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Teachers' Perceptions of Using Computers

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ABSTRACT

This study investigated teachers' perceptions of using computers in their classrooms. The study used secondary data from the Fast Response Survey System (FRSS): Teachers' use of educational technology in U.S. public schools by the United States Department of Education, Institute of Education Sciences, and National Center for Education Statistics. The survey was conducted from 2008-2009. The study used a chi-square statistical test and analysis of variance (ANOVA test) to examine the research questions. Three results emerged from the study. First, the results showed a connection between how teachers and their students utilized computers during classroom instruction and the teachers' years of experience in elementary or secondary education. Secondly, no correlation was found between the usage of computers by teachers or their students during instructional time and the type of community. Lastly, the third result highlighted a variation in the number of internet-connected computers introduced to schools, depending on the community type. The findings demonstrate a significant relationship between teachers' years of experience and students' engagement with computers during instructional time. This indicates that more experienced educators may utilize technology differently than their less experienced counterparts. Conversely, the lack of a relationship between computer usage and community type suggests widespread access to technology across various settings. However, the effective integration of such resources may still vary based on individual teaching practices rather than environmental factors. The study recommended studying how teachers and students interact while using computers during lessons and how this affects students' academic success. In addition, studies could compare students' success based on the types of training teachers receive.

Keywords: Computers, teachers' perceptions, digital learning tools, elementary education, secondary education.

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1. Introduction

Using computers in education indicates significant benefits in opening a new area of knowledge and providing a tool to change current educational approaches (Gilakjani, 2013; Sailer et al., 2021; Xenakis et al., 2025). Since 1994, the National Center for Education Statistics (NCES) has documented a significant increase in access to computers and the Internet in the nation's public schools (U.S. Department of Education 2000). Especially after the pandemic, most classrooms have become equipped with modern digital learning tools, such as computers, handheld devices, smartboards, projectors, and others. The surveys for the American Federation of Teachers (AFT) revealed key insights from teachers and public-school parents from a representative national sample of 1,755 AFTs (Molyneux & Baer-Bositis, 2023). As the survey results showed, teachers were broadly adopting educational technology across various aspects of their professions, such as laptop computers (97% overall, 83% daily), smartphones (70% overall, 34% daily), and interactive whiteboards (73% overall, 56% daily). Additionally, software has become essential in teachers' work. They frequently used learning management systems (85% occasionally or daily), assessment software (74%), digital encyclopedias (55%), and bibliographic search engines (50%). Integrating educational technology in classroom management is less prevalent, with only 26% of teachers using it daily and only 29% of schools strongly encouraging this practice ((Molyneux & Baer-Bositis, 2023).

Teachers are critical in effectively utilizing computing power within the educational system (Gilakjani, 2013; McCannon & Crews, 2000; Sailer et al., 2021; Xenakis et al., 2025). Gray et al.'s (2010) study found that "in the year 2008, 100 % of public schools in the U.S. had one or more instructional computers with Internet access, and 91% of the computers in public schools were used for instructional purposes" (p. 2). These increases have led to some studies examining the use of computers in the classroom and a need to understand the effect size of this use. Furthermore, several factors motivate teachers to incorporate computers into the classroom, including positive beliefs and attitudes toward technology use. Gilakjani (2013) argued that using a computer in the classroom is ineffective if the teacher lacks theoretical and practical knowledge. Sailer et al. (2021) noted that possessing basic digital skills was linked to increased time spent teaching with digital technology, while technology-related teaching skills and technologies in schools were not necessarily associated with the frequency of technology use in the classroom.

The present study, therefore, aims to investigate teachers' perceptions of using computers in their classrooms. The following research questions are formulated to examine the research problem:

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1. Is there a relationship between teachers or their students' using computers during instructional time in the classroom and the years of elementary/secondary teaching experience?

2. Is there a relationship between teachers or their students' using computers during instructional time in the classroom and the community type?

3. Does the number of computers brought into the classroom with internet access differ by community type?

2. Literature Review

Integrating computer technology into educational settings has become increasingly vital in enhancing teaching and learning processes. Relevant research (e.g., Mueller et al., 2008; Wilson et al., 2003) reveals significant insights into how educators utilize technology and the factors influencing their engagement.

Mueller et al. (2008) conducted a study that included a random sample of a heterogeneous group of 185 elementary and 204 secondary teachers and found seven variables for elementary teachers and six for secondary teachers (accounting for 74% and 68% of the variance, respectively). These variables included positive teaching experiences, teachers' comfort with computers, beliefs supporting using computers as an instructional tool, training, motivation, support, and teaching efficacy. Consistent with this, Gilakjani (2013) conducted a study examining five factors: computer self-efficacy, teaching experience, inadequate computer technology support, teachers' pedagogical practices, and professional development in computer technology integration that could enhance teachers' use of computer technology. The results of this research recommend that using computer technology in the instructional process can make positive changes, especially when the teachers know the purpose of using computers.

According to Wilson et al. (2003), on average, teachers utilized computers 1.9 hours per week mainly to enter grades in elementary schools, while students spent even less time on computers—only 1.5 hours per week. In addition, Cope and Ward (2002) found that experienced teachers with little or no professional development in using technology in the classroom were less likely to use it and were less likely to see the benefit of technology usage in the classroom.

Hermans et al. Valcke (2008) evaluated the impact of primary school teachers' educational beliefs (constructivist and traditional beliefs) on classroom computer use. They found a positive impact of constructivist beliefs, while traditional beliefs harm classroom use. Clark's (2000) study affirms these previous studies but with urban middle schools. She investigated urban middle school teachers' perspectives on their use of instructional technology, their understanding of this technology, and their feelings about the support structure associated with this equipment. She found that

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teachers believe technology is an integral part of educating their students and that there is a need for more technology in their classrooms.

Other studies also reported teachers' use of computers in different settings. For instance, Mouza (2008) examined the implementation of a laptop program initiative in a predominantly low-income, minority school, and she compared the data with the students who did not have laptops within the same school. The result indicated that the quantitative data did not reveal significant differences in student attitudes towards computers and schools between laptops and comparison students. In contrast, the qualitative data indicated that laptop integration enhanced motivation and engagement with schoolwork, affected classroom interactions, and empowered students. Warschauer (2007) confirmed that schools with higher socioeconomic status integrated technology much more quickly because teachers are confident that students have better access to computers at home. Therefore, they can finish their homework, which requires technology.

As seen from the findings of the aforementioned studies, comfort level with technology and professional development regarding the effective use of technology in the classroom is critical. Each study highlighted that teachers who hold positive beliefs about technology's role in education, receive adequate training and support, and possess a comfortable rapport with computers are likelier to integrate technology into their teaching practices. Additionally, the impact of socioeconomic factors and the differing outcomes were notable aspects highlighted in the relevant literature.

1. Methodology

This quantitative study utilized secondary data, allowing the researcher to gather necessary information efficiently, without the months or years typically required for primary data collection, and while also saving costs, as the researcher accessed available data public. Specifically, the Fast Response Survey System (FRSS): Teachers' Use of Educational Technology in U.S. Public Schools, created by the United States Department of Education, Institute of Education Sciences, and National Center for Education Statistics. It was conducted from 2008-2009. This survey included 3,159 eligible teachers who completed the survey by web, mail, fax, or telephone. Over 200 variables were included in this survey. The survey asked respondents to provide information on the use of educational technology in schools. The level of measurement for these variables was nominal and scale.

To address the research questions, the present study used a chi-square statistical test and an ANOVA test to examine a possible relationship between those categorical (nominal) variables: the frequency with which teachers or their students use computers during instructional time in their classroom, the years of

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elementary/secondary teaching experience, the community type, and the number of computers brought into the classroom that have internet access.

There were three null hypotheses: (1) there was no relationship between teachers or their students in using computers during instructional time in the classroom and the years of elementary/secondary teaching experience; (2) there was no relationship between teachers or their students in using computers during instructional time in the classroom and the community type; and) 3) there was no difference in the number of computers brought into the classroom that has internet access based on the community type. The alpha level of 0.05 was used.

2. Results and Discussion

The first research question aimed to examine a relationship between teachers or their students' using computers during instructional time in the classroom and the years of elementary/secondary teaching experience. The chi-squared test resulted in a more significant value ($\chi 2$: 25.461) than the critical value ($\chi 2$ critical value: 21.026); therefore, the null hypothesis was rejected, and the Cramer's V (.052) showed a significant effect. Thus, the relationship between teachers or their students using computers during instructional time in the classroom and the years of elementary/secondary teaching experience was strongly related (See Table 1).

Table 1

Frequency of Computer Use During Instruction by Years of Teaching Experience

Frequency of Use	3 or Fewer Years	4-9 Years	10-19 Years	20 or More Years	Total
Not available	24	84	113	115	336
Rarely	168	308	384	140	1000
Sometimes	421	595	532	213	1761
Often	104	130	86	31	351
Total	717	1117	1115	500	3159

Note. χ^2 (12, N = 3159) = 25.46, p = .013.

This finding supports previous research on teachers' perceptions of using computers. Cope and Ward (2002) found that experienced teachers with little or no professional development in using technology in the classroom were less likely to use

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it and less likely to see the benefit of technology usage. On the other hand, this study's result contrasted with Gray et al.'s (2010) study that found all public schools in the U.S. had at least one instructional computer with Internet access, and 91% of these computers were utilized for teaching purposes. This means that although using computers in the classroom was essential, it was not connected with the years of teachers' experiences. Using computers in the classroom may also be related to other instructional purposes instead of the years of teachers' experiences. This contradiction might have happened because the data of this study was secondary data that had been collected many years ago.

The second research question examined a relationship between teachers or their students' using computers during instructional time in the classroom and the community type. The chi-squared test resulted in a lower value ($\chi 2$: 9.415) than the critical value ($\chi 2$ critical value: 21.026); therefore, the null hypothesis failed to be rejected, and Cramer's V (.032) showed a weak effect. Thus, there was no relationship between teachers' or their students' use of computers during instructional time in the classroom and the community type (See Table 2)

Table 2
Frequency of Computer Use During Instruction by Community Type

Computer Use Frequency	City (n=877)	Suburban (n=827)	Town (n=762)	Rural (n=693)	Total (N=3159)
Not available	42	38	39	41	160
Never	72	65	78	63	278
Rarely	123	115	108	119	465
Sometimes	199	187	192	177	755
Often	441	422	345	393	1601
Total	877	827	762	693	3159

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The result of this study agreed with Gray et al. (2010), who found there was no relationship between the teachers who used computers in the classroom and the community type because the study found that 100 % of public schools in the U.S. had one or more instructional computers with Internet access. Although Mueller et al. (2008) identified six variables that discriminate teachers who fully integrate computers in the classroom and Gilakjani (2013) examined five factors that could

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enhance teachers' use of the computer, both these studies did not connect the community type with teachers' use of computers in the classroom.

The third research question examined whether there was a difference in the number of computers brought into the classroom with internet access based on the community type. A one-way ANOVA was conducted to compare the effect of community type on the number of computers brought into the classroom with internet access. There was a significant effect of community type on the number of computers brought into the classroom with internet access ($F(3, 3155) = 3.097$, $p < .05$). The test results showed a significant difference between city and suburban schools regarding the "Total computers that can be brought into the classroom" variable. Post hoc tests are conducted after a statistically significant ANOVA result to pinpoint which group means differ significantly (see Table 3).

Table 3

Post Hoc Tests Comparing Community Types on Classroom Technology Measures

Dependent Variable	Comparison	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
Number of Computers	City-Town	-0.028	0.334	1.000	[-0.89, 0.83]
	City-Rural	-0.057	0.340	0.999	[-0.93, 0.82]
	Suburban-City	0.028	0.334	1.000	[-0.83, 0.89]
	Suburban-Town	0.000	0.339	1.000	[-0.87, 0.87]
	Suburban-Rural	-0.029	0.345	1.000	[-0.91, 0.85]
Internet Access (Yes/No)	City-Suburban	-0.096	0.309	0.990	[-0.89, 0.70]
	City-Town	0.072	0.314	1.000	[-0.74, 0.88]
	City-Rural	-0.171	0.320	0.998	[-1.00, 0.66]
	Town-City	-0.072	0.314	1.000	[-0.88, 0.74]
	Town-Suburban	-0.168	0.318	0.998	[-0.99, 0.65]

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العدد (117) فبراير 2025

Dependent Variable	Comparison	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
	Town-Rural	-0.243	0.325	0.984	[-1.08, 0.60]
	Rural-City	0.171	0.320	0.998	[-0.66, 1.00]
	Rural-Town	0.243	0.325	0.984	[-0.60, 1.08]
	Rural-Suburban	0.075	0.331	1.000	[-0.78, 0.93]

Note. Tukey HSD post hoc tests were conducted following a significant ANOVA.

The analysis also revealed that the mean number of computers brought into classrooms with internet access differed significantly between suburban and town areas compared to city and rural areas. This finding was supported by the 95% confidence interval, which demonstrated that the actual population difference for these comparisons does not include zero, indicating a reliable mean difference. Figure 1 illustrates the average percentage of computers with internet access in high school classrooms across various community types (City, Suburban, Town, and Rural). The y-axis represents the average percentage (ranging from 7.5 to 9.5), while the x-axis displays the community types. Suburban schools showed the highest percentage of computers with internet access (slightly above 9.5), followed by Rural schools (nearly 8.5) and City schools (just below 8.5). Town schools had the lowest percentage of internet-connected computers (just below 8.0). These findings highlight a disparity in internet accessibility among different community types, emphasizing a digital divide between suburban and town schools.

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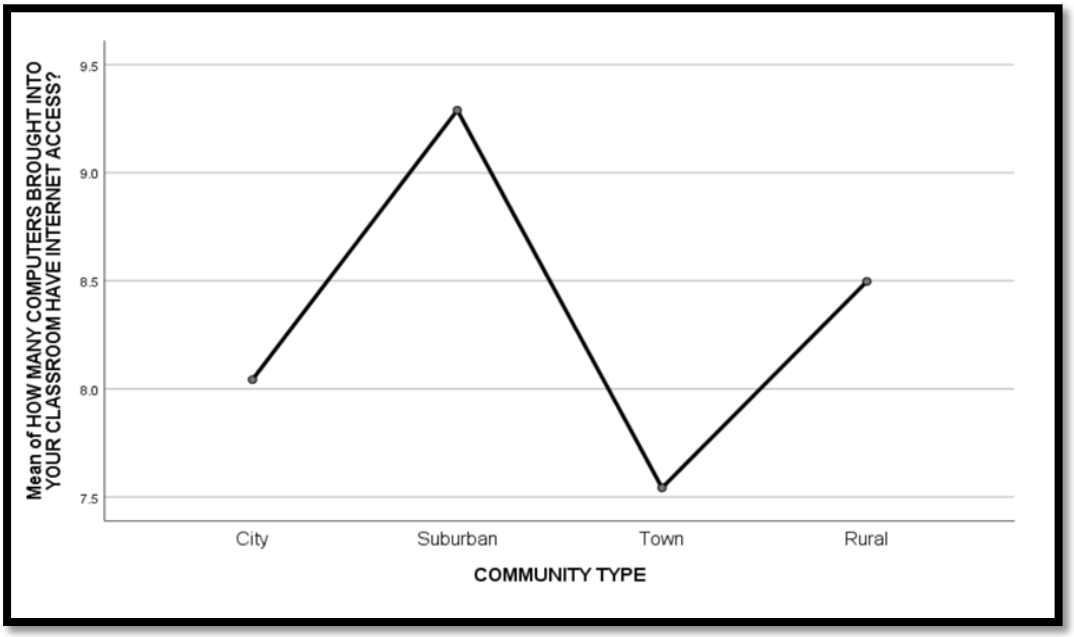
Figure 1
Mean Differences



These findings are aligned with the results of Warschauer's (2007) study, which found that the higher socioeconomic status schools integrated technology much more easily because teachers are confident that students have better access to computers at home and, therefore, that they can finish their homework, for which technology is necessary. In addition, Clark (2000) found that teachers teaching in an urban middle school believed that technology is an integral part of educating their students and that there is a need for more technology in their classrooms.

3. Limitations and Recommendations for Future Research

The results of our study must be considered in light of certain limitations. One limitation is that the researcher used a data set that she did not collect herself, which means she cannot ensure precision in data collection. Another limitation concerning the data collection method is that the results relied on self-reporting from teachers. Self-report can be unreliable and is subject to social desirability bias. Therefore, more objective test instruments for assessing teachers' skills may provide a more accurate picture. Future research could focus on evaluating technology-related teaching skills using more objective test instruments. Additionally, the results of this study may be affected by selection bias, as teachers with sufficient basic digital skills and/or technology-related teaching skills were likely more inclined to participate than those without these skills. Furthermore, the sample of 3,159 eligible teachers may not accurately represent all teachers in the United States.

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Therefore, the researcher makes some recommendations for future research. First, future research should look into gender differences in teachers' use of computers or other technologies available in classrooms. It is important to study how teachers and students interact while using computers during lessons and how this affects students' academic success. Research could explore different teaching styles and support levels from teachers to see how they influence students' technology use. Future research should consider how a student's background affects computer access and academic success. Comparing schools in different socioeconomic areas can reveal challenges some students face in using technology for learning. It would also be valuable if future research focused on how well teacher training prepares them to use technology effectively in their classrooms. Studies could compare students' success based on the types of training teachers receive. By exploring these topics, future studies can help us understand technology use in education and its effect on student success.

4. Conclusion

This study highlights the critical role of computers in the educational landscape and presents a nuanced understanding of teachers' perceptions regarding their use in classrooms. The findings demonstrate a significant relationship between teachers' years of experience and students' engagement with computers during instructional time. This indicates that more experienced educators may utilize technology differently than their less experienced counterparts. Conversely, the lack of a relationship between computer usage and community type suggests widespread access to technology across various settings. However, the effective integration of such resources may still vary based on individual teaching practices rather than environmental factors.

Moreover, the discrepancy in the number of computers with internet access relative to community type underscores the importance of continued investment in educational technology infrastructure, particularly in under-resourced areas. As educational institutions continue to evolve with technological advancements, this study reinforces the need for ongoing professional development and strategic support to empower teachers in maximizing the potential of computers as pedagogical tools. Ultimately, fostering positive attitudes toward technology among educators is paramount. Schools must prioritize the availability of technological resources and the adequate training and support necessary to create an enriching learning environment. Enhancing teachers' comfort and proficiency with computers will likely improve educational outcomes and prepare students to thrive in an increasingly digital world.

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