

AN INVESTIGATION OF THE USE OF COMPUTER APPLICATIONS BY PRIMARY SCHOOL SCIENCE TEACHERS

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ABSTRACT

This study looked into how often and to what extent science instructors utilise computers in the classroom as a teaching aid. Research on how teachers' usage of computers, their views on computer integration, and other variables have influenced their level of computer literacy is underway. This study involved 63 primary school science instructors in the North-western portion of Turkey. Teachers were polled as part of a research project. Increasing the computer literacy of science instructors appears to lead to an increase in the usage of computer applications as an educational tool by scientific teachers. Teachers utilise a significant share of Internet, email, and instructional software CDs in the classroom. The results also showed that there is a gender difference in the incorporation of computer applications as a teaching tool by scientific teachers.

Keywords: Computer Literacy, Integration of Technology, Science Education

I. Introduction

Over the course of the twentieth century, computer technology and scientific education forged a close relationship. It was in scientific education that computers were first introduced, both as a teaching aid and as a stand-alone subject. Instructors' education was also affected by computer-based instruction since many science teachers re-evaluated their teaching approaches based on ideas of student learning (Kožuš, Maksimović, & Zajić, 2021). Because of computers' increased speed, flexibility, and storage capacity, scientific educators have had to rethink what it means to have hands-on experience and how to utilise computers to teach science topics. Students should be taught how to use computers in their scientific classes, according to the National Science Education Standards (NSES), which emphasise computer-based technology integration into science lessons.

Many studies reveal that instructors do not use computers effectively in the classroom, despite the fact that evidence supports the usage of computers. (Rachmadtullah, et al. 2018) claims that there is still a lack of research into the impact of computers in science classes on student learning. Low computer usage in schools may be attributed to two primary factors: a lack of training for teachers and a lack of technology available to them. When it comes to teaching a topic using a computer, (Rachmadtullah, et al. 2018) observed that instructors are aware of the complexity of computers and feel uneasy. For example, in their study with 47 educators from twenty K-12 schools across three states, a supportive atmosphere is necessary for educators who want to use computers in their

classrooms to learn how to use them effectively. Teachers said that computers aided their personal growth, but many refused to credit the technology with bringing about the transformation. (Rachmadtullah, et al. 2018) observed that instructors who utilise computers more efficiently are more likely to be role models for their pupils, resulting in positive views toward computers among the students they teach.

II. Background

It was found that the incorporation of computer literacy into method courses gave preservice teachers the confidence to use their own explanations to educate their students how to use computers in the classroom. Teachers desire to be proficient in using computers and education because they can observe the good improvements in teaching practises as a consequence of utilising this technology, according to (Rachmadtullah, et al. 2018)'s qualitative study with 10 primary teachers. There has also been a lot of research into gender and science in the last decade. Gender has been shown to have a considerable impact on a wide range of computer-related traits. (Rachmadtullah, et al. 2018) observed that males were more enthusiastic about computers than females, and concluded that the lack of computer confidence among female instructors may keep them from utilising computers in scientific classes. Before a scientific teacher is interested in utilising and promoting computers, he or she may require a particular level of expertise and comprehension. Indeed, (Rachmadtullah, et al. 2018) opined that female instructors' apathy for computer integration may be due to a lack of prior computer knowledge.

Teachers' opinions regarding computers in scientific classes was shown to be strongly influenced by their gender, according to the research (Li, *et al.* 2019). Male instructors may have a little more positive attitude about computer use than female teachers, according to certain research. Other research, on the other hand, show that teachers' opinions are mostly unaffected by their gender. People's views about computers and their understanding of computers appear to be influenced by their age in general.

III. Purpose of the study

An investigation of how science instructors see the use of computer programmes as an educational tool, as well as how frequently they use computers and their degree of computer literacy, was the goal of this study (Melash, *et al.* 2020). Consider gender when looking at how computer programmes are integrated into education, according to the literature. As a result, a secondary goal of the study was to examine science instructors' use of computer apps as an educational aid depending on gender. As part of the study's objectives, the following research topics were addressed:

1. Are there any correlations between the level of computer literacy of science instructors and their usage of computers?
2. Are science professors who are proficient with computers more likely to include computer applications into their classrooms?
3. The usage of computers by scientific instructors and the integration of computer applications as a teaching aid have a correlation?
4. What role do gender disparities play in the use of computer applications as a teaching tool by science teachers?

IV. Method

Participants

To find study participants, researchers used snowball sampling. Teachers from elementary schools in one of Turkey's northwesterly provinces were chosen to collect data. At the time of the survey, there were 153 science instructors in the province. Researchers began by setting up meetings with science instructors in person and soliciting their involvement in the study. In the face-to-face sessions, science instructors were instructed to look for other science teachers. Prospective participants' names, phone numbers, email addresses, and postal addresses were collected at the in-person meeting (Melash, *et al.* 2020). The contact information of other scientific instructors was used to solicit their participation in the project. The study's sample size of 63 science instructors, with a 95% confidence level and a 10-point confidence interval, was deemed adequate.

Instrument

The survey used to collect the study's data was customised by (Rachmadtullah, *et al.* 2018). The content validity of this survey has been verified by previous research projects. There were four parts to the survey as it was revised. Demographic data was gathered in the survey's first component. There were 10 responses ranging from "Never" to "Very High" in the second section of the survey, which was used to determine the amount of computer application use by scientific instructors (Melash, *et al.* 2020). Ten questions were utilised in the third portion of the survey to gather data on the frequency with which science instructors use computer programmes. Six questions with answer options ranging from "Strongly Disagree" to "Strongly Agree" were used in the survey's last part to gather information on science instructors' impressions of the incorporation of computer applications as a teaching tool. Scale replies were given numbers from 1 to 5 because the questions were framed in both directions (Li, *et al.* 2019). Taking the survey took me around 20 minutes.

Data Collection

There were 63 instructors who agreed to participate in the study who received surveys. Surveys were favoured by 30 percent of respondents if they were sent to and completed at their respective institutions. In order to obtain data from these students, surveys were sent to and collected from their respective schools (Melash, *et al.* 2020). 44% of respondents chose to complete the surveys over the phone, while the remaining 52% opted to complete the surveys by email after receiving them in the mail.

Data Analysis

The results of the surveys collected were checked for inaccuracies, but none were discovered. SPSS 13 was used to conduct further analysis on the data that had been imported (Hursen, & Bas, 2019). Correlational and One-Way analysis are examples of descriptive analysis. For the purpose of answering study questions, ANOVAs were used in the data analysis.

V. Results

The teachers' background information included the gender and computing experience of the students. According to the poll, around half of teachers were female (46 percent). According to the poll results, 95% of instructors said they were utilising computers in the classroom (Melash, *et al.* 2020). The years of teaching experience among the participants ranged from a few months to almost a decade. Only 6.5 percent of instructors stated that they had

worked with computers for more than 15 years, while 35 percent of teachers stated that they had worked with computers for four to seven years, as shown in Table 1.

Table 1: Computer Experience of Participants

Computer Experience	1-3 years	4-7 years	8-11 years	12-15 years	>15 years
	13%	35%	33.3%	13%	6.5%

Internet (49.2 percent), email (47.6 percent) and instructional software CDs (14.3%) were the most frequently used computer programmes among science instructors, according to Table 2. There was also a medium degree of use for word processing (34.7 percent), spreadsheets (36.5 percent), desktop publishing (36.5 percent), and presentation (30.2 percent). Graphics and drawing applications (47.6%), word processing (28.2%) and spread sheets (28.6%) were all listed as "never being used by scientific instructors," as were database programmes (23.8%) and graphic and drawing programmes (23.8%) (Hursen, & Bas, 2019). This study's findings suggest a symmetrical link between the number and intensity of computer applications used by scientific teachers. The Internet (percentage 49.2), emails (percentage 47.6), and instructional software CDs (percentage 14.3) were the most commonly utilised computer programmes among instructors, according to this study (see Table 3).

Table 2: Level of Using Computer Applications

	Never		Low		Medium		Medium-high		Very high	
	f	%	f	%	f	%	f	%	f	%
Word processing	18	28.6	16	25.4	20	31.7	8	12.7	1	1.6
Spread sheets	18	28.6	14	22.2	23	36.5	8	12.7	0	0.0
Database programs	15	23.8	22	34.9	17	27	8	12.7	1	1.6
Graphics and drawing programs	15	23.8	14	22.2	21	33.3	12	19.0	1	1.6
Desktop publishing	12	19.0	15	23.8	23	36.5	10	15.9	3	4.8
Presentation programs	8	12.7	8	12.7	19	30.2	21	33.3	7	11.1
Educational CDs	3	4.8	7	11.1	17	27	27	42.9	9	14.3
Email	1	1.6	4	6.3	13	20.6	15	23.8	30	47.6
Internet	1	1.6	2	3.2	12	19.0	17	27	31	49.2
Others	6	9.5	14	22.2	32	50.8	10	15.9	1	1.6

Table 3: Frequency of Using Computer Applications

	Never		Low		Medium		Medium-high		Very high	
	f	%	f	%	f	%	f	%	f	%
Word processing	25	39.7	12	19	22	34.9	4	6.3	0	0
Spread sheets	26	41.3	12	19	14	22.2	10	15.9	1	1.6
Database programs	24	38.1	15	23.8	15	23.8	9	14.3	0	0
Graphics and drawing programs	22	34.9	11	17.5	14	22.2	15	23.8	1	1.6
Desktop publishing	19	30.2	13	20.6	16	25.4	13	20.6	2	3.2
Presentation programs	13	20.6	12	19	16	25.4	17	27	5	7.9
Educational CDs	7	11.1	14	22.2	11	17.5	22	34.9	9	14.3
Email	1	1.6	16	25.4	8	12.7	13	20.6	25	39.7
Internet	2	3.2	10	15.9	14	22.2	8	12.7	29	46
Others	20	30.7	10	15.9	25	39.7	6	9.5	2	3.2

Table 4 summarises the findings of an investigation on scientific instructors' views on the use of computer applications in the classroom. Accordingly, 49.2 percent of the instructors stated that they support the use of computer applications in the classroom to create and implement educational activities. However, 23.8 percent of the instructors disagree with this assessment of the situation. Only 38.1% of instructors said they often check

Internet resources for teaching purposes, while 23.8% said they never check the internet at all (Hussein, *et al.* 2019). According to instructors, if they utilise computer applications as an educational tool, then they analyse classroom activities using computer apps. In science courses, nearly half of instructors (50.8 percent) said they encourage pupils to utilise computer programmes. Fourteen.4% of participants said they did not believe the assertion that conventional techniques are used in education because teachers do not know how to use computer programmes (Sahin, & Yilmaz, 2020). When asked if they sought to be a role model for their pupils in integrating computer applications, 46% of science instructors said yes. Of those surveyed, 23.8% said they didn't try hard enough to serve as a role model for the pupils.

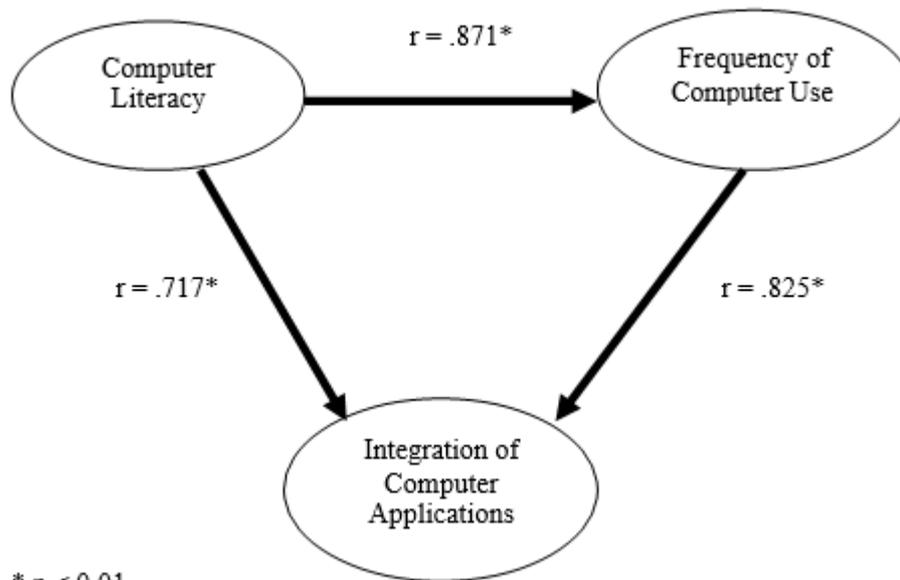
Table 4: Perceptions about Integration of Computer Applications as an Instructional Tool

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	f	%	f	%	f	%	f	%	f	%
I design instructional activities using computer applications and apply them in the class.	4	6.3	15	23.8	5	7.9	31	49.2	8	12.7
I evaluate the results of the classes where I used computer applications.	2	3.2	15	23.8	6	9.5	30	47.6	10	15.9
I encourage students to use computer applications in science classes.	1	1.6	17	27	8	12.7	32	50.8	5	7.9
I know how using computer applications will affect students' success and I become a model in this matter.	2	3.2	15	23.8	11	17.5	29	46	6	9.5
I review the internet sources periodically to use in the instruction.	3	4.8	15	23.8	10	15.9	24	38.1	11	17.5
I use traditional methods since I do not know how to apply computer applications in instruction.	28	44.4	9	14.3	9	14.3	17	27	0	0

Table 5: Relationship among Computer Literacy, Frequency of Computer Use, And Integration of Computer Applications (CA)

	Computer Literacy	Frequency of Computer use	Integration of CA
Computer Literacy	1	.871	.717*
Frequency of Computer use	.871*	1	.825*
Integration of CA	.717	.825	1

*p< 0.05



Correlation coefficients between computer literacy, frequency of computer use, and application integration are shown in Table 5. Computer literacy is positively associated with the frequency of computer usage and with the integration of programmes, according to Table 5 (Figure 1). More than half the difference in computer literacy and computer usage may be explained by a positive connection, according to correlation coefficients that varied from 717–877.7 percent.

Using One-way ANOVA, we looked at how different men and women saw the integration of computer applications as a teaching aid (Sahin, & Yilmaz, 2020). Table 5 shows the findings. Table 6 shows the mean and standard deviation of science instructors' use of computers in the classroom by gender.

Table 5: Source Table for Analysis of Variance
Between Subject Effects

Source	SS	Df	MS	F
Between groups	508.820	1	508.820	7.663*
Within groups	4050.609	61	4050.609	
Total	4559.429	62		

* $p < 0.05$

Table 5 showed that male and female science instructors use computer apps in different ways, with male teachers using them more frequently than female teachers (Dorouka, Papadakis, & Kalogiannakis, 2020). Table 6 shows that the integration of computer applications by male scientific instructors ($x = 32.52$) is greater than the integration of computer applications by female science teachers ($x = 26.82$).

Table 6: Means and Standards Deviations for Gender

Gender	N	Mean	SD	Std. Error	95% Confidence Interval		Lowest	Highest
					L. Bound	U. Bound		
Female	29	26.82	9	1.67	23.4	30.25	10	42
Male	34	32.52	7.34	1.25	29.96	35.09	18	47
Total	63	29.9	8.57	1.08	27.74	32.06	10	47

VI. Discussion

This study demonstrated a favourable association between the frequency with which science instructors utilise computers and their level of computer literacy. As their proficiency with computers grows, so does their frequency of computer usage among science educators. A positive link was also established between the degree of computer use by scientific instructors and the utilisation of computer apps as an educational aid (Dorouka, Papadakis, & Kalogiannakis, 2020). As a result of increasing science teachers' computer literacy, it appears that they are more likely to employ computers as an educational tool. There is a strong correlation between teachers' lack of computer literacy and the low degree of computer use in schools. According to previous research and the strong association established in this study, instructors of science who are more computer literate are more likely to use technology in the classroom.

23.8 percent (15) of scientific instructors disagree, and 6.3 percent (4) severely disagree, with the design of educational activities employing computer applications (Aliyyah, *et al.* 2020). The percentage of scientific instructors who do not use computer apps in their teaching climbs to 30.1 percent when the "disagree" choice is combined with the "strongly disagree" option. One-third of educators oppose utilising computers in the classroom, indicating that instructors' use of technology is still a concern in many places (Hussein, *et al.* 2019). There is a favourable attitude toward adopting computer apps by most Turkish scientific instructors in this study, according to findings. These findings are at odds with earlier investigations undertaken by other researchers. One possible explanation for the rise in the use of computer applications in the classroom is the proliferation of these programmes in schools during the last several years.

Male instructors had more computer skills than female teachers, according to this study, which is in line with other research (Aliyyah, *et al.* 2020). Of the science instructors surveyed, 23.8% said they don't make use of online resources. Results also show that many science instructors appear to be unable to access Internet resources to obtain current knowledge or to obtain alternate materials for their teaching.

VII. Conclusion

As a whole, the findings of this study are consistent with those of other studies done in this field. Computers have an important part in students' learning of scientific concepts because of the widespread usage of computer technology by science professors. Teachers may use computers to examine science issues in a variety of ways. Science instructors of the future will be required to use computer technology effectively in their classes. Some teachers may worry that kids are becoming too reliant on technology. It is possible to utilise computers mechanically, and students' comprehension of elementary science concepts could be rudimentary. The absence of computers in scientific classrooms may be due to this. However, additional research is needed to corroborate this hypothesis. This research found that 50.8% of instructors said they encourage their pupils to use computer programmes in their scientific lessons. They aren't alone (Bakirci, & Karisan, 2018). However, teachers may worry that children grow overly reliant on computer programmes and are unable to learn the fundamentals of science, which is a valid concern. It will be interesting to observe how teachers can make advantage of the complexity of information through the usage of computers. In order to better understand how science instructors interact with computers and make use of them as a teaching tool, additional study comparing the technology usage of teachers based on gender differences is required.

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