also changed. In traditional teaching, computers are tools which transfer information to students as teachers. In contemporary teaching, on the other hand, it is adopted that all of the students strive to learn, have efficient roles in education, and reach predetermined level of behavioral objectives regarding teaching products (Tandoğan, 1998). In accordance with changes in educational perspectives and new arrangements it has become compulsory for teachers to change themselves, gain new information and skills and apply these in the classrooms (Akkoyunlu, 1998).

In order to transfer new technological developments to classroom environment, varied teaching methods are needed. There are two main teaching methods which are carried out by computers today: Computer-Assisted Teaching Method and Computer-Based Teaching Method.

**Computer Assisted Teaching** is transferring instructional content and activities to students via computers. Here, computers are tools which complete and strengthen the system, they are not alternatives which replace teachers in teaching process (Demirel, 2003). In computer assisted teaching, computers are used to support education and instruction. Classroom teacher is the main teacher that teaches the subject, and determined objectives and attitudes. All of educational and instructional activities are performed by the teacher. In this method, computers are used by teachers in educational and instructional environment as only supplementary tools (İşman, 2003). In computer assisted teaching method, a teacher can use computers in different periods, places and ways while teaching according to hardware and software facilities she/he owns, characteristics of the students and the subjects she/he will teach and teaching objectives determined. According to Aşkar and Erden (1996), Keser (1998), the ways of using computers can be given as follows:

1. The teacher teaches the subject with traditional method in classroom. Students who miss the lesson by any reason or who are unsuccessful or in need for learning can have an opportunity to learn the subject via computers. Here the computer is private teacher.
2. After the teacher teaches the subject with traditional method, evaluation studies are made in the classroom by means of computers.
3. After the teacher teaches the subject in the classroom, exercises, applications, and evaluations are carried out by means of computers.
4. The subject is taught by computers. The teacher can compensate for learning deficiencies by means of discussion method; and correct the student's mistakes by examining them.

The role of computer assisted teaching in learning and teaching is beyond dispute that its contributions in educational and instructional process are so significant. According to Doğanay (2002), the advantages supplied by this method are as follows.

1. It increases efficiency in education and instruction, it makes effectiveness easier in classroom.
2. It makes education and instruction enjoyable and attractive.
3. It motivates the students to the lesson by the help of sound- pictures and music.
4. It makes it easier to repeat complicated problems, concepts and processes many times.
5. It contributes to the student's intelligence to develop.
6. It gives the students concrete experiences similar to real life.
7. It causes the students and researchers to reach rich information sources.
8. Mistakes in texts written can be corrected easily, and some additions and omissions can be made easily, too.
9. It gives the students courage, ambition and excitement and in this way it makes development and success of students easier.

10. It develops the students' self-confidence.

Using computers is one of the most efficient ways to make the lessons audio-visual, to supply a fluent and effective education, to keep the students from memorization, to obtain speed and permanence in perception. Because computers address to more senses compared to other technological tools and make abstract and complicated concepts concrete digitally because of their extensive multimedia properties. According to Bagui (1998) if information is presented to the students in multienvironment, it will be easier to transfer it to the brain.

**Computer Based Teaching** means using computers to control some activities of computer systems such as planning teaching, measuring learning, recording data related to the students, making statistical analysis on learning data (Yalın, 1999). In computer based teaching, computers execute all of educational and instructional activities. In this way of teaching, computers are the main teacher that teaches the subject and determined objectives and attitudes. All of the educational and instructional activities are performed by computer programmes prepared. The teacher manages organizational activities by being of secondary importance (İşman, 2001). The students can learn all information by applying different activities in computers. The teacher can be a helper or guide in these activities (İşman, 2003). Computer based teaching is a system which is personally focused, follows an order, adjusts its own speed, supports repetition and uses animation effects extensively (Friend and Cole, 1999). There is an interaction between the students and teaching materials inserted in CDs, and the students learn the materials following the subjects in a supplied guided order. These subjects are usually presented with sounds and animations. Simulations and exercises are completed with repetition. Individual tests provide the students with feedback about their performances and this is followed by a compensation stage to decrease learning deficiencies. The structure of computer based teaching which supports animation, includes repetition and adjusts its speed is seen as teaching which enables the students to comment on their own learning processes, directs them to repetition, increases the transfer to cognitive awareness (Leuthold, 1999).

While performing computer based teaching, private teachers, exercises and repetition, association and some programmes for problem solving are made use of (Jacoby, 2005). Puts the benefits of computer based teaching which is performed by using these programmes in the following titles: Flexibility, adjusting personal speed, easy recording, decreasing the need for human teachers, the same information for everybody, information which is consistent and of good quality, unlimited repetition, confidentiality and motivation.

Today, both methods are used for different subjects and programmes in pre-schools, elementary and secondary schools, high schools and universities. However, some questions such as whether these methods can be used for every lesson, in which conditions these methods will be more effective are under debate. If these methods can be used for right place, age group, topic and subject effectively, it may be possible that more output can be obtained from the students, information can be permanent and practical, the attitudes of the students towards the lesson can be improved.

### **THE OBJECTIVE**

In this study it is aimed at determining how computer assisted teaching and computer based teaching affect of students in computer lessons, and also the effect them on computer using attitudes of students. In accordance with this objective, the answers to the following questions are expected.

1. Is there a difference between the success of students who take computer courses with computer assisted teaching method and whose success is at information stage of cognitive domain, and the success of students who take computer courses with computer based teaching method and whose success is at information stage of cognitive domain?
2. Is there a difference between the success of students who take computer courses with computer assisted teaching methods and whose success is at application stage of cognitive domain, and the success of students who take computer courses with computer based teaching method and whose success is at application stage of cognitive domain?
3. Is there a difference between computer using attitudes of the students who take computer course with computer assisted teaching method and the students who take computer course with computer based teaching method?

### **HYPOTHESES**

1. The students gave real answers to the questions in attitude scale used in research.
2. Attitude scale questions used for research are in capacity of answering the questions directed by the research.

3. It is sufficient to teach subject through the computer based teaching method and the Cd “I am learning WORD” produced by the company named CDROM DATA and used by the group who have taken computer classes.
4. Variables which were not controlled affected the both group in the sam way.

### **LIMITATIONS**

This study has been limited with

1. 94 students who have studied at the second grade of the Primary Teaching Department of Education Faculty at Trakya University in formal education program,
2. Starting the Microsoft Word program of computer classes, studying with tool bars, studying menu, personalizing menu, moving the document, saving document, protecting the documents with password, determining choice in the document, putting characters into a form, saving changes, taking changes back organizing paragraphs, alining texts, formingcolour texts, numbering and using item marks, realizing imprint previev, adding lines and frames to the documents, using background, changing uppercase and lowercase, finding and changing text, adding special icons, adding a text from a different document, adding border and shade, forming tables, forming a table using chart toolbar, deleting lines and columns with eraser, moving in the table, changing the size of lines and columns, adding lines and columns, dividing or combining cells, using the feature of automatic fitting, using chart toolbar, using automatic figures, deleting figures, copying and transporting, wordart, studying with minor pictures and forming graph with Microsoft Graph,
3. Information and application steps of cognitive domain,
4. Six weeks period.

### **METHOD**

#### **The Model of the Study**

The experimental /Testing Model was used in this study. Through this model, 94 students at second grade, Primary Teaching Department (formal education) of Education Faculty of Trakya University were included in this study. Fortysix of these students formed the experiment group who had taken computer classes with computer based teaching method and the rest fortyeight students formed the control group who had taken the same class with the computer asissted method. Pre-test and post-test control group pattern was used while forming sampling.

#### **Tools of Collecting Data**

In this study, a placement test including 60 questions and the topics of Word program used by the researcher was utilized to evaluate. The difficulty indexes of these test items have changed between 0,24 and 0,73. Additionally, the reliability coefficient of the test is 0,93. Considering the ability of the students for using Word program, an application test including 10 questions formed by the researcher was utilized as well. With the aim of evaluating the attitudes of using computers of the students, an attitude scale was used. The original form of this attitude scale was improved by Jones and Clark. It was translated into Turkish by Uzunboylu (1995) later. The realibility coefficient of this scale which covers 40 items has been found as 0,97.

Each student of experimental group used a computer. Later, the researcher distributed instructional CD's named “I am learning Word” explaining Microsoft Word program. After the students had switched their computers on and made their Cds ready to work, the reseracher distributed the topic headings to be learnt from the CD “I am learning Word” and the worksheets covering the application to be realized. Students listened to the topics of that class from the instructional CD by wearing headphones and took notes when necessary. Students completed their studies in a four class hours each had been 50 minutes. The instructor picked up the disks which the students recorded their studies on at the end of class to evaluate. The disks were given back to the students again in the following class. Since the computer based teaching method requires, the instructor never answered any question asked by the students during the classes. Instructor didn't made any contribution related to learning but helped them with only the problems resulting from hardware.

Before beginning to study with the students of control group, the instructor formed a teaching design related to the topics to be given by using Dick and Carey Model. The steps of the model are given below.

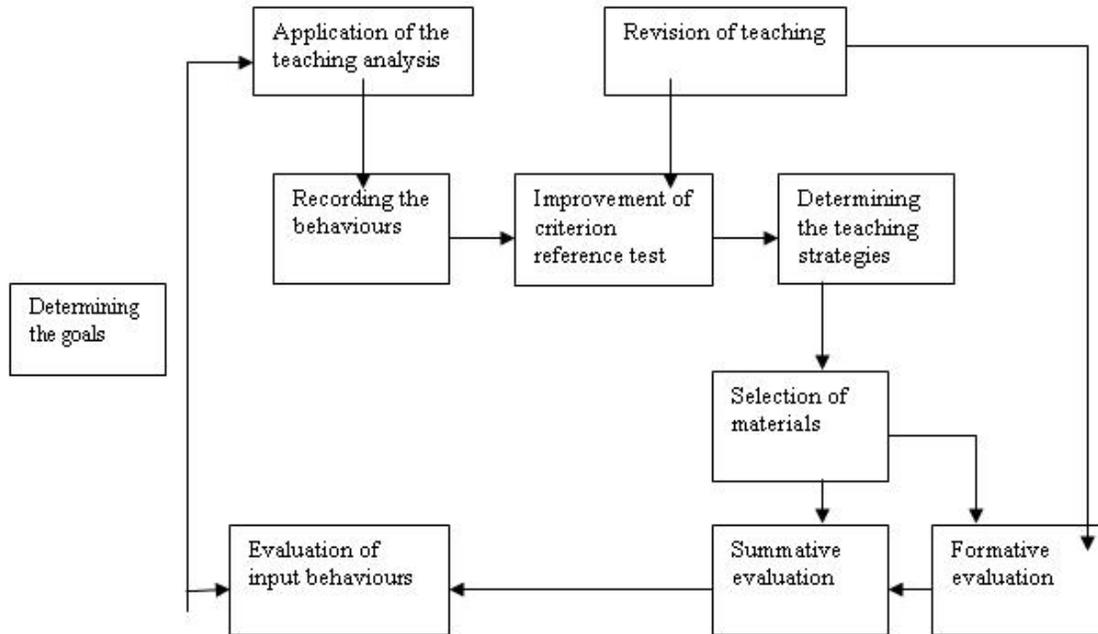


Figure 1. The Model of Dick and Carey

The one week study of the control group has four classes each one is 50 minutes. In the first two hours of the classes, students listened to the topics of that class accompanied by power point slides prepared by the researcher. They took notes when necessary while listening to the subject. In apposition to the study realized in experimental group, the researcher answered all the questions asked by the students and contributed while instructing this group. Because the computer is the basic teaching material used by the instructor in the computer assisted teaching method. Computer doesn't replace the instructor but contributes the teaching. In the last 2 hours of the class, students were placed in a position that each would have a computer to study on. The same worksheets prepared for the experimental group were given to this group as well and made them apply the subject. On the contrary, the researcher who didn't answer any questions and help in the application of the experimental group, answered all the the questions and helped the students to support them in this method.

#### Application of Data Collection Tools

The prepared placement test was applied to determine the levels of the students at the information step of cognitive domain considering the interest of the students about Microsoft Word before six week study period. Control and experimental group students answered the test at the same time. Students took this placement test again at the end of the study in order to see how they improved at the end of this six-week study period. This placement test was completed to see the permanence of the information students acquired.

Application test was given to both control and experimental group students at the same time before the six week study period. Students, who were placed as each one would have a computer, answered the questions on their own computers after they had taken the exam-question papers. They completed the test by saving the answers they gave on the disks which belonged to themselves. They delivered their disks to the instructor when they finished the exam.

The attitude scale improved by Jones and Clark and translated into Turkish by Uzunboylu (1995) was applied to the both groups at the same time in order to determine the attitudes of the students towards the computer usage of the students. This attitude scale was applied once more to the both groups after the study was completed. The reason of the application of the scale once more after the study is to determine the change in their computer usage attitude at the end of the teaching period.

#### The Analysis of The Data

The data gained from evaluation tools were analyzed using SPSS 12.00 statistic program.

## FINDINGS

Table 1. Comparison of the points of placement test applied to the experimental and control groups before the study

	GROUP	N	Average	SS	sd	t	p
PRETEST	Control	48	10,47	9,29	92	,219	,827
	Experimental	46	10,93	10,88			

The values of t test which was applied to compare the results of the placement test realized before the six week study period of the experimental and control groups are given before. There is no considerable difference between the groups ( $t_{(92)}=,219$ ;  $p>,05$ ).

Table 2. Comparison of the points of the placement test applied to the experimental and control groups before the study

	GROUP	N	Average	SS	sd	t	p
PRE-APPLICATION	Control	48	0,89	3,54	92	,616	,539
	Experimental	46	1,36	3,90			

According to the values of t test given to compare the result of the application test given to the groups before the six-week study, there is not a considerable difference between the groups ( $t_{(92)}=,616$ ;  $p>,05$ ).

Table 3. The effect of the applied method on the success of computer class t test values

	METHOD	N	Average	SS	sd	t	p
PRE-TEST	Computer Assisted Teaching	48	10,47	9,29	92	,21	,82
	Computer Based Teaching	46	10,93	10,88			
POST-TEST	Computer Assisted Teaching	48	43,54	8,05	92	,49	,61
	Computer Based Teaching	46	42,71	7,94			
PRE-APPLICATION	Computer Assisted Teaching	48	,89	3,54	92	,61	,53
	Computer Based Teaching	46	1,36	3,90			
POST-APPLICATION	Computer Assisted Teaching	48	<b>59,64</b>	21,96	92	5,95	,00
	Computer Based Teaching	46	<b>36,02</b>	16,13			

t test was carried out in order to determine how the methods of computer assisted teaching and computer based teaching were effective on the success of the students in their computer classes. According to the obtained data, there is not a considerable difference ( $t_{(92)}=,21$ ;  $p>,05$ ) between the points of pre-test of the students. Also, a considerable difference was not obtained between the post-test points of the students ( $t_{(92)}=,49$ ;  $p>,05$ ). A considerable difference was not found between the points of the application test given before the study to the students ( $t_{(92)}=,61$ ;  $p>,05$ ) whereas in the post application test applied after completing the study, a considerable difference was determined between the students ( $t_{(92)}=5,95$ ;  $p<,05$ ). In order to determine this difference is more advantageous to which group, average values were taken into consideration. This value is 59,64 in the group who had computer assisted teaching while it is 36,02 in the group who had computer based teaching. It was determined that the group instructed via computer assisted teaching were more successful.

Table 4. The effect of the method applied to the attitude of the students towards computer usage t test values

	METHOD	N	Average	SS	sd	t	p
PRE-ATTITUDE	Computer Assisted Teaching	48	144,33	15,25	92	,04	,96
	Computer Based Teaching	46	144,47	14,11			
POST-ATTITUDE	Computer Assisted Teaching	48	147,77	14,29	92	,04	,96
	Computer Based Teaching	46	147,73	12,16			

It was determined that there was not a considerable difference between the groups when we take the effect of the applied method regarding the attitude towards computer usage into consideration ( $t_{(92)}=,04$ ;  $p>,05$ ).

## CONCLUSION AND PROPOSAL

According to findings about the effect of the method which was used in the research on students' success, it was determined that the group to which computer assisted teaching method was applied was more successful in word application exam conducted after the 6 weeks studying programme. While average grade of the group which learned the Word program with computer assisted teaching method was 59,64 in the last application. This value

was 36,02 for the group learning with computer based teaching method. This may be caused by following variable: In computer assisted teaching, the agent that is responsible for teaching is the teacher. In this method, computers are the most important tools which help the teacher for teaching the subjects. The most important feature of the computer assisted teaching is making use of the computers. The group which studied with computer assisted teaching method continued their studies with both the guidance and the help of the instructor. In every stage of the lesson the students in this group and the instructor collaborated with each other. The instructor used Power Point presentations prepared by herself while teaching the subjects. In addition, in accordance with the teaching design model used, some deficiencies were tried to be compensated at the end of the lessons. When needed, for some lacking and incorrect information and actions, it was started from the beginning. On the other hand, the students who studied with computer based teaching method tried to learn the subjects with one-to-one teaching programme which they used in their computers. In this method, there was not any interaction between the instructor and the students in the group related to explanation of the subject. Besides, in the application stage of the topics taught the instructor didn't give any support to the students. The instructor only intervened some problems that were seen in the computer and that the students could not manage. The student who studied with computer based teaching method found themselves without solutions in the subjects they could not understand. In addition, they weren't warned by the computer for any mistake they made during the application. Because one-to-one teaching method which these students used was not interactive. It only consisted of the topic explanation supported by motions. The students realized the application of post stage of the subject by using hand-outs given by the instructor by being independent from this programme.

Clark (1985) thinks learning tools are of secondary importance in learning process and claims that "the tools do not affect learning in any case." According to him "the tools do not make any contribution, and they only present information but do not affect the success of the students. They can be compared to trucks which carry our food but do not affect our nutrition." During the last 20 years, education technology has improved considerably. The days which teaching tools have included only blackboard and books have been left behind and today's technology has been started to use. Nowadays, we see the computer as a very important educational and instructional tool. In computer assisted teaching method, the main helper and learning tool is the computer. This study shows that if the instructor uses the computer appropriately and consciously, the students are affected by this situation positively if we consider their success.

For both of the methods, findings about the attitudes of the students towards using computers were investigated. It was found that the methods used did not cause any difference between the students' attitudes. The instructor showed close interest to the students in the group which computer assisted teaching method was used. The instructor answered all of the questions of the students about the subject and helped them to compensate for lacking and incorrect points. Apart from this, the instructor tried to keep the students' motivation as high as possible by means of lesson presentation. Whereas, the students who were applied computer based teaching method studied only in computer environment independent from the instructor during learning and application studies. The instructor in this method is the computer. The researcher motivated the students enough at the beginning of the class in computer assisted teaching. In addition the instructor prepared Power Point presentations for teaching Word program to the students through computer assisted teaching method. It can be accepted that these presentations are sufficient for learning. Even though computer assisted teaching has these positive conditions, features, the group who took the computer class via computer based teaching method, used Word teaching program which was well-designed caused a difference between the students regarding their attitude towards computer usage.

The following suggestions were developed according to the results obtained from this study:

1. This study can be carried out again by using an interactive teaching program, relieving the deficiency of the instructor.
2. Traditional teacher-centered teaching method and computer assisted teaching method were compared to each other at different school levels in the previous studies. But, computer based teaching method does not take place in these comparisons. In primary and high school levels, the differences of success and attitude of the methods of computer assisted teaching and computer based teaching in both computer classes and also other classes should be investigated.
3. This study can be developed as a comparison of computer assisted teaching method to internet assisted teaching method.

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