PERCEPTIONS OF PUBLIC EDUCATORS REGARDING ACCESSIBILITY TO TECHNOLOGY AND THE IMPORTANCE OF INTEGRATING TECHNOLOGY ACROSS THE CURRICULUM

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Abstract

Purpose: *This research study was designed to determine if teachers' attitudes toward the utilization of technology, the availability of resources and equipment to educators, and the amount of technology training that the educator had received are affected by specific demographic factors. These factors were also used to determine if a relationship existed between the educators' access to technology and their use of technology in instruction.* ***Method:*** *A descriptive research design employing the survey method was used to collect data from teachers in one county in a southeastern state.* ***Results:*** *Teachers with fewer years of teaching experience utilized technology more than seasoned teachers. Special education teachers, elective subject teachers, and career and technical education teachers utilized technology less than teachers who taught other subjects. Participants indicated that the availability of technology resources and equipment was not always sufficient or available when needed. Participants noted that adequate technology training was being provided to teachers on how to use and integrate technology into the curriculum. Teachers who have access to technology are reportedly utilizing it for classroom instruction; thus, schools should consider additional funding for technology resources.*

Introduction

During the past three decades the commercialization of the Internet and the development and application of technologies have changed many facets of everyday life. Numerous recent researchers have reported that the integration of technology into instruction is a key ingredient for student success in the 21st century workforce (Cornelius, 2012; Foster, Kelley, Pritz, & Hodes, 2011; Harter, 2011; Pritchett, 2012; Washbon, 2012; Williams, 2009).

"Net Generation" students are quite different from the teachers who educate them. Current students expect instant gratification. They view the Internet as a tool for self-expression; furthermore, they are constantly connected via some form of technology. Because today's students have been exposed to technology

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throughout their lives, they expect technology to be a part of their education. As a result, successful educators must accommodate students' need for technology (Cornelius, 2012; Foster et al., 2011; Gaytan, 2011; Harter, 2011; Henderson & Chapman, 2012; McEwen & King, 2012; Pritchett, 2012; Washbon, 2012).

Gaytan (2011) found that when technology is used in teaching, student-teacher interactions increase and students are more engaged in the learning process. Pritchett (2012) agreed and concluded that utilizing technologies in instruction supported authentic learning environments and helped students make the connection between the classroom and the workplace. Educators must understand that "regurgitating the textbook" (Gaytan, 2011, p. 47) in a lecture-style atmosphere is no longer an effective instructional delivery method. Adding technology to the instructional mix ensures greater student engagement in the learning process. Knowing this, the researchers acknowledged that it would be enlightening to investigate not only business/marketing educators' attitudes but also the attitudes of teachers who teach other subjects.

Purposes of the Study

This study was designed to determine if specific demographic factors affect teachers' attitudes toward (a) the utilization of technology, (b) the availability of resources and equipment to educators, and (c) the amount of technology training that the educators had received. The research also sought to determine if a relationship existed between the educators' access to technology and their use of technology in instruction. An additional purpose was to provide information that may be used to improve the overall effectiveness of utilizing technology for classroom instruction and the integration of web-based learning into the curriculum.

Significance of the Study

The research findings will be useful to school administrators for planning, budgeting, and integrating technology into their school systems. Furthermore, the findings will give business/marketing educators an awareness of the attitudes that core academic subject teachers possess regarding technology and the barriers to effectively integrating technology into classroom instruction.

Research Questions

1. Is there a statistically significant relationship between the teachers' attitudes toward the utilization of technology and (a) the number of years the educator has been teaching, (b) the subjects taught by the educator, or (c) the perceived ability of the educator?
2. To what extent is there a significant difference between the teachers' attitudes toward the utilization of technology and the availability of technology resources and equipment?

3. Is there a significant relationship between the teachers' attitudes toward the utilization of technology and the amount of technology training that the educator has received?
4. To what extent is there a significant correlation between the teachers' access to technology equipment and the teachers' use of technology equipment in instruction?

Review of Related Literature

Washbon (2012) observed that technology has changed the types of skills and knowledge used in the workplace. Technology alters the way information and knowledge are applied to situations. Williams (2009) defined technology literacy as "the ability to use technology to access and communicate information effectively, to use a computer and its software to accomplish physical tasks, and to identify the appropriate technology to use in specific situations" (p. 4). Rapidly changing technological advances have reshaped the 21st century workforce, the educational needs of the labor force, and the institutions that provide career and technical education (CTE) nationally (Washbon, 2012). Williams (2009) added that technology literacy is critical for success in the 21st century workforce.

Technology for Success in Instruction

Bailey and Mountjoy (2009) indicated that technology has been "woven into the fabric" (p. 3) of virtually every profession, including education. Pritchett (2012) stated that "technology has influenced the dynamics of teaching and learning on many levels" (p. 47). However, educators are constantly challenged to create meaningful technology instruction (Pritchett, 2009). Cornelius (2012) concurred and reported that technology is a tool that requires lifelong learning, and many educators continue to resist using technology in the classroom. Kitchel and Yopp (2008) added that the digital age has reshaped society completely, transforming the educational environment. These changes require teachers to stay abreast of the latest trends in technology and continually devise new techniques to prepare students for today's workforce. Foster et al. (2011) specified that if educators utilize technology to improve the effectiveness of instruction, the result will be students who are better equipped to enter the workforce.

Technology for Success across the Curriculum

Pritchett (2012) determined that effective educators must embrace the integration of technology into teaching and learning. Foster et al. (2011) found that students need a combination of technical skills, academic skills, and employability skills in order to be successful in the 21st century workforce. Harter (2011) added that the integration of technology enhances both *what* and *how* students learn; further, students prefer learning core content materials that are supplemented with technology. Students expect integration of technology from all teachers,

even those who teach core academic subjects like math, science, and English. In the existing uncertain economy, it is more crucial than ever that all students be prepared to become productive members of society. Foster et al. (2011) suggested that teachers of every subject should use technology to make instruction more effective.

Many business/marketing educators are ahead of the learning curve when integrating technology into the classroom. Specifically, they understand that technology should be taught in the context of how it is used in the real world; and they incorporate technology into teaching methods and into student learning (Kitchel & Yopp, 2008). The achievement gap between what the workforce expects of students and what education delivers is created because educators have failed to provide a creative, collaborative, contextual, and practical application of concepts being taught (Cornelius, 2012). Therefore, teachers of all subjects should commit to researching and understanding the best practices for integrating technology into the classroom.

Gaytan and McEwen (2010) affirmed that the primary goal of integrating technology into the classroom is to make the educational process more effective. All teachers must embrace lifelong learning to remain current with persistent technological changes. Redmann and Kotrilik (2004) acknowledged that "technology based learning environments can help students acquire the type of knowledge, skills, and attitudes needed for success" (p. 77).

Accessibility and Training

Simply having the resources available is not sufficient, and it should not be assumed that teachers will know how to utilize technological resources. Redmann and Kotrlik (2008) reported that most teachers who successfully integrate technology use "self-study to learn about using new technology; and most also use workshops, courses, and peers as technology training sources" (p. 86). Gaytan (2006) emphasized that there is a difference between simply using technology in the classroom and effectively integrating technology into teaching practices. Training teachers to integrate technology into the classroom should also include pedagogical content to ensure that technology is being integrated effectively.

Future of Technology in Education

According to Cornelius (2012), shifting conditions in education have left students feeling unprepared to meet the requirements that the 21st century workforce demands. Educators across the curriculum have the responsibility to "encourage learning for being, knowing, working, and living" (p. 55). Mishra, Koehler, and Kereluik (2009) indicated that ever-changing technology increases the pressure for teachers to learn not just the technology but also how to integrate that technology into their teaching practices. The integration of technology must become a priority for teachers in all subject areas. Pre-service teachers must

be taught to use technologies effectively to reach and stimulate those they teach (McEwen, 2008). In-service teachers must commit to being lifelong learners and staying abreast of innovative technology. In-service teachers must also utilize current technology to prepare students to enter the 21st century workforce. Harter (2011) concluded that to prepare students to be career-ready and ready to go to college, the integration of technology across the curriculum, even in core-content areas, is critical.

Methods and Procedures

Because business/marketing educators are often the trendsetters in embracing new technologies and integrating them into instruction, the researchers thought it important to investigate not only business/marketing educators but also the attitudes of teachers of other subject areas (e.g., math, science, and English). The attitudes of teachers of these core academic areas regarding access to technology and about the integration of technology into their subject areas seemed relevant to this study.

Participants

The population for this study consisted of all of the teachers in one county school system located in the southeastern U.S. These teachers were selected because they represent everyday educators who are in an excellent position to report realities about their access to technology and/or their willingness to integrate technology into the general curriculum.

Research Design

A descriptive research design employing the survey method was used to collect data from teachers. The Technology Integration Survey instrument was used to collect demographic information. Teachers' responses provided information and perceptions regarding the availability of resources and equipment, technology training, and technology used in instruction.

The survey instrument was reviewed by a panel of experts to determine its usability. All comments, input, and recommendations from the panel were considered and incorporated into the final survey instrument. Content and face validity were established by the panel members who were chosen for their knowledge and experience in survey research design. Concerns about internal validity and the presence and degree of measurement error of the instrument were controlled by developing clearly worded instructions and questions that minimized the sources of error. Cronbach's alpha was calculated to ascertain reliability coefficients for the following sections of the survey instrument: (a) the use of technology in classroom instruction (alpha coefficient of .919), (b) available technology resources and equipment (alpha coefficient of .744), and (c) adequate technology training (alpha coefficient of .734).

Respondents were asked various demographic and background questions in the first section of the survey. Next, participants were asked to rate their utilization of technology using a four-point Likert-type scale: (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree. Then, teachers were asked to rate the availability of resources and equipment and their technology training. Finally, respondents were asked various *yes* or *no* questions related to technology use in instruction. The review of current literature provided a basis for topics that were evaluated in the survey.

Data Analysis

Descriptive statistics were used to organize, summarize, and describe the data. Analysis of variance (ANOVA) was used to determine if there were statistically significant relationships between (a) the teachers' attitudes toward the utilization of technology and number of years the educator had taught (0-3, 4-7, 8-11, 12-15, 16-19, or 20+), (b) subjects taught by the educators (elementary school, math, science, history; English, special education, career and technical education, or elective courses), and (c) perceived technology ability of the educators (illiterate, beginner, average, or expert).

A Pearson product-moment correlation was computed to determine if a significant difference existed between the teachers' attitudes toward the utilization of technology and the availability of resources and equipment. The relationship between the teachers' attitudes toward the utilization of technology and the amount of technology training that the educator had received was analyzed using ANOVA. The difference between the teachers' access to technology and the teachers' use of technology in instruction was analyzed utilizing a Pearson product-moment correlation.

Findings

There were 199 teachers who participated in the study. Table 1 summarizes the demographics of the research participants.

Research Question 1

Is there a statistically significant relationship between the teachers' attitudes toward the utilization of technology and (a) number of years the educator has been teaching, (b) subject taught by the educator, and (c) perceived ability of the educator?

Participants were asked to rank various statements regarding their use of technology in the classroom using a four-point Likert-type scale: (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree. Table 2 reports the percentages of degrees of respondents' perceived use of technology in the classroom.

Table 1
General Demographic Data of Respondents

Categories	*n*	Percent
Years of Teaching Experience		
0-3	16	8.0
4-7	33	16.6
8-11	23	11.6
12-15	34	17.1
16-19	39	19.6
20+	54	27.1
Subjects Taught		
Elementary	106	54.4
Math	18	9.2
Science	16	8.2
History	12	6.2
English	12	6.2
Special Education	11	5.6
Career & Technical	12	6.2
Elective	8	4.1
Perceived Ability to Use Technology		
Beginner	22	11.1
Average	165	82.9
Expert	12	6.0

A sum score of the educator's use of technology was calculated from the participant's responses and could range from 5 to 20. ANOVA was used to determine if there were statistically significant relationships between the teachers' attitudes toward the utilization of technology and (a) number of years the educator had been teaching (0-3, 4-7, 8-11, 12-15, 16-19, or 20+), (b) subject taught by the educator (elementary school, math, science, history, English, special education, career and technical education, or elective courses), and (c) perceived ability of the educator (illiterate, beginner, average, or expert). Considering an alpha level of .05, educators' attitudes toward the utilization of technology and the number of years the educator had been teaching were statistically significant [$F(5, 199) = 4.131$, $p = .001$]. In addition, teachers' perceptions of the use of technology and the subject taught by the educator were significant [$F(7, 195) = 2.185$, $p = .037$].

Participants' views of the use of technology and perceived ability of the educator were also statistically significant [$F(2, 199) = 10.986$, $p = .000$].

Table 2
Degrees of Perceived Use of Technology

	Percentages of Degrees			
Category[a]	**(4)**[b]	**(3)**	**(2)**	**(1)**
Use technology often in classroom	55	41	3	1
Using technology enhances instruction	35	65	0	0
Using technology improves student learning	36	64	0	0
Using technology to prepare classroom instruction	55	43	1	1
Technology has made participant an effective teacher	52	42	5	1

[a]$n = 199$ for each category
[b]Scale of (4) strongly agree, (3) agree, (2) disagree, (1) strongly disagree

Research Question 2

To what extent is there a significant difference between the teachers' attitudes toward the utilization of technology and the availability of technology resources and equipment?

Participants were asked to rank various statements regarding the availability of technology resources and equipment using a four-point Likert-type scale: (1) strongly disagree; (2) disagree; (3) agree; and (4) strongly agree. Table 3 reveals the percentages of degrees of respondents' perceived availability of technology resources and equipment. A sum score of the availability of resources and equipment as perceived by the secondary teachers was calculated from each participant's responses. A Pearson product-moment correlation was computed to determine if there was a significant difference between the teachers' attitudes toward the utilization of technology and the availability of resources and equipment. A significant relationship was indicated between the teachers' perceptions of the use of technology and the availability of resources and equipment [$r(198) = .383$, $p < .01$].

Research Question 3

Is there a significant relationship between the teachers' attitudes toward the utilization of technology and the amount of technology training that the educator has received?

Respondents were asked to rank various statements regarding the technology training they had or had not received using a four-point Likert-type scale:

(1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree. Table 4 summarizes the percentages of degrees of respondents' perception regarding technology training. The relationship between the teachers' attitudes toward the utilization of technology and the amount of technology training that the educator had received was analyzed using ANOVA. With an alpha level of .05 and compared to the sum score for the teachers' perceived use of technology in the classroom, the amount of technology training was significant [$F(3, 192) = 3.470$, $p = .017$].

Table 3

Percentages of Degrees of Perceived Availability of Technology Resources & Equipment

	Percentages of Degrees			
Category[a]	**(4)[b]**	**(3)**	**(2)**	**(1)**
Availability is adequate in participant's classroom	32	43	22	3
Available when needed	35	49	14	2
All students have access to a computer when needed	25	40	28	7
Enough computers available in school for instruction	22	42	27	9
Resources and equipment malfunction often	9	31	55	5
Technology malfunctions are repaired in a timely manner	12	58	24	6
Computers and Internet access are adequate in school	16	60	21	3
Use of technology depends on availability of equipment	37	56	6	1

[a]$n = 199$ for each category

[b]Scale of (4) strongly agree, (3) agree, (2) disagree, (1) strongly disagree

Table 4

Percentages of Degrees of Perceived Technology Training

	Percentages of Degrees			
Category[a]	**(4)[b]**	**(3)**	**(2)**	**(1)**
Attended several technology training sessions	20	61	18	1
Using technology is difficult due to lack of training	1	12	66	21
School system has provided adequate technology training	11	72	15	2
Not received adequate training on technology use	2	15	64	19

[a]$n = 199$ for each category

[b]Scale of (4) strongly agree, (3) agree, (2) disagree, (1) strongly disagree

Research Question 4

To what extent is there a significant correlation between the teachers' access to technology equipment and the teachers' use of technology equipment in instruction?

Respondents were asked if they had various school-provided technology, such as a laptop, LCD projector, and/or smart board. A follow-up question asked if they used the equipment in classroom instruction. The difference between the teachers' access to technology equipment and the teachers' use of technology equipment in instruction was analyzed utilizing a Pearson product-moment correlation. A significant positive correlation was indicated between the educators' access and use of technology equipment in the classroom for laptop computers, LCD projectors, and smart boards. Table 5 reports the results.

Table 5

Correlation Analysis of the Access and Use of Technology Equipment

	Pearson Product-Moment	
Category	***n***	**Coefficients**
Laptop Computer	192	.773*
LCD Projector	186	.805*
Smart Board	188	.625*

*$p \leq .01$ for each category

Conclusions, Recommendations, and Implications

The fewer the years teachers have taught, the higher their average sum score for utilizing technology. Teachers with 0-3 years of teaching experience had a higher sum score for utilizing technology. Teachers with 20+ years of teaching experience had the lowest sum score for utilizing technology. Additional research is needed to explore the reasons for the decline in teachers' attitudes toward the utilization of technology as years of teaching experience increase. In addition, science teachers, elementary school teachers, and history teachers reported a higher sum score for perceived use of technology in classroom instruction. Special education teachers, elective course teachers, and career and technical education teachers reported a lower sum score for perceived use of technology in classroom instruction. This conclusion is discouraging because career and technical education teachers should be effectively integrating technology to prepare students to succeed in the 21st century. Additional research is needed to explore the reasons for these differences.

There was a significant difference between the teachers' perceived use of technology in the classroom and the availability of resources and equipment. Participants indicated that the availability of technology resources and equipment was not always sufficient. School systems should ensure that technology resources and equipment are available to effectively integrate technology into the classroom. Moreover, there was a significant relationship with regard to teachers' perceived use of technology in the classroom and the amount of technology training. This was promising since it appears, for the most part, that adequate technology training was being provided to teachers for integrating technology into the curriculum. Furthermore, there was a significant positive correlation between the teachers' access and use of technology equipment in the classroom for laptop computers, LCD projectors, and smart boards. This, too, is encouraging because it appears that when teachers have access to technology, they use it in their classroom instruction.

Additional research is needed to determine the reasons for various differences regarding the perceived accessibility of Web 2.0 technologies. School systems and/or teachers should be encouraged to apply for technology grants to purchase additional technology equipment. Teachers of special education, career and technical education, and elective subjects should seek additional technology training on how to integrate technology. Seasoned teachers should pursue additional training on how to use and integrate technology. Additionally, this study should be repeated in future years and in other K-12 schools across a wider geographic area.

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