Assessing the National Educational Technology Standards and Performance Indicators for Teachers in Two Senior High Schools in Ghana

John F. K. Ekpe (PhD)

Accra Technical University, Ghana, johnfekpe@gmail.com

Abstract

The recent change in education is the integration of information and communication technology (ICT) into the classroom. The purpose of this study was to assess and determine how teachers from two senior high schools differed in the use of ICT to improve teaching and learning processes in their classrooms of the Greater Accra and Western regions of Ghana. Purposive sampling technique was used to draw the two regions of Ghana. Thirty teachers participated in this study, 15 each were purposively selected from two senior high schools of the two regions. Data collecting instrument was the Technology Assessment Questionnaire (TAQ), which was developed from the National Educational Technology Standards and Performance Indicators for Teachers. Descriptive statistics and independent samples t-test were employed. The 0.05 level was used as the criterion for the statistical significance. Major findings of the study were: 1) teachers occasionally use ICT to facilitate and inspire their students' learning and creativity in a different ways, 2) they agreed to using ICT to design and develop digital-age learning experiences and assessments differently, 3) they occasionally use ICT to model digital-age work and learning indifferent ways, 4) they rated their competency as medium in the use of ICT to promote and model digital citizenship and responsibility differently, and 5) they occasionally use ICT to engage in professional growth and leadership in different ways. Recommendations were made for future research.

Keywords: Educational technology, Technology standards, Technology performance, ICT, Perception, Assessment

Introduction

Background

One of the most influential recent changes in education is the application of information and communication technology (ICT) into the classroom. ICT integration is gaining prominence in education in the world over. Researchers and professional organizations have emphasized the need and relevance of ICT integration (Chang, 2002; Giles, Shaw, and Baggett, 2003; Hare, Howard, and Pope, 2002; Lund and Runyon, 2002; Runyon and Lund, 2000; Shelly, Cashman, Gunter, and Gunter, 2006; Wepner, Tao, and Ziomek, 2003), teacher preparation towards ICT integration into teaching and learning (Beach and Franklin, 2002; Franklin, 2004; Goetze and Stansberry, 2003; Mehlinger and Powers, 2002; Murphy, Richards, Lewis, and Carman, 2005; Shamatha, Peressini, and Meymaris, 2004; Testa, 2001), ICT use in the teaching and learning (Brzycki and Dudt, 2005; Burris and Satyanarayanan, 1999; Dodge and Molebash, 2005; Efaw, 2005; Harley and Maher, 2003; Lemon, 2005; McCarthy, 2004; Moore, 2006; Tajabadi and Ranjbar, 2006; Vannatta, Beyerbach, and Walsh, 2001; Zare-ee and Shekarey, 2010; Zarei-Zavaraki, 2002), and ICT assessment (Byers, 2001; Gustafson and Kors, 2004). The aim of this study was to examine and compare whether teachers from two senior high schools differed in the use of the forms of ICT to improve teaching and learning processes in their classroom settings. These forms of ICT include productivity tools, presentation tools, communication tools, and World Wide Web tools.

ICT has several advantages. According to Shelly et al. (2006), integrating ICT encouraged students to see and experience more clearly; to assemble their thoughts in words and in sounds, color, and animations. Brandsford, Brown, and Cocking (2000, as cited in Zare-ee and Shekarey, 2010) referred to five very important roles that ICT could play in education as: 1) bringing the real-world experiences into the classroom; 2) providing scaffolding that allowed learners to participate in complex cognitive tasks; 3) increasing opportunities to receive sophisticated and individualized feedback; 4) building communities of

interaction between teachers, students, parents, and other interested groups; and 5) expanding opportunities for teacher development.

Notwithstanding the advantages that ICT brings to the teaching and learning, there are some disadvantages. According to Tajabadi and Ranjbar (2006) some of the main disadvantages of the use of ICT in academic setting are: 1) a lot of time and energy for learning how to use ICT effectively, 2) the distraction from actual learning targets, 3) the negative effects of the myths around the teaching and learning in computerized classroom, 4) increasing individualized learning and creating isolation, 5) very difficult measuring the effectiveness of practices, 6) limited computer access, 7) difficult getting intelligent feedback from computers, 8) suitable for some communication skills, 9) negatively changing teacher's roles, and 10) frequent crashing of computers. Other disadvantages are problems in infrastructures, lack of training, and weak technical support. Some preventive factors are the lack of time, software, hardware, keyboarding skills, knowledge of available ICT resources, and unavailability of computer laboratories and computer laboratory technicians. Other negative factors individual perceived are that ICT is frustrating, that ICT changes are too fast, and that ICT is ineffective. From the perspective of students and non-teaching staff, ICT has inadequate computers to use and insufficient knowledge and skills of teachers (Zare-ee and Shekarey, 2010).

Despite these advantages and disadvantages of the use of ICT in education, different teachers and different institutions demonstrated varying amounts and patterns of ICT use. The question now is, how the ICT is used, and is the ICT used in a manner so as to encourage learning? Teacher education programs need to train teachers to acquire essential 21st century ICT skills (Davies, 1997; Shelly, Cashman, Gunter, and Gunter, 2006). Snelbecker (1999, as cited in Zare-ee and Shekarey, 2010) argued that the uses and influences of ICT in instruction, education, or training issues were important. Wepner, Tao, and Ziomek (2003) also argued that "if teacher education programs hope to keep up with the changes that are occurring as result of new digital society, then it is important that we take a closer look at the role that ICT can have in transforming teacher preparation" (p. 72).

In Iran, Zarei Zavaraki (2002) investigated the use of ICT in various institutions. Yaghoobi (2001, as cited in Zare-ee and Shekarey, 2010) studied factors affecting the use of ICT for research and instruction among faculty, the use of ICT for research and instruction among faculty members and postgraduate students. Yaghoobi found that: 1) there was a significant effect on the amount of ICT use for perceived complexity of ICT, 2) there was no significant effect on the amount of ICT use for perceived adaptability of ICT to teaching and learning situations, 3) there was a significant effect on the amount of ICT use for positive attitude toward the advantages of ICT, 4) there was a significant effect on the amount of ICT use for perceived testability of teaching and learning through ICT, and 5) proficiency in English as a foreign language was a very effective factor that influenced the amount of ICT use.

According to Deal, Purinton, and Weston (2009) teachers interactively cooperated through ICT with other teachers and this way realized partnership cooperation. They communicated through the Internet, intranet, e-mail, forums, web pages, and demonstrated different opinions, views and aspects. They exchanged various works and so simplified their administrative work.

In Ghana, the integration of ICT into the teaching and learning is still ongoing and much has to be done in the training of teachers on forms of ICT integration. The National Educational Technology Standards and performance indicators for teachers (NETS-T) are formulated to serve as an international guide for all teachers to comply. Even though some researchers had expressed doubts regarding the effectiveness of ICT; Kozma (as cited in Zare-ee and Shekarey, 2010) agreed that ICT could be used effectively as a tool for teaching and learning. Bruce and Levin (2010, as cited in Zare-ee and Shekarey, 2010) suggested that ICT could be helpful in classroom settings, encouraging inquiry, helping communication, constructing teaching materials, and assisting students' self-expression. The question is, are teachers effectively using forms of ICT in the classroom settings to support and improve students' learning?

Purpose of the Study

The purpose of this study was to assess and determine how teachers from two senior high schools differed in the use of ICT to improve their teaching and learning processes in the classrooms of the Greater Accra and Western regions of Ghana.

Research Questions

The research questions that were asked by the researcher were:

1. How do teachers differ in the use of ICT to facilitate and inspire their students' learning and creativity in the two senior high schools in the two regions of Ghana?
2. How do teachers differ in the use of ICT to design and develop their digital-age learning experiences and assessments in the two senior high schools in the two regions of Ghana?
3. How often do teachers use ICT to model their digital-age work and learning in the two senior high schools in the two regions of Ghana?
4. To what extent do teachers use ICT to promote and model digital citizenship and responsibility in the two senior high schools in the two regions of Ghana?
5. How often do teachers use ICT to engage in their professional growth and leadership in the two senior high schools in the two regions of Ghana?

Methods

Research Design

This study was a descriptive study and the design used was a descriptive survey design.

Population and Sampling

This study was carried out in two senior high schools (A and B) in the Greater Accra (GAR-A) and Western regions (WR-B) of Ghana. Participants were teachers drawn from two senior high schools in the two regions. Purposive sampling method was used to select teachers who used ICT in some way to teach and enhance their personal development. Thirty teachers participated in this study, 15each were from the two senior high schools of the two regions.

Procedure for Collecting Data

The researcher visited the project site, introduced himself to the head of the school, and described the purpose of his visit and the project. The following day the researcher gave an URL of the web-based questionnaire to those teachers who liked to respond online and a paper-based questionnaire to other teachers to complete. A day later, the questionnaires were collected. The responses were analysed using the computer SPSS and Microsoft Excel. Tests for differences in teachers' perceived mean scores in the two senior high schools were conducted at .05 levels of significance.

Instrumentation

Technology Assessment Questionnaire (TAQ) questionnaire was used as a main instrument for data collection in this study. This survey instrument consisted of 35 items out of which 29 were developed from the National Educational Technology Standards and Performance Indicators for Teachers. The process of selecting appropriate statements for the construction of the technology assessment questionnaire involved broad and specific areas. These included: facilitating and inspiring student learning and creativity, designing and developing digital-age learning experiences and assessments, modelling digital-age work and learning, promoting and modelling digital citizenship and responsibility, and engaging in professional growth and leadership of the teachers.

Table 1: Item Analysis

Technology Standards	Item Number	Numbering	Cronbach's Alpha
Facilitate and inspire student learning and creativity	6	7-12	.73
Design and develop digital–age learning experiences and assessments	6	13-18	.61
Model digital-age work and learning	6	19-24	.62
Promote and model digital citizenship and responsibility	4	25-28	.62
Engage in professional growth and leadership	7	29-35	.80

Overall	29	7-35	.80

Responses to the questionnaire items were made on a three-point and a five-point Likert liked scales. Statements 7-12, 19-24, and 29-35 were scored as follows: Very often carried 5 points, often, 4 points, occasionally, 3 points, rarely, 2 points, and Not at all, 1 point. Statements 13-18 were scored as strongly agree weighted 5 points, agree, 4 points, neutral, 3 points, disagree, 2 points, and strongly disagree, 1 point. The range of the mean score response was from 5 to 1, with 5 depicting the most positive response or the highest degree of non-occurrences or disagreement. Statements 25-28 were scored as follows: High carried 3 points, Medium, 2 points, and Low, 1 point. The range of the mean score response was from 3 to 1 indicating the most positive response. The questionnaire was pilot tested and its reliability coefficient was 0.80 Cronbach's alpha.

Interpretive Scales

The interpretive scales for the teachers' mean scores to the questionnaire items were based on a three-point and a five-point Likert liked scales. Statements 7-12, 19-24, and 29-35 had average scores as follow: Very often carried 5.4-4.5 points, often, 4.4-3.5 points, occasionally, 3.4-2-5 points, rarely, 2.4-1.5 points, and Not at all, 1.4-0.5 points. Statements 13-18 were scored as follow: strongly agree, 5.4-4.5 points; agree, 4.4-3.5 points; neutral, 3.4-2.5 points; disagree, 2.4-1.5 points; and strongly disagree, 1.4-0.5 point. The range of the mean score response was therefore, from 5 to 1, with 5 depicting the most positive response or the highest degree of non-occurrences or disagreement. Statements 25-28 had average scores as follows: High carried 3.4-2.5 points, Medium, 2.4-1.5 points, and Low, 1.4-0.5 point.

Results

The data were examined using summary descriptive statistics; the means and standard deviations were reported. This descriptive data served as a basis for answering the research questions 1, 2, 3, 4 and 5. Each respondent's perceived total score for each category was found. The category perceived score of each respondent was computed summing the scores of the items for that category. The inferential statistics, independent samples t-test was used to determine the difference in the perceived mean scores between the teachers' perceived ICT practices in the two senior high schools in the Greater Accra and Western regions of Ghana. The five percent alpha level was used as the criterion for statistical significance.

Facilitating and Inspiring Student Learning and Creativity

The mean ICT usage scores and standard deviations of the teachers on the facilitating and inspiring their students' learning and creativity are shown in Table 2. From Table 2, the mean responses for items 7, 8, 9, 10 and 11suggest that teachers in the two schools perceived that they occasionally used ICT to facilitate and inspire their students learning and creativity. However, the mean responses for item 12 suggest that teachers at WR-B rarely perceived that they used ICT to facilitate and inspire their students' learning and creativity; whereas teachers at GAR-A occasionally perceived that they used ICT to facilitate and inspire their students' learning and creativity. The consensus on this category was that both teachers occasionally perceived that they used ICT to facilitate and inspire their students' learning and creativity. From Table 7, it can be seen that there was a statistically significant difference in the teachers' perceived mean scores of ICT usage in the two schools ($t = 22.25$; $df = 29$; $p < 0.05$). This means that the ways teachers in the two schools perceived they used ICT to facilitate and inspire their students' learning and creativity was not the same.

Designing and Developing Digital–Age Learning Experiences and Assessments

Using summary descriptive statistics, the perceived ICT usage mean scores and their standard deviations on designing and developing digital-age learning experiences and assessments are shown in Table 3. Table 3 shows that the teachers' perceived mean responses for items 13, 14, 15, 16, and 17 suggest that both teachers at the two schools perceived that they agreed to use ICT to design and develop digital-age learning experiences and assessments. However, the teachers' perceived mean responses for item 18 suggest that teachers at WR-B perceived that they agreed to use ICT to design and develop digital-age learning experiences and assessments, whereas teachers at GAR-A strongly perceived that they agreed to use ICT to design and develop digital-age learning experiences and assessments. This implies that both teachers in the two regions perceived that they agreed to use ICT to design and develop digital-age learning experiences and assessments. Table 7 revealed that there was a statistically significant difference

in the teachers' perceived mean ICT usage scores, ($t = 45.01$; $df = 29$; $p < 0.05$). This means that the ways teachers in the two schools perceived they used ICT to design and develop digital-age learning experiences and assessments were different.

Modelling Digital-Age Work and Learning

Using summary descriptive statistics, the teachers' perceived mean ICT usage scores and their standard deviations on modelling digital-age work and learning are shown in Table 4. From Table 4, the teachers' perceived mean responses for items 19, 20, 22, 23, and 24 suggest that both teachers at the two schools occasionally perceived that they used ICT to model digital-age work and learning. However, the teachers' perceived mean responses for item 21 suggest that both teachers often perceived that they used ICT to model digital-age work and learning. The consensus on this category was that both teachers from the two schools occasionally perceived that they used ICT to model digital-age work and learning. It can be seen from Table 7 that there was a statistically significant difference in the teachers' perceived mean ICT usage scores in the two schools, ($t = 29.51$; $df = 29$; $p < 0.05$). This means that the ways teachers in the two schools perceived that they used ICT to model digital-age work and learning was not the same.

Promoting and Modelling Digital Citizenship and Responsibility

Using summary descriptive statistics, the teachers' perceived mean ICT usage scores and their standard deviations on promoting and modelling digital citizenship and responsibility are shown in Table 5. Table 5 shows that the mean responses for items 25, 26, 27 and 28 suggest that all the teachers in the two schools rated their competency as medium in the use of ICT to promote and model digital citizenship and responsibility. Table 7 reveals that there was a statistically significant difference in the teachers' rated mean ICT usage scores in the two schools, ($t = 23.58$; $df = 29$; $p < 0.05$). This means that the ways teachers in the two schools rated their competency in the use of ICT to promote and model digital citizenship and responsibility were different.

Engaging in Professional Growth and Leadership

Using summary descriptive statistics, the teachers' perceived mean ICT usage scores and their standard deviations on engaging in professional growth and leadership are shown in Table 6. From Table 6, the mean responses for items 29, 30, and 33 suggest that both teachers at the two schools occasionally perceived that they used ICT to engage in professional growth and leadership. The mean responses for items 31 and 35 suggest that both teachers in the two schools often perceived that they used ICT to engage in professional growth and leadership. However, teachers' perceived mean responses for items 32 and 34 suggest that teachers at WR-B occasionally perceived that they used ICT to engage in professional growth and leadership, whereas teachers at GAR-A often perceived they used ICT to engage in professional growth and leadership. The consensus on this category was that both teachers in the two schools occasionally perceived they used ICT to engage in professional growth and leadership. From Table 7, it can be seen that there was a statistically significant difference in the teachers' perceived mean ICT usage scores in the two schools, ($t = 32.57$; $df = 29$; $p < 0.05$). This means that the ways teachers in the two schools perceived they used ICT to engage in professional growth and leadership were not the same.

Conclusion

The purpose of this study was to assess and determine how teachers from two senior high schools differed in the use of ICT to improve teaching and learning in their classrooms of the Greater Accra and Western regions of Ghana. The findings of this study were: teachers occasionally use ICT to facilitate and inspire their students' learning and creativity in a different ways, teachers agreed to using ICT to design and develop digital-age learning experiences and assessments differently, teachers occasionally use ICT to model digital-age work and learning indifferent ways, teachers rated their competency as medium in the use of ICT to promote and model digital citizenship and responsibility differently, and teachers occasionally use ICT to engage in professional growth and leadership in different ways. Recommendations were made for future research. The findings of this study provide additional literature supporting the role of ICT in teaching and learning.

Recommendation

The findings of this study have some recommendation for Ministry of Education, Ghana Education Service, ICT directors, educators, policymakers, teachers, and students. First, teachers should be encouraged by their heads of institutions to integrate ICT into their teaching and learning and self-

development. Second, institutions should support teachers to provide access to internet facilities, and constant electricity supply. Third, students should be encouraged to use ICT in their learning and communications. Fourth, school-community collaboration should be encouraged in the use of ICT. Fifth, teachers should engage in professional growth and leadership through ICT use. Sixth, teachers' and students' ICT usage should be made compulsory. Students should be required to do almost all their assignments online. Teachers should assess students online so that students have feedback quickly. Seventh and finally, teachers should be encouraged to do online learning to upgrade themselves instead of taking study leave to leave classroom.

Table 2: Facilitate and Inspire Student Learning and Creativity as Perceived Teachers by School

		WR-B		GAR-A		Combined	
Items	Technology Standards for Teachers	M	SD	M	SD	M	SD
7.	Apply ICT to develop students' higher order skills and promote creativity in students	3.07	1.03	2.93	1.10	3.00	1.05
8.	Manage student learning activities in a technology-enhanced environment where students' use ICT to develop other skills (social skills, team building, work-related) and develop such skills where appropriate.	2.73	0.96	3.20	1.15	2.97	1.07
9.	Encourage and guide students to explore real life issues by using web based learning resources and solve problems using appropriate digital tools	2.53	0.92	2.93	1.22	2.73	1.08
10.	Identify and use ICT resources that establish diversity and promotes learners' reflection by using collaborative tools to reveal student's conceptual understanding, thinking, planning and creative processes	2.60	1.12	3.00	0.76	2.80	0.96
11.	Identify opportunities to use ICT resources to meet specific instructional needs to facilitate students' learning	3.00	0.85	2.67	0.98	2.83	0.91
12.	Use ICT effectively to communicate and collaborate with peers, parents, and the larger community in order to engage in learning.	2.20	1.08	3.07	1.28	2.63	1.25
	Combined Mean	2.69	0.62	2.97	0.76	2.83	0.70

Table 3: Design and develop Digital–Age learning Experiences and Assessments for Teachers by School

		WR-B		GAR-A		Combined	
Items	Technology Standards for Teachers	M	SD	M	SD	M	SD
13.	Teachers are to design and adapt learning experiences that incorporate digital tools and resources to promote students learning and creativity	4.33	0.72	3.87	1.06	4.10	0.92
14.	Teachers are to develop and apply ICT resources in learning environments to enable and empower all students with diverse backgrounds, characteristics, and abilities to pursue their individual	4.27	0.80	4.33	0.72	4.30	0.75

	curiosities						
15.	Teachers are to encourage active participation of students in ICT enriched environments by adapting the constructivist paradigm	4.33	0.90	4.33	0.90	4.33	0.88
16.	Teachers are to design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of students by incorporating digital tools and resources to promote students learning and creativity	4.40	0.74	4.27	0.70	4.33	0.71
17.	Teachers are to apply ICT in assessing students' learning of subject matter using a variety of formative and summative assessment techniques aligned with content and technology standards	4.33	1.05	3.93	1.49	4.13	1.28
18.	Teachers are to use ICT resources to collect and analyze data on students' assessment, interpret results, and communicate findings to improve instructional practices and maximize students' learning.	4.40	0.63	4.60	0.63	4.50	0.63
	Combined Mean	4.35	0.48	4.21	0.57	4.28	0.52

Table 4: Model Digital-Age Work and Learning for Teachers by School

	Technology Standards for Teachers	WR-B		GAR-A		Combined	
Items		M	SD	M	SD	M	SD
19.	Demonstrate continual growth in ICT knowledge and skills to stay abreast of current and emerging technologies	3.47	1.06	3.27	1.03	3.37	1.03
20.	Constantly evaluate and reflect on professional practices to make informed decisions regarding the use of ICT in support of students' learning.	3.40	0.91	3.13	0.74	3.27	0.83
21.	Work together with colleagues to share ideas for improvement in ICT use	3.53	1.06	4.00	0.76	3.77	0.94
22.	Collaborate with students, peers, parents and community members using ICT tools and resources to support students success and innovation	3.33	0.98	3.13	1.25	3.23	1.10
23.	Communicate relevant information and ideas within subject area and across the curriculum to students, parents and peers using varied digital-age media and formats	2.87	0.99	2.87	1.19	2.87	1.07
24.	Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate and use information resources to support research and learning	2.93	1.03	2.80	1.15	2.87	1.07

	Combined Mean	3.27	0.57	3.20	0.65	3.24	0.60

Table 5: Promote and Model Digital Citizenship and Responsibility for Teachers by School

		WR-B		GAR-A		Combined	
Items	Technology Standards for Teachers	M	SD	M	SD	M	SD
25.	Responsible for advocacy, modelling, and teaching safe, legal and ethical use of ICT including respect for copyright, intellectual property and the appropriate documentation of sources	1.67	0.62	1.87	0.64	1.77	0.63
26.	Addressing the diverse needs of all students by adapting the student-centered strategies and providing equitable access to appropriate digital tools and resources	2.13	0.64	2.20	0.68	2.17	0.65
27.	Promoting and modelling digital etiquette and responsible social interactions related to the use of ICT	1.73	0.59	2.00	0.66	1.87	0.63
28.	Developing and modelling cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaborative tools	1.87	0.64	2.00	0.76	1.93	0.69
	Combined Mean	1.87	0.45	2.05	0.46	1.96	0.46

Table 6: Engage in Professional Growth and Leadership for Teachers by School

		WR-B		GAR-A		Combined	
Items	Technology Standards for Teachers	M	SD	M	SD	M	SD
29.	Participate in local and global learning communities to explore creative applications of ICT to improve students' learning	3.00	0.76	3.27	0.80	3.13	0.78
30.	Exhibit leadership by demonstrating a vision of ICT infusion	3.07	1.10	3.07	1.16	3.07	1.11
31.	Participate in shared decision making and community building	3.73	0.80	3.80	0.68	3.77	0.73
32.	Help in developing leadership and ICT skills of others	3.13	1.06	3.73	0.88	3.43	1.01
33.	Frequently evaluate and reflect on current research and professional practice to make use of existing and emerging digital tools and resources in support of students' learning	3.27	0.96	3.13	0.99	3.20	0.96
34.	Provide leadership for modelling the use of ICT to improve student learning and productivity	3.47	0.99	3.60	0.99	3.53	0.97
35.	Contribute to the effectiveness, vitality and self renewal of the teaching profession and of your school and community	3.60	0.63	3.67	0.82	3.63	0.72

Combined Mean	3.32	0.63	3.48	0.51	3.40	0.57

Table 7: Independent Sample t-Test of Overall Teachers' Perception about Technology Standards for Teachers in the Two Schools

Technology Standards for Teachers	WR-B		GAR-A		Combined				
	M	SD	M	SD	M	SD	t	df	p-value
Facilitate and Inspire student learning and creativity	2.69	0.62	2.97	0.76	2.83	0.70	22.25	29	.0001
Design and develop Digital–Age learning Experiences and Assessments	4.35	0.48	4.21	0.57	4.28	0.52	45.01	29	.0001
Model Digital-Age work and learning	3.27	0.57	3.20	0.65	3.24	0.60	29.51	29	.0001
Promote and Model digital citizenship and responsibility	1.87	0.45	2.05	0.46	1.96	0.46	23.58	29	.0001
Engage in professional growth and leadership	3.32	0.63	3.48	0.51	3.40	0.57	32.57	29	.0001

References

1. Beach, B., and Franklin, T. (2002). Preparing technology proficient teachers. Proceedings of Society for Information Technology and Teacher Education International Conference 2002, 2302-2305.
2. Brzycki, D., and Dudt, K. (2005). Overcoming barriers to technology use in teacher preparation programs. Journal of Technology and Teacher Education, 13(4), 619-641. Norfolk, VA: AACE.
3. Burris, E., and Satyanarayanan, S. (1999). Using technology to manage diverse student needs. In Proceedings of (WEBNET) E-Learn Conference 1999 (pp. 160-164). Chesapeake, VA: AACE.
4. Byers, C. (2001). Interactive Assessment: An Approach to Enhance Teaching and Learning. Journal of Interactive Learning Research, 12(4), 359-374.
5. Chang, C. (2002). Teacher perceptions of school technology environment as predictors of level of self-reported technology integration. Unpublished doctoral dissertation, New Mexico State University, Las Cruces.
6. Davies, G. (1997). Computer assisted language learning: Where are we now and where are we going? http://www.nestafuturelab.org/viewpoint/learn23.htm
7. Deal, T. E., Purinton, T., and Weston, D. C. (2009). Making sense of social networks in schools (1st ed.). Thousand Oaks, Corwin Press.
8. Dodge, B., and Molebash, P. (2005). Mini- courses for teaching with technology: Thinking outside the 3-credit box. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2005 (pp. 3155-3156). Chesapeake, VA: AACE.
9. Efaw, J. (2005). No teacher left behind: How to teach with technology. EDUCAUSE, 4, 26-32.
10. Franklin, C. (2004). Teacher preparation as a critical factor in elementary teachers: Use of computers. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2004 (pp. 4994-4999). Chesapeake, VA: AACE.
11. Giles, R., Shaw, E., and Baggett, P. (2003). Teacher educators' inspiration for technology integration. Proceedings of Society for Information Technology and Teacher Education International Conference 2003, 848-849.

12. Goetze, S. K., and Stansberry, S. (2003). Implementing instructional technology in teacher education programs: The how and the why of IT. Action in Teacher Education, 24(4).

13. Gustafson, K. K., and Kors, K. (2004). Strategic implications of educational Technology assessment. EDUCAUSE, 2, 71-72.

14. Hare, S., Howard, E., and Pope, M. (2002). Technology integration: Closing the gap between what preservice teachers are taught to do and what they can do. Journal of Technology and Teacher Education, 10(2), 191-203.

15. Harley, D., and Maher, M. (2003). Technology enhancements in a large lecture course. EDUCAUSE Quarterly, 26(3), 27-33.

16. Lemon, C. (2005). Using technology to teach content in a student teaching experience (and as a first year teacher). Contemporary Issues in Technology and Teacher Education, 5(1), 73-76.

17. Lund, D., and Runyon, L. (2002). Preservice teachers integrating technology: An update. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2002 (pp. 1438-1440). Chesapeake, VA: AACE.

18. McCarthy, D. (2004). Practice makes possible. Preservice teachers use technology to learn before using it to teach. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference (pp. 2481-2483). Chesapeake, VA: AACE.

19. Mehlinger, H.D., and Powers, S.M. (2002). Technology and Teacher Education: A Guide for Educators and Policy Makers. Boston: Houghton Mi in Company

20. Moore, D. (2006). The technology/inquiry typology: defining instructional technology. Journal of Interactive Learning Research, 17(4), 401-406.

21. Murphy, K., Richards, J., Lewis, C., and Carman, E. (2005). Strengthening educational technology in K-8 urban schools and in preservice teacher education: A practitioner-faculty collaborative process. Journal of Technology and Teacher Education, 13(1), 125-139.

22. Runyon, L., and Lund, D. (2000). Giving teachers the tools they need to integrate technology. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2000 (pp. 1511-1516). Chesapeake, VA: AACE.

23. Shamatha, J., Peressini, D. and Meymaris, K. (2004). Technology-supported mathematics activities situated within an effective learning environment theoretical framework. Contemporary Issues in Technology and Teacher Education, 3(4), 362-381.

24. Shelly, G. B., Cashman, T. J., Gunter, G. A., and Gunter, R. E. (2006). Teachers discovering computers: Integrating technology and digital media in the classroom (4th ed.). Boston, MA: Course Technology.

25. Tajabadi, M. and Ranjbar (2006). Approaches in ICT use in Agriculture. The Irandoc Journal. 3(6)

26. Testa, A. M. (2001). Seven principles for good practice in teaching and technology. In R. A. Cole (Ed.), Issues in Web-based pedagogy: A critical primer (pp. 237-245). Westport, CT: Greenwood Press.

27. Vannatta, R., Beyerbach, B., and Walsh, C. (2001). From teaching technology to using technology to enhance student learning: Preservice teachers' changing perceptions of technology infusion. Journal of Technology and Teacher Education, 9(1), 105-127.

28. Wepner, S. B., Tao, L., and Ziomek, N. M. (2003). Three teacher educators' perspectives about the shifting responsibilities of infusing technology into the curriculum. Action in Teacher Education, 24(4), 53-63.

29. Zare-ee, A. and Shekarey, A. (2010). Comparative Study of the Use of ICT in English Teaching-Learning Processes. Turkish Online Journal of Distance Education- TOJDE 11(2).

30. Zarei Zavaraki, A. (2002). ICT Use and Globalization. The Proceedings of the Second Conference of the Iranian Students in Dehli.