

Technology Knowledge and Teaching Experience Relationship, Key Points to Meet the Standards.

Allison Mecabe
Marlon Small
Bradley Fitzgerald
Elsa-Sofia Morote

Dowling College
United States
morotee@dowling.edu

Abstract

The purpose of this study was to investigate the relationship between public high schools teachers' knowledge of technology, measured by three components; 1) operations, concepts, and productivity; 2) lesson planning, teaching, and evaluation; 3) social, ethical, legal, and human issues; and teachers' years of experience. Three hundred eighty-eight high school teachers from Long Island completed the survey. A correlation was used to analyze the relationships of three components and teachers' years of experience. The findings showed that teachers who had less years of teaching experience in the education field were more knowledgeable about the different knowledge of technology components. In addition, in order to identify areas for professional development the researchers analyzed the relationships of each item from each of the 3 components of knowledge of technology and years of experience. The study also gives valuable information of areas for professional development and training in meeting the state standards.

a. Purpose

Over the last few years, schools have increasingly invested in computer-based technologies. The reasons behind the increased investment was supported by the notion that technology will not only improve teaching and learning outcomes, but will also help to better prepare our students for a society that is moving rapidly down the information super highway. As schools increased their technology budgets, critics have, however, countered that teachers are not making effective use of the technology. The critics claim that this has had the effect of reducing the impact that technology has on student learning (Russell, Babell, O'Dwyer, and O'Connor, 2007).

Since 1994, the National Center for Education Statistics (NCSE) has documented the large increase in access to computers and the Internet in the nation's public elementary and secondary schools (U.S. Department 2000). These increases have led to a need to understand the extent and types of teachers' perceptions of their own preparedness to use these tools in the class.) In 2007 Fitzgerald analyzed NETS standards and the six standards were reduced by factor analysis to three components of knowledge: 1) operations, concepts, and productivity; 2) lesson planning, teaching, and 3) evaluation; and social, ethical, legal, and human issues. The purpose of this study was to investigate the relationship between public high schools teachers' knowledge of technology based on NETS standards and as reduced by Fitzgerald. The study also gives valuable information of areas for professional development and training in meeting the state standards.

b. Perspective

Over the last decade, there has been substantial research that has examined teachers' use of technology for instructional purposes. One such study is the Use, Support, and Effect of Instructional Technology (USEIT) of 2001. According to Russell, Babell, O'Dwyer, and O'Connor (2007), the study

examined the patterns of technology use by teachers who have been teaching over varying periods of time. The study explored the use of technology by 2,864 Massachusetts teachers from grades K through twelve in four different areas. These areas were the teachers' use of technology for delivering instruction, the teachers' use of e-mail for professional purpose, the teachers' use of technology for preparation, and the teachers directed students to use technology during class time.

The results of the study indicated that teachers who had been teaching from three to five years, six to ten years, and eleven to fifteen years had the highest mean technology use in the area of directing students to create products using technology. In the area of "teachers direct students to use technology during class time", Russell, Babell, O'Dwyer, and O'Connor reported that teachers who had been at their school for one year or less did not direct their students to use technology during class time, while teachers who had been teaching between eleven and fifteen years most frequently directed their students to use technology during instructional time (2007). It was the authors' contention that a teacher's tenure in a building affected their use of technology as they got to know the building culture, and become acquainted with the school's technological resources and plan. The report also indicated that teachers who had been in the profession between six and ten years and was in their current building for over three years had the most frequent mean e-mail use for professional purposes. Teachers who had been in the profession for between six and ten years and who had only been in their building for less than one year had the highest mean for the most frequent use of technology for preparation.

Despite the popular belief that teachers who are new to the profession would be more inclined to deliver instruction through the use of technology, the results of the study indicated differently. According to Russell, Babell, O'Dwyer, and O'Connor, the study indicated that teachers who had been in the field for between eleven and fifteen years and had been in their present building for three to five years were most likely to deliver instruction through the use of technology.

Rowand (2000) looked at a National Center for Education Statistics survey and found that newer teachers were more likely to use computers or the internet. Elementary teachers were more likely than secondary teachers to assign practice drills using computers and to have their students use computers or the Internet to solve problems; but secondary school teachers were more likely to assign research to be completed on the computer. The survey found that 99% of full-time regular public school teachers reported they had full access to computers or the Internet somewhere in their school.

Newer teachers were more likely to use the computer or Internet; Sixty-six percent reported using computers or the Internet for instruction during class time. Forty-one percent reported assigning students work that involved computer applications such as word processing or spreadsheets to a moderate or large extent; 31% reported assigning practice drills, and 30% reported assigning research using the Internet to a moderate or large extent; 31% reported assigning practice drills, and 30% reported assigning research using the Internet to a moderate or large extent. (Rowand, 2000, pg. 1).

Joycelin Palacio-Cayetano, Stephanie Schmier, Sara Dexter and Ron Steven (2002), conducted a study that consisted of 67 pre-service and 67 in-service teachers' performances on computer-based scenarios, promoting instructional decision-making and using embedded assessment. This study illustrated the differences in how experienced and novice teachers made technological integration decisions. Teachers who were trained in in-services addressed significantly more key elements of technology integration. In-service teachers also make technology a learning tool and feel that there is substantial importance in professional development.

All teachers earn degrees and are licensed through teacher preparation programs that are accredited by the National Council for Accreditation of Teacher Education Programs (NCATE). To ensure that teachers are educated in technology, NCATE receives recommendations and guidelines from the International Society for Technology in Education (ISTE), (NETS, 2006).

The six standard areas with performance indicators listed also provide guidelines for teachers currently in the classroom. The standards are technology operations, and concepts; planning and designing learning environments and experiences; teaching, learning, and the curriculum; assessment and evaluation; productivity and professional practice; and social, ethical, legal, and human issues. Fitzgerald (2007) developed a survey to analyze (among others) teacher knowledge of technology based on these standards.

c. Data Sources

Data was taken from a large study conducted by Bradley Fitzgerald (2007). The original survey taken from Fitzgerald (2007) is divided into five sections. Items measuring teacher knowledge of technology were based on six dimensions as determined by the NETS. These six dimensions included: technology operations and concepts, planning and designing learning environments and experiences; teaching, learning, and the curriculum; assessment and evaluation; productivity and professional practice; social, ethical, legal, and human issues. After factor analysis this was reduced to schools teachers' knowledge of technology, such as operations, concepts, and productivity; lesson planning, teaching, and evaluation; and social, ethical, legal, and human issues. The survey utilized a five-point Likert scale for questions 1 through 43. Participants were asked to circle the number that best corresponded to their level of agreement with each item based upon the following scale: (1) Strongly disagree, (2) Disagree, (3) Somewhat agree, (4) Agree, and (5) Strongly Agree.

Fitzgerald's study was performed on nine public high schools in Nassau and Suffolk counties on Long Island. These school districts have no association with the New York City school system. Teachers limited their survey responses to reflections on the 2005-2006 school year. Three hundred thirty-eight teachers completed and returned the surveys, resulting in a 31 percent rate of return. The nine schools had various-sized populations.

The majority of participants were Caucasian (91 percent) and female (69 percent). They taught under various licensels with a broad distribution among English, Social Studies, Mathematics, Science, Foreign Language, Physical Education, Special Education, and English as a Second Language. Teacher age ranged from 23 to 62 years old with a median age of 42.

d. Methods

To answer the research question: What is the relationship between teachers' years of experience and their knowledge of technology? A correlation analysis was conducted to analyze the relationship between teachers' years of experience and their knowledge of technology. In addition, we analyzed the items of the three knowledge components and its relationship with the number of years of experience that teachers have. Then we identified areas of training and made recommendations for professional development.

e. Results

The study identified the relationships of public high school teachers' knowledge of technology, operations, concepts, and productivity, lesson planning, teaching and evaluation, and social, ethical, legal and human issues, and teachers' years of experience.

Table 1:
Relationship of Teachers Years of Experience and Their Knowledge of Technology

Correlations

		lesson plan, teach and evaluation	technology operations, productivity and concepts	social, ethical, legal and human issues	teachy ears
lesson plan, teach and evaluation	r p N				
technology operations, productivity and concepts	r p N	.614** .000 269			
social, ethical, legal and human issues	r p N	.553** .000 264	.494** .000 291		
teachyears	r p N	-.171** .006 260	-.307** .000 293	-.152** .009 294	

** . Correlation is significant at the 0.01 level (2-tailed).

Table 1 presents the correlation of teachers' years of experience and their knowledge of technology. The teachers with more experience have less knowledge with technology operations, productivity and concepts. Lesson planning, teaching, and evaluation ($r = -.171$, $r^2=.029$), technology, operations, productivity and concepts, ($r = -.307$, $r^2=.094$), and social, ethical, legal, and human issues ($r = -.152$, $r^2=.023$).

Table 2:
Areas in Need of Training: Technology, Operations, Concepts, and Productivity

Technology Operations, Concepts, and Productivity		Correlation	Years of Teaching	rsq (%)
Q1.demonstrate continuous growth in computer technology to stay abreast of current technologies.	r	-0.16		2.55
	p	0.00		
Q3. I know and use Excel and spreadsheet.	r	-0.26		6.92
	p	0.00		
Q4. I use digital camera and download.	r	-0.29		8.39
	p	0.00		
Q5. I make learning technology ongoing practice.	r	-0.19		3.55
	p	0.00		
Q6. I bookmark and save to favorite places.	r	-0.14		1.92
	p	0.01		
Q23. I use computer, PDA to organize professional life.	r	-0.05		0.27
	p	0.36		
Q27. I create folders on computer to organize, archive and update teacher activity.	r	-0.31		9.39
	p	0.00		
Q28. I create folders on email to organize, archive and update teacher activity.	r	-0.22		4.79

In order to identify areas of training we presented Table 2, 3, and 4. Table 2 shows important areas for professional development, especially for teachers with years of experience teaching nontraditional classes, but insufficient knowledge in the uses of technology. Table 2 shows the needs of training in all NETS areas, especially:

Question 27: I create folders on computers to organize, archive, and update teacher activity.

Question 4: I use a digital camera and download photographs.

Question 3: I know and use Excel and spreadsheets.

**Table 3:
Lesson Planning, Teaching, and Evaluation**

		Teacher Years of Experience	rsquare (%)
Q7. I plan for computers in my lessons.	r	-0.22	4.66
	p	0.00	
Q8. I identify and locate tech resources and evaluate for lessons.	r	-0.25	6.21
	p	0.00	
Q9. I reserve lab and ensure software for lesson planning.	r	-0.18	3.35
	p	0.00	
Q10. I plan for technology for diverse needs of students.	r	-0.20	4.07
	p	0.00	
Q12. I apply research on technology in lesson planning.	r	-0.16	2.54
	p	0.01	
Q13. Classes use computers for standards-based projects.	r	-0.07	0.48
	p	0.23	
Q14. I use computers to write or map curriculum.	r	-0.18	3.29
	p	0.00	
Q15. I use search engines and Internet to develop critical thinking skills in students.	r	-0.17	2.83
	p	0.00	
Q16. My curriculum involves learning with computer technology.	r	-0.12	1.48
	p	0.03	
Q17. Students use hypermedia to create and present digital projects or portfolios.	r	-0.06	0.36
	p	0.30	
Q19. I use technology to collect, correct and return assignments.	r	-0.06	0.33
	p	0.32	
Q20. I use computers to assess students.	r	-0.04	0.14
	p	0.51	
Q21. I assess student use of technology for their assignments.	r	-0.06	0.34
	p	0.32	
Q31. I use computer to demonstrate consideration and respect.	r	0.00	0.00
	p	0.99	

**

Correlation is significant at the 0.01

level (2-tailed).
Correlation is significant at the 0.05 level (2-tailed).

*

Based on Table 3 we highly recommend focused training in:
Question 7: I plan for computers in my lessons.
Question 8: I identify and locate technological resources and evaluate for lessons.
Question 10: I plan for technology for diverse needs of students.

Table 4:
Social, Ethical, Legal and Human

Social, Ethical, Legal and Human Issues		Number of Year of Teaching experience	rsquare (%)
Q29. I am versed in cyber ethics.	r	-0.18	3.21
	Sig. (2-tailed)	0.00	
Q30. I use software for which I am licensed or that I purchased.	r	-0.03	0.12
	Sig. (2-tailed)	0.55	
Q31. I use computer to demonstrate consideration and respect.	r	0.00	0.00
	Sig. (2-tailed)	0.99	
Q33. I understand social issues with technology.	r	-0.16	2.48
	Sig. (2-tailed)	0.01	
Q34. I understand copyright and fair use regarding sharing, downloading	r	-0.11	1.29
	Sig. (2-tailed)	0.05	

Table 4 shows that there is a negative correlation between teachers' years of experience and their knowledge of social, ethical, legal, and human issues with technology. We will recommend that teachers with more experience get professional development on cyber ethics, social issues related to the use of technology and how teachers use computers to demonstrate consideration and respect.

f. Educational Importance of the Study

The results of this study indicated that teachers with more years of experience in the education field are less likely to integrate technology into their classroom. In order to facilitate the integration of technology into the classrooms districts will have to invest in technological hardware and software. They will also have to invest in professional development opportunities, so that the teachers feel more comfortable when integrated and utilizing technology in their classrooms. Over the years schools have invested a tremendous amount of computer resources and the development of technological plans and it is pertinent that the schools make sure that the teachers are utilizing the technology and are aware of how to appropriately utilize all of the components in their classrooms. Professional development for experienced teachers should focus on the following items:

A) Ethics

- cyber ethics,
- understanding social issues with technology

B) Technology Operations, productivity, and concepts

- how teachers create folders on their computers to organize, archive, and update their teacher-related activities,
- how teachers create folders on their e-mail accounts to organize, archive, and update professional activities.

- lesson planning, teaching, and evaluation,

- how they identify and locate technology,

C) Lesson planning, teaching, and evaluation

- how teachers plan for technology in lessons,
- how teachers use technology to meet the diverse needs of students in the classroom,

- introducing teachers to the social use related to technology, and
-we can continue focusing on the teachers' strength of how they use computers to demonstrate consideration and respect for others.

Future qualitative studies should be conducted examining why experienced teachers have fear about their usage of technology in the classroom. Teachers have to be involved in professional development choices, so that they will feel empowered to be apart of the integration of technology into their curriculum. A review of related literature suggests that teacher's tenure in a building affected their use of technology as they got to know the building culture, and become acquainted with the school's technological resources and plan (Russell, Babell, O'Dwyer, and O'Connor, 2007).

Since the 2000 study by Rowand, things have not change. We also found that newer teachers are more knowledgeable with technology. Experiences teachers need intense training in order to meet the state standards.

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