

THE EFFECTS OF COMPUTER-ASSISTED LEARNING ON THE ACHIEVEMENT AND PROBLEM SOLVING SKILLS OF THE EDUCATIONAL STATISTICS STUDENTS

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Abstract

The basic aimed of this study is to investigate the effects of Computer Assisted Learning on the achievements of the educational statistic students the measurements related to the experimental and control groups. The result showed that, the difference is on behalf of the experiment group. This fact shows that the Computer-assisted learning method and traditional education methods have a clear different effect on the student's educational statistics achievements. This result leads that experiment group's students with computer-assisted learning methods increase their achievement level and show a higher performance more than the control group students.

Keywords:

Introduction

If the traditional methods are thought to be insufficient in educating an individual who is supposed to have the contemporary skills, one of the most effective ways is taking advantage of instruction technologies, especially the computers (Altun, Uysal and Ünal, 1999; Yiğit and Akdeniz, 2000). Particularly, reasons like the un proportional change of the students and the teachers' numbers, complexification of content due to the data quantity, some applications' importance that show the individual differences direct people to benefit from the computers in education (Alkan, 1998; Uşun, 2000).

With the use computers in education, a lot of terms have come into and gone out of use in education (Owusu, Monney, Appiah, & Wilmot, 2010). The overlapping terms related to the uses of computer and associated technologies in science education are categorized into three by Bybee, Poewll, & Trowbridge (2008) as follows: learning about computers, learning with computers and learning through computers.

Big impact is placed on the computer-based science and education as well as ordinary science laboratories in the educational curricula in the world. One of the aims of the science and technology course is to train individuals capable of keeping up the fast developing and changing science world and capable of utilizing the recent technological discoveries in every field. As a result of the rapid development of the information and communication technology, the use of computers in education has become inevitable. The use of technology in education provides the students with a more suitable environment to learn, serves to create interest and a learning centered-atmosphere, and helps increase the students' motivation. The use of technology in this way plays an important role in the teaching and learning process (İşman, Baytekin, Balkan, Horzum, & Kılıcı, 2002). Liao (2007) found out that CBI had a positive effect on individuals by comparing 52 research studies carried out in Taiwan in his meta-analysis study.. According to Alessi & Trollip (2005), it is possible to divide educational software into five different types such as tutorial, drill and practice, simulation, educational games and hypermedia type. For effective and productive teaching, these techniques should be used with some classroom activities. These are: presentation, demonstration, practice and evaluation of learning (Özmen, 2004). The use of computer technology enables learners be active in the learning process, to construct knowledge, to develop problem solving skills and to discover alternative solutions (Özmen, 2008).

The computer-based Instruction makes teaching techniques far more effective than those of the traditional teaching methods as it is used for presenting information, testing and evaluation and providing feedback. It makes a contribution to the individualization of education. It motivates students and gets them to take an active part in the learning process. It helps to develop creativity and problem solving skills, identity and self-reliance in learners. CBI provides drawings, graphics, animation, music and plenty materials for the students to proceed at their own pace and in line with their individual differences. It serves to control lots of variables having an impact on learning, which cannot be controlled by means of traditional educational techniques (Kaşlı, 2000; Chang, 2002).

Researcher has been interested in revealing the benefits of Computer Assisted learning (CAL) college students attending educational statistic classes. As a supplement to a strong educational statistics curriculum, a CAL programme that to increase student's achievement in educational statistic was provided to students in the treatment group. These students were compared with control students taught by the same teacher but without CAL support.

Statement of the problem and questions

The study aims to answer the following research questions.

1. Does the computer-assisted learning have any effects on the achievements and their problem solving skills of the students?

2. Is there a significant difference between the means of the post-test achievements scores corrected according to the pre-test achievements scores of the control group according to the traditional method and the experimental group taught according to the Computer-Assisted Learning (CAL)?

Is there a significant difference between the post-test achievements scores of the control group and experimental group?corrected according to the pre-test achievements scores of the control group according to the traditional method and the experimental group taught according to the Computer-Assisted Learning (CAL)?

Is there a significant difference between the post-test of the problem solving scores of the control group and experimental group?corrected according to the pre-test achievements scores of the control group according to the traditional method and the experimental group taught according to the Computer-Assisted Learning (CAL)?

3. Is there a significant difference between the means of the problem solving post-test scores corrected with respect to the pre-test scores of the control group taught according to the traditional method and the experimental group taught according to the Computer-Assisted Learning (CAL)?

Objective of the Study

The basic aimed of this study is to investigate the effects of Computer Assisted Learning on the achievements of the educational statistic students.

Study Significance

Computer Assisted learning (CAL) is regarded as one of the aspects that had been enjoying an increasing interest and care in the field of learning and teaching in the Arab world, because using the computer as an assisting means in instruction has achieved a great success in the field of learning and teaching in the technologically advanced countries according to the studies conducted in their societies (**Bani abdelrahman, 2010**).

Limitations

It the finding of the study, it has been confined to:

- 1- A sample of students in educational college at the University of Jordan.
- 2- Nature and construction of the program.

3- It was done in the academic year of 2012\2013.

REVIEW of the study

To limOF RELATED LITERATURE

Many researchers are interested in using computers as a medium for teaching / learning., Pattern and Cadienno (1993) compared the relative effectiveness of traditional instruction and processing instruction, both for interpreting and producing Spanish object pronouns in object- verb-subject (OVS) and object- verb (OV) order .The traditional instruction involved grammatical explanation and output practice, while the processing instruction involved grammatical explanation and comprehension practice. The processing group performed significantly better than the traditional group.

This study is different from the previously mentioned studies. It deals with a component, which was neglected by many researchers, English grammar. To the researcher’s best knowledge; a few studies were conducted on teaching grammar through computer in Jordan. For this purpose, the researcher developed an instructional program for teaching the passive voice.

Study was done by Senteni (2004) found out that CBI enabled the students to increase their motivation and achievements and to develop positive attitudes. According to research studies in literature, the use of computer-based education increases students’ attitudes and achievements significantly (Berger, Lu, Belzer, & Voss, 1994; Geban, 1995) .

The pre-test/post-test control group design (PPGD) was used in this study. The pre-test/post-test control group design is a mixed design, which is widely used. A mixed design is a factorial design widely used in social sciences, especially in education and psychology. The pre test-post test control group design as one of the mixed designs is one of the most widely used experimental designs. In PPGD, in order to determine the effectiveness of the experimental process, whether the variation between two groups is significantly different is tested by means of the “t” or “F” test Büyüköztürk, 2010).

Table 1 The pretest-posttest control group model

Groups	Pre test	Process	Post test
E1	O1	X	O2
E2	O3		O4

Balcı, 2007

As can be seen in Table 1, notations are: E1=Experimental group, E2=Control Group, O1, O2_= Pre-test and Post- test (Experimental group) scores, O2, O4_= Pre-test and Post-test (Control group) scores, X=Process that stands for the experimental variable of the computer insisted learning.

Definitions

Computer-assisted learning (CAL) any use of computers to aid or support the education or training of people. CAL can test attainment at any point, provide faster or slower routes through the material for people of different aptitudes, and can maintain a progress record for the instructor.

Computer-assisted learning is one of several terms used to describe this application of computers. Other terms include *computer-aided* (or *-assisted*) *instruction*, *CAI*, *computer-based learning*, *CBL*, and *computer-managed instruction*, *CMI*.

Academic achievement or (academic) performance is the outcome of education — the extent to which a student, teacher or institution has achieved their educational goals.

Student's academic achievement: It is the result of what the students learn after the learning process.

Data Collection Instruments

The achievement of students with the Cronbach's Alpha reliability coefficient of .85 was used as a data collection instrument prepared by Serin, Bulut Serin and Saygılı (2010). The scale is a five grade likert type scale rating from 1 to 5 and consisting of 25 items that can be administered to educational college students. The points range from 24 to 120. High scores represent the positive perception of their achievement, whereas low scores represent the negative perception of their achievement .

Methodology

This study is composed of two parts:

- 1-In the first part, a CAL programme provided to students in the treatment group.
- 2- In the second part, students taught by the same teacher but without CAL support.

Study Community

The study community consisted of all educational students in the University of Jordan for the year 2011-2012.

Study Sample

The study sample consisted of (180) students of educational college at university of Jordan.

The study sample was divided into two sections, each section Consists 90 students.

Two sections were named as control and the other as experimental.

Table (2) below shows the sample distribution according to method

Dimensions	Control group	Experimental group	Total
Achievements Pre- test	45	45	90
Problem solving	45	45	90
Total	90	90	180

Analysis of Data

The Experimental Process and Collecting Data

1. Does the computer-assisted learning have any effects on the achievements and their problem solving skills of the students?

The “computer-assisted learning CAL” was applied to the experimental group and not to the control group. The t-test results of the pre-test points related to the achievements and problem solving of the experimental and control groups are given in Table 3. As can be seen in Table 2 there was not a statistically significant difference between the pre-test means of the experimental and control groups. In this case, it can be assumed that the levels of the achievements and problem solving of the control and experimental groups were equivalent before the experiment began.

Table 3 the t-test results of the “achievements and problem solving” pre-test scores of the experimental

Measurement	Groups	n	X	s.d	Df	t	P
Achievements Pre- test	Experimental	45	42	11.3	50	.77	.085
	Control	45	40	11.0			
Problem solving Pre- test	Experimental	45	55	16.4	50	.06	.081
	Control	45	54	15.8			

The students, who were educated with Computer-assisted learning and traditional educational methods in “Relation, function and operation” learning platform, were investigated if their post-test educational statistics achievement test points were different. The facts of the control and experiment groups’ post-test achievement points are shown in Table4.

Table 4. The results of control and experiment groups’ post-test points of educational statistics achievement test

GROUPS	N	X	S.D	CD	T	P
EXPERMENTAL	45	31.2	8.766	88	8.6	002
CONTROL	45	28.9	8.9			

Is there a significant difference of the post-test achievements scores corrected between the control and experiment groups’ students’ achievement?

As we see in Table4, between the control and experiment groups’ students’ achievement test post-test points are statistically different (t=8.6;

$p < 0,05$). In the experiment group's students 'achievements ($X = 31.2$) are higher than the control group's students ($X = 28.9$). This difference is on behalf of the experiment group. This fact shows that the Computer-assisted learning method and traditional education methods have a clear different effect on the student's educational statistics achievements. This result leads that experiment group's students with computer-assisted learning methods increase their achievement level and show a higher performance more than the control group students. .

Table5. The results of control and experiment groups' post-test points of problem solving test

GROUP	N	X	s.d	Cd	t	p
EXPEREMENTAL	45	44.3	6.9	88	6.4	000
COTROL	45	42.1	7.3			

Is there a significant difference of the post-test of the problem solving scores between the control group and experimental group?

As we see in Table5, between the control and experiment groups' problem solving post-test points are statistically different ($t=6.4$; $p < 0, 05$). In the experiment group's students 'achievements ($X = 44.3$) are higher than the control group's students ($X = 42.1$). This difference is on behalf of the experiment group. This fact shows that the Computer-assisted learning method and traditional education methods have a clear different effect on the student's educational statistics problem solving. This result leads that experiment group's students with computer-assisted learning methods increase their problem solving level and show a higher performance more than the control group students.

Result and discussion

The main aim of this study was to investigate the effects of the computer-assisted learning on the achievements and problem solving skills on the educational sciences students. To this end, This result leads that experiment group's students with computer-assisted learning methods increase their problem solving level, achievement and show a higher performance more than the control group student.

A significant difference was found at the end of the application on behalf of the experiment group between the educational statistics achievements of the control group who had traditional instruction methods and the experiment group who had computer-assisted learning.

This study showed that, computer-assisted learning method was more effective on the students' educational statistics achievements than the traditional instruction methods.

In books and articles, we can see a lot of researches that compare achievements of groups who are applying the traditional instruction or the computer-assisted instruction method on different fields. In most of the researches there were found significant differences about achievements on behalf of the computer-assisted instruction applying group (Akinsola & Animasahun, 2007; Budak, 2000; Gurbuz, 2007; Ozmen, 2008; Tienken & Wilson, 2007).

Study recommendations

According to the study results which indicated the effective use of computer assisted learning compared to the traditional methods of learning, the study recommends the following:

1-Expansion in using computer assisted learning to other theoretical curriculums and stressing the use of computer as an educational tool in learning and teaching.

2-Giving training courses to computer teachers regarding the use of computer learning and teaching educational subjects provided that these courses will be available over the academic year.

3-Conducting more studies on using computer assisted learning in the academic curriculum in the University atmosphere.

4-This study is limited to the study of educational statistics course. Similar research can be carried out on different topics in different classes.

5- Quantitative and qualitative studies can be carried out on the achievements and problem solving skills of high achievers and low achievers in the other college subjects.

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