



## **Development and Evaluation of the Computer Supported Education Materials Integrated into E-Education in the Industrial Design Engineering**

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### **Keywords**

Educational Technology, Computer aided Education.

### **Abstract**

Rapid changes in technology cause certain radical changes in the field of education as well. Use of computers in education has contributed immensely in making education more productive, to extend education and to individualize it. Today, computer supported education (CSE) is extending day by day in our institutes of formal education. However, from the scientific researches conducted today the importance of integration with E-education to make CSE more effective has been understood. In this study, traditional experimental comparison was made between the CSE developed in Industrial Design Engineering and CSE material supported with the Internet, on the success of the student. The body of the research was constituted by students undergoing education at the Technology Faculty, Industrial Design Engineering Dept. of Gazi University in the academic year 2017-2018. In order to conduct the research, experimental teaching groups were obtained by using the Pre-Test Control Group and the Final Test Control Group models. Two experimental and one control groups were established to this effect. Tests were administered to all the three groups before the experiment began. Data collection tool was developed for the compilation of the research data. The data were evaluated by entering the SPSS 12 statistical program. This study revealed that Internet supported CSE was more effective than the traditional education and CSE in the success of the student.

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## 1. Introduction

Education is defined as changes in behavior created in people and a process which prepares the individual for life. Consequently, education should give the individual the cultural values to fulfill the duties mentioned in the definition. Thus, technology culture, among the cultures to be given through education, should be the top priority one from the standpoint of this definition. This situation is extremely important in catching up with the developments in the world.

Accomplishment of the harmonization with the technology cultural within the framework of formal education is called technology education. The important thing in this education is to establish a bridge between today and the future by placing emphasis on the current technology applications (Uluğ, 1997).

Technology education is comprised of educational experiences developed by taking general education as the basis and around technology culture. The purpose of this education is to make the individuals become aware of the technology features of the age they live in and to establish harmony between the environments they live in and the future environment. In this regard, technology education makes the individual appreciate the techniques and skills of the current civilization, and enables the individual to determine his/her place in the contemporary world, to release his/her creativity power and act as go-between in directing these powers to fields of science.

Making use of technology has become inevitable in the advancement of today's technology and with the increase in the importance given to education and in the solution of the educational problems. The most important one of these technologies is the computer. The rapid development in computers in the recent years has affected the educational system and made it necessary to make changes in it. Use of computers to improve the quality of learning-teaching activities and the quality of school administration and counseling has created the computer supported education model. Schools have started to use computers in the field of education, by arranging the teaching and learning activities according to the requirements of the individual, and to execute the education services more productively and to create a more contemporary teaching-learning environment. Use of contemporary educational methods and the development of materials in technology education will contribute in giving the individual a more productive technology culture.

CSE is the transfer, by means of computers, the materials or activities to be taught. In CSE computer technology is one of the implementation in the education process. These implementations may be in the form of presentation of information, acting as private tutor, or contributing in the development of a skill. According to another definition of CSE, it is to be able to directly receive the lessons loaded in the computer system. In addition to this, computers may at the same time be tools for teachers to be used in developing materials. For example, a colored a graphic to be drawn by the teacher on a computer may be an effective material in teaching. However, the role of the computer here is quite different from the role of CSE. In

CSE the computer is used as an instructor, a trainer, an implementer or a simulator of an event.

Emphasized that the purposes of CSE was to determine the different disciplines of use of this technology and at the same time to extend the use of computer tools and equipment in primary and secondary schools.

Use of computers in education is basically the logical development of see-hear techniques. Together with this, while this equipment takes its place among other auxiliary education tools it looks like it will cause some radical changes in the concept of teaching. Just like the telescope and microscope broadened the scope of view of mankind, the computer may contribute to science and education by broadening the logic, instinct, and comprehension of mankind (Alkan 1985).

Alkan (1998) classified the functions of the computer in education as follows:

- **Arrangement and evaluation of educational data:** In fulfilling this function which covers the data processing activity, the computer is fast and reliable in compiling, maintaining and processing statistical data related with education. It can evaluate the personal and academic data pertaining to students and teachers. It can record and provide all types of logistical data.
- **Functions related with the administration of the education sector:** It may feed the decision making process with appropriate data in the management of student programs.
- **Education functions:** The computer may act like a teacher who never tires or is bored in fulfilling this function; it may use communication channels such as sound, vision and touch. Computers programmed in a suitable manner may spell words, may repeat words; may issue instructions that need to be followed; it may present images and symbols which maybe answered without inhibitions; it may evaluate the student's performance and may direct the student to learn the subject in an appropriate manner.

The following may be the basic guidelines developing countries like Turkey base themselves in the use computers (Uşun, 2000):

- **\*Social basis:** Students should be aware of what is going in the world. Computers hold an important place in every walk of life. If schools educate children for the society they must teach them computers as well.
- **Professional basis:** Using and programming computers gives the students confidence, perhaps someday they may choose a career related with computers.
- **Pedagogical basis:** Students learn better numerous subjects on science and art through the computer.
- **Acceleration basis:** Schools can make positive changes with the use of computers. Teachers, parents and students are more open to changes in the schools which have computers. Computers alleviate and reduce the student's burden of memorizing.

- **Industrial basis of technology data:** The local industry sector which is under development want the extension of local computers in schools. This, of course, means, supporting the national industry.
- **Less effort basis:** It is asserted that education can be accomplished more economically with computers. Because as the production of computers increases and the unit cost drops the salaries of the teachers increase.

Individuals have requirement for different types of education. The existing situation cannot meet this and does not allow everybody to benefit equally from the education. Therefore, mass education should be accomplished to eliminate the shortfalls in situations where the traditional education and CSE fall short of the requirement, which will enable individual and independent education, and which will provide new education possibilities to those who are left outside of the existing education system. At this point, e-education is accepted as a new implementation brought on with new trends and new technology, with the new numerous mass education possibilities it can provide. As the process of e-education is through interface it is easier to achieve the desired levels of effectiveness and productivity. This feature can eliminate the unilateral method applied in the traditional system or the limitations imposed through technology determinism.

At the same time, the limitations imposed by the traditional implementations reflecting the man-machine understanding of technologies can be reduced with the interface provided by the computer and the data base technologies. Because of this capability the students can store, create and use information (Stromen, 1992). With the capabilities it provides the computer and the data base technologies prevent the students from being constrained to a single location and limited in time. In this regard, the demographic feature of the students who study through e-education is different from that of the students learning in classrooms. Although e-education is implemented as an independent education environment for students it can be effectively used for the support of the class teacher also. Therefore, the flexible understanding of e-education aimed at learning, which makes use of the wealthy web environment both in respect to information and technology infrastructure has been created. With this understanding, it will be possible to meet the individual requirements of the students, to motivate them to learn, and to create a teaching-learning environment driven by the requirements of the age.

### **1.1. The Purpose of the Research**

The general intent of the research is to determine the effect of lessons in technology education on the success of the students in the CSE and Internet supported CSE. The sub-purposes based on this general purpose are the following;

- Is to determine if there is a difference or not in the levels of the test results in lessons in the specific unit used under the scope of this research and the results obtained by the students with the application of CSE on the traditional education.

- To determine if there is a difference or not in the levels of the test results in lessons in the specific unit used under the scope of this research and the results obtained by the students with the application of Internet supported CSE on the traditional education.

The quorum in the research was sufficient to determine the number of students owning personal computers, and whether the students were able to access the internet easily whenever they wanted, in constituting the experimental and control groups.

## **2. Method**

In this research we have tried to determine the effect of CSE and Internet supported CSE traditional education on the success of the student. Accordingly, the effect of the independent, variable CSE and Internet supported CSE and the traditional education on the dependent, variable student success has been researched. In order to achieve this, an experimental design was obtained by making use of the pre-Final test control group models. Two experimental and one control groups were established to this effect. Tests were administered to all the three groups before the experiment began. The same experimental tests were administered to both groups after the end of the program.

The body of the research was constituted by 200 students undergoing education at the Technology Faculty, Industrial Design Engineering department of Gazi University in the academic year 2017-2018.

Selection of the Sampling Group: The samples of the research were constituted by the junior class of the Industrial Design Engineering Department. The following criteria were used in establishing the two experimental (CSE and Internet supported CSE) control groups:

- Ownership of a personal computer.
- The ability to access the internet easily whenever the student wanted.

Vis-à-vis discussions were held with the students for the two criteria mentioned above. The students who met both criteria were selected into the Internet supported CSE experimental group and the students who only met one of the criteria were selected into the Internet supported CSE experimental group. The students who did not meet both criteria were selected into the control group.

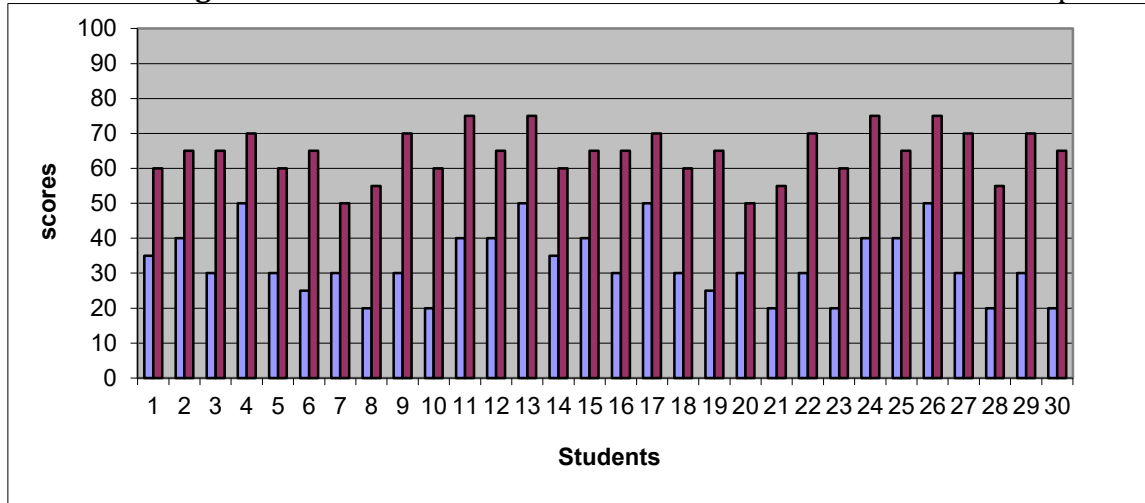
### **2.1. Compilation and Evaluation of the Data**

Data collection tool was developed for the compilation of the research data. This was the test containing the subjects in the units taught in the applied programs. The following statistical calculations were used in the development of measuring tools and in the evaluation of the results of the research. The SPSS for Windows 12.0 package program was used in all the analysis. The arithmetical average, standard deviation, average standard error methods were used in the analysis of the data from the research and in comparing the groups.

### 3. Results and Remarks

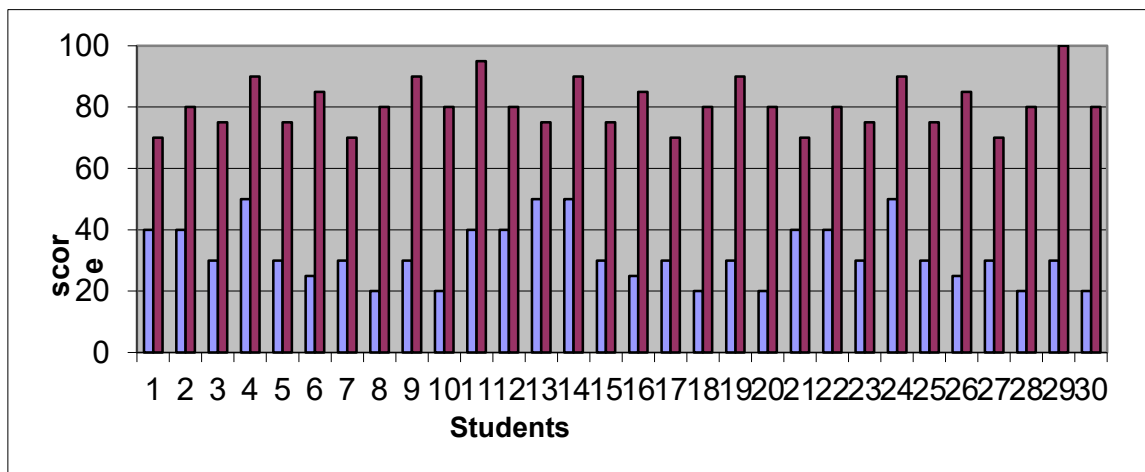
In this section of the research the findings from the experiments were analyzed and interpreted. The findings were obtained from the success test analysis. Given below are the findings obtained from the test administered to the students to check the effectiveness of the CSE applied to develop the success rate of the students. Given in Figure 1 are the scores obtained by the students in the control group in the tests administered prior to teaching and after teaching the lesson through the traditional teaching method.

**Figure 1.** Pre and Final Test Scores of the Students in the Control Group



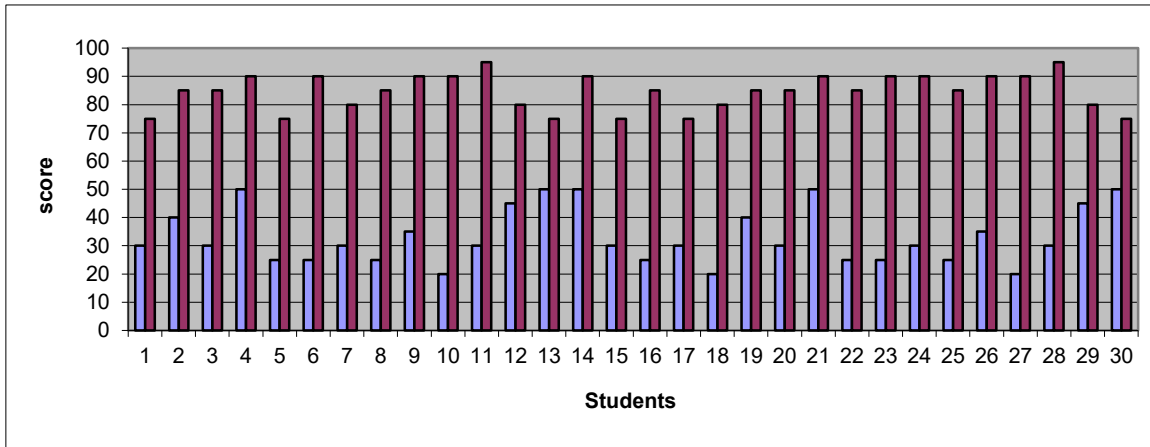
Given in Figure 2 are the scores obtained by the students in the CSE Experimental group from the tests administered prior to and after teaching the lesson.

**Figure 2.** Pre and Final Test Scores of the Students in the CSE Experimental group



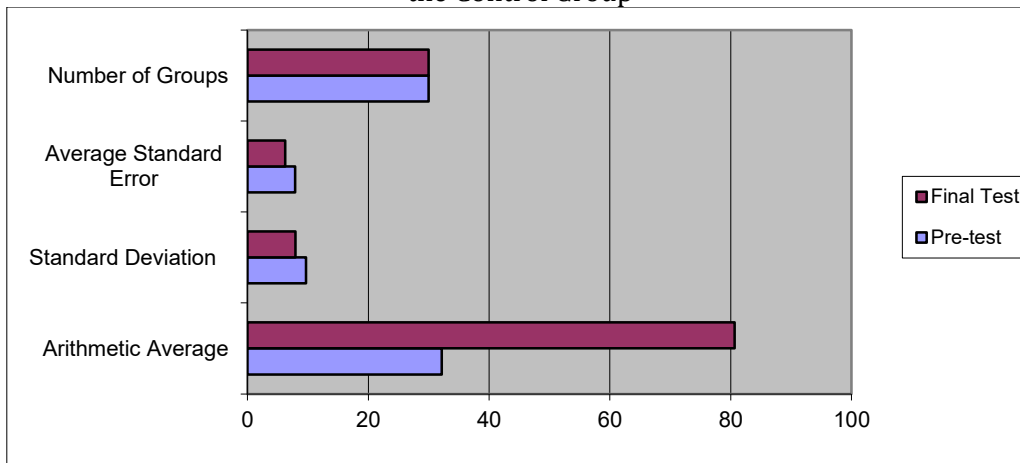
Given in Figure 3 below are the scores obtained from the tests administered before and after teaching the lesson to the Internet supported CSE experimental group.

**Figure 3.** Pre and Final Test Scores of the Students in the Internet supported CSE Experimental Group



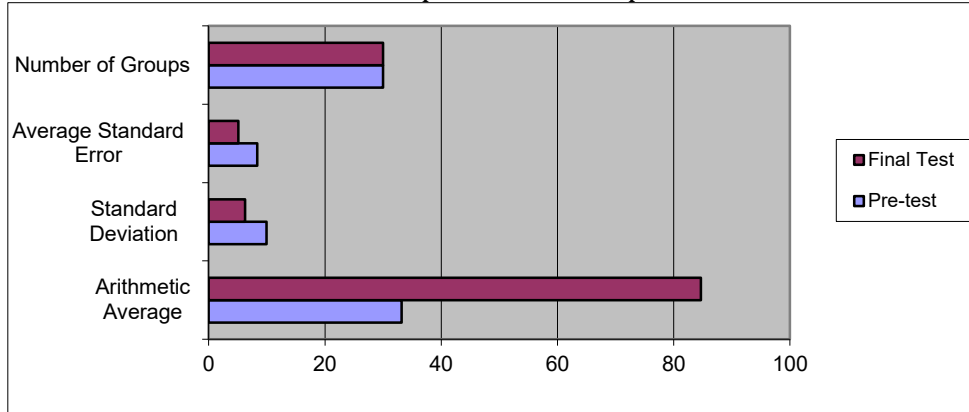
The statistical definitions pertaining to the Final test scores of the students in the control group are given in Figure 4, the statistical definitions of the Final test scores of the students in CSE experimental groups are given in Figure5, and the results for the Internet supported CSE experimental groups are given in Figure 4.

**Figure 4.** Statistical Definitions Pertaining to the Final Test Scores of the Students in the Control Group

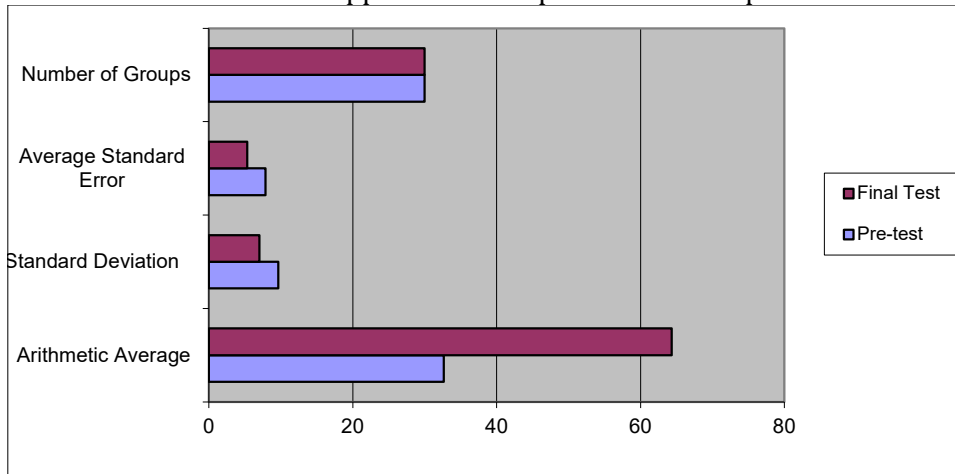




**Figure 5.** Statistical Definitions Pertaining to the Final Test Scores of the students in the CSE Experimental Group.



**Figure 6.** Statistical Definitions Pertaining to the Final Test Scores of the students in the Internet supported CSE Experimental Group.



As can be from the review of the figures 4,5, and 6, while the arithmetical average of the scores obtained by the students in the Final tests who were taught in the traditional teaching method was 63, the arithmetical average of the students who were taught through the CSE method was 81 and the arithmetical average of the students who were taught through Internet supported CSE method was up to 85.

It was concluded that the difference between the arithmetic averages of the Final tests applied to both groups was significant. The fact that the arithmetic averages of the Final test scores in the group taught through Internet supported CSE method were high, goes to show that teaching lessons through this method was more successful, that it had an educational quality and that it could be used in teaching-learning environment as a teaching instrument. In looking at all the results of the success test in the research we see that the Internet supported CSE was more effective in increasing the success of the students as compared to CSE and the traditional method of teaching.



#### 4. Conclusion and Recommendations

While, according to the results obtained from the research show that the differences in the pre-test scores administered to the control groups who were taught through Internet supported CSE, CSE method, and the traditional education method were very little there was a significant difference in the arithmetical averages in the Final tests of the groups and according to the arithmetic average of the pre-test. In conclusion it can be said that Internet supported CSE and the CSE method are more effective in increasing the academic success in teaching the lesson in Industrial Design Engineering as compared to the traditional method.

It was observed that there were some difficulties in conducting such an application which is quite new in Industrial Design Engineering. First of all, in this regard, in applications which are student oriented approaches the fact that individuals will have to conduct independent studies and research in order to be successful has to be taken into consideration. Along with this, technology infrastructure problems (problems in transferring data bases and slowness in speed) may adversely affect the teaching –learning process. Furthermore, in the light of this study, research can be conducted to see the level of impact Internet supported CSE and CSE learning methods have on the success rate of learning Industrial Design Engineering and other fields in respect to different variables (i.e. social environment the individual lives in, number of children in the family, the professions of the parents, etc.).

#### References

- Alkan C. (1998). Eğitim Teknolojisi,  
Alkan C. (1985). Eğitim Teknolojisi  
Stromen S. (1992). Constructivism, Technology and the Future of Classroom Learning Retrieved May 23, 2001 from the World Wide Web: [www.ilt.colombia.edu/K-12 live text/docs/construct.html](http://www.ilt.colombia.edu/K-12%20live%20text/docs/construct.html)  
Tekeli İ. (1994). Bilgi Çağı  
Uluğ M. (1997). Türkiye’de Teknoloji Eğitimi ve Öğretmen Yetiştirme IV. Eğitim Bilimleri Kongresi. Eskişehir  
Uşun F. (2000). Dünyada ve Türkiye’ de Bilgisayar Destekli Öğretim.

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