

Science and Technology Teachers' Views towards Computer-Assisted Instruction in Primary Schools (Sample of Gaziantep and Kilis District in Turkey)

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Abstract

This quantitative study was conducted in order to find out whether there were any significant differences between the opinion of the science and technology teachers working in elementary schools towards computer assisted science and technology instruction application. The most important aspect hinders Computer Assisted Instruction success is knowledge, skills, attitudes and values of the teachers are not enough. In this research, teachers' opinions and thoughts that concern the teaching of Science and Technology instruction with Computer-aided instruction are determined and It is expected that measures will be taken about the solution of the problems that encountered. The study was performed in randomly selected elementary education schools from the central districts of Gaziantep and Kilis cities in 2011-2012 education years. The sampling of the study was composed of 135 science and technology teachers working in elementary schools in central districts of Gaziantep and Kilis cities. One scale of two parts was employed to collect data. The number of the teachers was 93 working in Gaziantep and 42 working in Kilis. The data were analyzed through SPSS programme. In order to find out whether there was a significant difference between the participants' opinions and gender and seniority , the frequency (f) and percentage (%) values were calculated, and t-test, One Way Variance Analysis (ANOVA) and LSD multiple comparison were conducted. The findings show that there was no significant difference between the participants' opinions and the gender but a significant difference was found between their opinions and seniority.

Keywords: computer assisted instruction, computer assisted science, technology learning

INTRODUCTION

With the advance of technology, computers have been an indispensable part of our life. We tend to use computers in our business or private life, which enables the use of computers to be commonly used in educational and instructional fields and influences our educational system. The overwhelming development of science and technology in our era has led to drastic changes in our educational system as in other fields. New technologies emerging in the second part of 20th century have the potential to change social and economic conditions across the globe. Computers, one of these new technologies, have been an indispensable part of our life. Computers, critically beneficial for institutions, have also been used in educational settings as well in recent years, and the importance of computers in schools is on the increase. Computer labs have been established in primary schools, and computer education has been given to students to help them familiarize themselves with computers (Akçay, 2002).

According to Feyzioğlu (2002), computer-assisted instruction offers various opportunities ranging from simple applications to virtual educational settings. Thanks to the development in computer technology,

texts, music, paintings, animated pictures can be easily processed through computers.

Besides using computers in education, a lot of software programs have also started to be employed in educational settings. Since lecture as a teaching method is often preferred in schools, and interaction is the least used in classes and prevents individual efforts and very few educational goals are achieved, this method, therefore, should be lessened in science instruction. Instead, learning and interaction based methods should be used (Oğuzkan, 1993).

According to Karamustafaoglu, Aydın and Ömer (2005), in computer-assisted instruction applications, simulations related to abstract concepts enable students to actively participate in learning process interactively by making use of computer-assisted software programs through animations and help them to construct concepts they have difficulty in comprehending more easily in their mind.

The statement of the research problem is " What are the science and technology teachers' opinions about computer-aided education with their own field in primary schools? "The main purpose of this study is to examine Science and Technology Teachers' views towards Computer-Assisted Instruction in Primary

Schools. The science and technology teachers participated in the study in order to determine the advantages and disadvantages of computer assisted instruction by their gender and seniority indemnity variables. Therefore, the following research questions were asked:

1.Does computer-assisted instruction in science and technology class show a significant difference by gender?

2.Does computer-assisted instruction in science and technology class show a significant difference by seniority indemnity?

The research is limited with the science and technology teachers' views in primary schools in the provinces of Gaziantep and Kilis in Turkey.

METHOD

A survey method, a type of quantitative research, was used in this study in order to determine the attitude, belief and opinions of the participants. This method is commonly used in education, sociology and psychology due to its generalizability, versatility and efficiency. According to Karasar (2004) a survey method is an approach that aims to describe an existing and past event without interference or treatment. Within this framework, this study intended to evaluate the opinions of science and technology teachers towards computer assisted science and technology instruction.

Universe and Sampling

The universe of the study constituted the science and technology teachers working in primary schools in Turkey. The sample was also composed of science and technology teachers working in primary schools in Sahinbey Central District of Gaziantep City and Kilis Province Center. The school names of the teachers were obtained from Gaziantep Sahinbey District National Education and Kilis Province National Education Directors. The data of 93 teachers in Gaziantep and 42 in Kilis, totaling 135 participants, who participated in the questionnaire, were analyzed.

Data Collection Tool

A questionnaire consisting of two parts was used to collect the data. The first part includes the questions containing personal information of the teachers participating in the survey. In this chapter, the teachers were asked about their gender and occupational experience. The second part includes a grading scale, consisting of Likert-type questions, where the teachers stated their views on Computer-Assisted Instruction. The Likert-type scale in the second part to collect the data is a scale consisting of three subscales developed by Oral (1994), and was used in a doctoral study carried out at Inönü University Institute of Social Science. The subscales are as follows:

- Subscale-1 : Views on the benefits of Computer- Assisted Instruction to students
- Subscale-2 : Views on influencing the role of the teachers in terms of tasks they undertake during Computer -Assisted Instruction application
- Subscale-3: Views on prospective changes by Computer-Assisted Instruction application in the teaching-learning setting.

DATA COLLECTION AND ANALYSIS

The data used in the analysis were obtained by the science and technology teachers working in primary schools in Sahinbey Central District of Gaziantep and Kilis Province Center. The questionnaire was conducted in the second half of 2011-2012 academic year. The teachers were given a week time to reply to the questionnaire.

The data were analyzed using SPSS program. Frequency (f), percentage (%) were calculated. T-test, one-way analysis of variance (ANOVA), LSD multiple comparison test were used in the sub-dimensions and all sub-dimensions of Computer - Assisted Instruction to determine if there was a significant difference between gender and occupational experience of the teachers and their opinions towards Computer-Assisted Instruction application.

Validity and Reliability Studies of Data Collection Tool

Validity of a measurement tool is the degree to which it measures what it is designed to measure accurately and completely without any confounding variable (Tavsancil, 2005). The reliability of a measurement tool can be defined as an indication of 'measuring to what extent it measures a certain item for a certain period of time under a given set of conditions' (Tekin, 2000). Cronbach's alpha coefficient, a criterion for internal reliability, was used to determine the level of reliability in Likert-type scale. The reliability study of this measurement tool used in order to determine the teacher's views towards the Computer Assisted Instruction application was carried out by Oral (1994) and the following results were obtained:

- Subscale-1: Benefits of Computer Assisted Instruction application for the students: 0,87
- Subscale-2: Influencing the role of the teachers in terms of the task they will undertake during Computer Assisted Instruction application: 0,86
- Subscale-3: Propsective changes through Computer-Assisted Instruction application in the teaching-learning setting : 0,88

135 teachers in Sahinbey Central District of Gaziantep City and Kilis Province Center were given the scale in this study; the internal consistency

Cronbach's alpha coefficients of the subscales and the total of the subscales were calculated as follows:

- Subscale-1: Benefits of Computer Assisted Instruction application for the students: 0,73
- Subscale-2: Influencing the role of the teachers in terms of the task they will undertake during Computer Assisted Instruction application: 0,62
- Subscale-3 Propsective changes through Computer-Assisted Instruction application in the teaching-learning setting: 0,89

FINDINGS AND COMMENTS

Findings on Teachers Personal Characteristics

The distribution of the elementary school science and technology teachers by gender is given in Table 1.

Table 1. Frequency and percentage distribution of the teachers by gender

Gender	f	%
Female	61	45,2
Male	74	54,8
Total	135	100,0

The frequency and percentage distribution of the science and technology teachers by gender is presented in Table 1. While %45, 2 of the teachers were females in the survey, %54, 8 were male teachers. These findings show that the male teachers formed the majority of teachers. The distribution of the science and technology teachers by occupational seniority is given in Table 2.

Table 2. Frequency and percentage distribution of teachers by occupational seniority

Occupational Seniority	f	%
1-10 Years	39	28,9
11-20 Years	55	40,7
21 Years and above	41	30,4
Total	135	100,0

As seen in Table 2, %28,9 of the teachers had 1-10 year seniority, and %40,7 of them had 11-20 year seniority, and %30 of them had 21 year and over seniority.

Findings on the Characteristics Regarded as Advantage and Disadvantage for Computer-Assisted Instruction Application that the Teachers attended

In this part, findings on the characteristics regarded as advantage and disadvantage for computer-assisted instruction application that the teachers attended are given. The opinions of the science and technology teachers are analyzed in 3 subscales.

Subscale 1. Views on Benefits of Computer Assisted Instruction Application for Students

There are 14 statements in total regarded as advantage and disadvantage of CAI application on this subscale. Within the limits of this subscale, the possible highest total score is 70; the possible lowest total score is 14. The group obtaining scores more than 42 on this subscale show that they confirm that CAI is accepted as advantage and do not confirm that CAI is accepted as disadvantage

T-test results are given in Table 3 to show the significant difference between the gender of science and technology teachers and their opinions towards CAI application that benefited students.

Table 3. T-test results of teachers' opinions towards CAI application that benefited the students by gender

Gender	N	\bar{X}	SS	sd	t	p
Male	61	47,11	4,99	133	0,207	0,837
Female	74	46,95	4,48			

The findings in Table 3 show that there was not a significant difference between the total scores of the opinions of the science and technology teachers on CAI application benefiting the students and their gender [$t(133)=0,207, p>0,05$]. While the average scores of the opinion scale of the male teachers in the survey were ($\bar{X}=47, 11$), the scores of the female teachers were ($\bar{X}=46, 95$). It was found that the male teachers had higher scores about CAI application than the female teachers did. Since all the teachers, both males and females, obtained a score more than 42, they agreed on the fact that CAI application benefited the students. Whether there was a significant difference between the seniority of the science and technology teachers and CAI application that benefited the students was investigated, and the results are given in Table 4.

Table 4. Descriptive statistics results of opinions of the teachers CAI application that benefited the students by occupational seniority

Occupational Seniority	N	\bar{X}	SS
A. 1-10 Years	39	48,77	3,42
B. 11-20 Years	55	47,76	4,94
C. 21 Years and above	41	44,37	4,36
Total	135	47,02	4,70

Table 4 shows that the average scores of science and technology teachers by occupational seniority changed between ($\bar{X}=48,77$) and ($\bar{X}=44,37$). Considering the differences between the average

scores, the teachers ($\bar{X}=48,77$) with 1-10 year occupational seniority provided the highest support for CAI application that benefited the students, while the teachers ($\bar{X}=44,37$) with 21 year seniority offered the least support for CAI application. As all the teachers with different occupational seniority obtained a score more than 42, they agreed on the fact that CAI application benefited the students.

Variance analysis (ANOVA) was done to determine whether there was a significant difference between the scores of the science and technology by occupational seniority, and the results are presented in Table 5.

Table 5. Variance analysis results of opinion of the teachers towards CAI application that benefited the students by occupational seniority

Variance Source	sd	F	p	Significant Difference	
Between Groups	438,57	2	219,29	11,46 0,000*	A-C
Within	2526,36	132	19,14		B-C
Total	2964,93	134			

* p<0,05

The findings in Table 5 show that there was a significant difference between the opinions of the science and technology teachers towards CAI application that benefited the student and their occupational seniority [F(2-132)=11,46, p<0,05]. LSD test was carried out to understand which group produced the difference. LSD test results indicated that there was a significant difference between the science and technology teachers with 1-10 (A) year, 11-20 (B) year occupational seniority and the science and technology teachers with 21 and above occupational seniority. The teachers with 1-10 (A) year and 11-20 (B) year occupational seniority supported the view more than the teachers with 21 year and above (C).occupational seniority did.

Subscale 2. Findings on influencing the role of teachers in terms of the tasks they will undertake during CAI applicition

There are 14 statements accepted as advantage and disadvantage by the teachers on the subscale. The highest total score was 70, while the lowest total score was 14. The group with more than 42 score accepted the idea that CAI application might affect the role of teachers as positive in terms of the tasks they will undertake during instruction ,and reject the idea that may affect the role of the teacher as negative. T-test results are given in the Table 6 to find out if there was a significant difference between the gender and the opinion that CAI might affect the role of teacher during instruction.

Table 6. T-test results of the opinions of the teachers in terms of the tasks they will undertake during CAI application by gender

Gender	N	\bar{X}	SS	sd	t	p
Male	61	47,59	4,29	133	1,142	0,255
Female	74	46,76	4,16			

The findings in Table 6 show that there was not a significant difference between the gender and the total score of the science and technology teachers' opinions that CAI application might affect the role of teacher during instruction t(133)=1,142, p>0,05]. While the average score of the opinion scale of the male teachers in the survey was ($\bar{X}=47,59$), the score of the females was ($\bar{X}=46,76$). The male teachers had a higher score in that CAI application might affect the role of teacher during instruction. Since all the teachers, both male and female obtained a score more than 42, they agreed on the idea that CAI application might affect the role of teachers as positive.

Whether there was a significant difference between the occupational seniority of science and technology teachers and opinions that CAI application might affect the roles of the teachers during instruction was investigated, and the results are presented in the Table 7.

Table 7. Descriptive statistics results of opinions that CAI application might affect the roles of the teachers during instruction by occupational seniority

Occupational Seniority	N	\bar{X}	SS
A. 1-10 Years	39	48,21	3,63
B. 11-20 Years	55	47,80	4,27
C. 21 Years and above	41	45,22	4,14
Total	135	47,13	4,22

Table 7 shows that the score of the science and technology teachers changed between ($\bar{X}=48,21$) and ($\bar{X}=45,22$). Given the difference between the scores, the teachers with 1-10 year occupational seniority supported the opinion that CAI application might affect the roles of the teachers during instruction more than the teachers with 21 year and above occupational seniority did. Since all teachers with different occupational seniority received a score more than 42, they agreed on the idea that CAI application might affect the roles of the teachers during instruction.

Variance analysis was done to determine whether there was a significant difference between the score of the science and technology teachers and their occupational seniority, and the results are presented in Table 8.

Table 8. Variance analysis results of the opinions that CAI application might affect the roles of the teachers during instruction (ANOVA)

Variance Source	sd	F	p	Significant Difference	
Between Groups	219,42	2	109,71	6,67 0,002*	A-C
Within	2172,18	132	16,46		B-C
Total	2391,60	134			

* p<0,05

The findings in Table 8 show that there was a significant difference between the science and technology teachers' opinion that CAI application might affect the roles of the teachers during instruction and occupational seniority [F(2-132)=6,67, p<0,05]. LSD test was performed to understand which group produced the difference. LSD test results point out that there was a significant difference between the science and technology teachers with 1-10 (A) year and 11-20 (B) year occupational seniority and the science and technology teachers with 21 and above occupational seniority. The teachers with 1-10 (A) years and 11-20 (B) year occupational seniority agreed that CAI application might affect the roles of the teachers during instruction more positively than the teachers with 21 and above occupational seniority.

Subscale 3. Findings on prospective changes of CAI application in teaching-learning setting

There are 22 statements accepted as advantage and disadvantage for the prospective changes in teaching-learning setting on the subscale of CAI application. The highest total score was 110, whereas the lowest total score was 22. The group with more than 66 score accepted the idea that CAI application might create prospective changes in teaching-learning setting as positive and did not confirm that CAI application might affect as negative.

T-test results are given in Table 9 to show if there was a significant difference between the gender of science and technology teachers and the opinion that CAI application might create prospective changes in teaching-learning setting.

Table 9. T-test result of the teachers' opinions that CAI application might create prospective changes in teaching-learning setting by gender

Gender	N	\bar{X}	SS	sd	t	p
Male	61	72,90	7,54	133	-0,181	0,857
Female	74	73,14	7,40			

The findings in Table 9 show that there was not a significant difference between the total score of science and technology teachers' opinions that CAI application might create prospective changes in

teaching-learning setting and their gender [t(133)=-0,181, p>0,05]. While the average score of the opinion scale of female teachers in the survey was (\bar{X} =73,14), the score of the male teachers was (\bar{X} =72,90). The female teachers obtained a higher score than the male teachers did. Since all the teachers, males and females, received a score more than 42, they agreed on the idea that CAI application might create prospective changes in teaching-learning setting.

Whether there was a significant difference between the occupational seniority of science and technology teachers and opinions CAI application might create prospective changes in teaching-learning setting was investigated.

Table 10. Descriptive statistics results of the teachers' opinions that CAI application might create prospective changes in teaching-learning setting

Occupational Seniority	N	\bar{X}	SS
A. 1-10 Years	39	74,54	6,00
B. 11-20 Years	55	74,98	7,84
C. 21 Years and above	41	68,98	6,61
Total	135	73,03	7,44

Table 10 shows that the score of the science and technology teachers by occupational seniority changed between (\bar{X} =74,98) and (\bar{X} =68,98). Considering the difference between the scores, the teachers (\bar{X} =74,98) with 11-20 years occupational seniority offered more support for the idea that CAI application might create prospective changes in teaching-learning setting than teachers with 21 and above occupational seniority. Since all the teachers with different occupational seniority obtained a score more than above 66, they agreed that CAI application might create prospective changes in teaching-learning setting.

Variance analysis was done to determine whether there was a significant difference between the score of science and technology teachers by occupational seniority and their opinions that CAI application might create prospective changes in teaching-learning setting, and the results are presented in Table 11.

Table 11. Variance analysis result of the teachers' opinions that CAI application might create prospective changes in teaching-learning setting by occupational seniority

Variance Source	sd	F	p	Significant Difference	
Between Groups	972,23	2	486,12	9,97 0,000*	A-C
Within	6437,65	132	48,77		B-C
Total	7409,88	134			

* p<0,05

The findings in Table 11 show that there was a significant difference between the science and technology teachers' opinion CAI application might create prospective changes in teaching-learning setting and occupational seniority of teachers [F(2-132)=9,97, p<0,05]. LSD test was carried out to understand which group produced the difference. LSD test results show that there was a significant difference between science and technology teachers with 1-10 (A) year and 11-20 (B) year occupational seniority and science and technology teachers with 21 years and above occupational seniority (C). Teachers with 1-10 (A) year and 11-20 (B) year occupational seniority supported the process more than the teachers with 21 year and above occupational seniority (C).

CONCLUSION AND SUGGESTIONS

The findings show that given the total sum scores of sub-dimensions of computer assisted instruction and the total sum scores of all sub-dimensions, there was not a significant difference between the teachers' gender and the opinions of the science and technology teachers towards computer-assisted instruction application.

The findings indicate that given the total sum scores of sub-dimensions of computer assisted instruction and the total sum scores of all sub-dimensions there was a significant difference between the occupational seniority and the opinions of science and technology teachers towards computer-assisted instruction. LSD test was conducted in order to understand which group produced the difference. The results of LSD test showed a significant difference between the science and technology teachers with the occupational seniority of 1-10 years and 11-20 years and the science and technology teachers with 21 year and above occupational seniority. The teachers with the occupational seniority of 1-10 years and 11-20 participated in computer assisted instruction application more than the teachers with 21 year and above occupational seniority did.

As a result, the science and technology teachers who participated in the study all had a favorable opinion on the computer-assisted instruction. We can say that the gender variable of the science and technology teachers who participated in the study did not play any role to favor the computer assisted instruction. Furthermore, other field studies conducted by Aydođdu (2003) and Keskin (2003) verified that the gender difference is not an influential factor. We can say the science and technology teachers who have more occupational seniority (years of service) favor the computer assisted instruction less. Science and technology teachers who are older participated less in computer assisted science and technology instruction compared to other science and technology teachers who were younger in age. We can list the reasons as follows:

- Computer technology and computer assisted instruction method is a newly developing application. The fact that teachers who are younger adapt to century's innovations more quickly and become more prone to use the technology might have led to this difference.
- The fact that the younger teachers received computer instruction prior to their career during high school and the university and benefiting from computers and computer assisted instruction may have created this difference.

The most important factor that helps the computer assisted instruction method achieve success is teacher's attitude towards supporting computer assisted instruction. Hence, to further promote the dissemination of the computer assisted instruction, first and foremost, teachers should be educated about computer assisted education and then computer labs should be set up and developed at schools. Furthermore, teachers should be encouraged to teach classes through computer assisted instruction.

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