Usage, Barriers, and Training of Web 2.0 Technology Applications

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This research study was designed to determine the degree of use of Web 2.0 technology applications by certified education professionals and examine differences among various groups as well as reasons for these differences. A quantitative survey instrument was developed to gather demographic information and data. Participants reported they would be more likely to use technology with training/professional development. The highest reported barriers preventing the use of Web 2.0 technology applications were a lack of time, lack of necessary knowledge and skills, and budget constraints. Professional development is needed for certified educators; it should address how to use and implement technology.

Introduction

Redmann and Kotrlik (2004) described how the traditional learner would listen to a class lecture, take notes, and prepare for a written test. This type of traditional environment does not prepare the learner for the contemporary work world that exists today. Technology enhanced learning environments prepare students with the knowledge and skill needed for success in the twenty-first century. Employers are hiring employees who are dependable, educated, able to reason, communicate, problem solve, and are technologically savvy (Lam, 2007). Career and Technical Education (CTE) programs should strive to maintain the commitment for educating students to become competent individuals in the twenty-first century workforce. Hosler and Meggison (2008) suggested that transformations are inevitable and will occur in course content and delivery methods, but the dual objectives of providing education for occupational skill and economic competence have always been and should remain top priority. Bruett (2006) recommended that it is vital that students are prepared to be competitive in the global economy, an economy that would not be possible without current technology.

CTE programs are known for educating and preparing students to enter the workforce. Lowther, Inan, Daniel-Strahl, and Ross (2008) acknowledged the two evolving themes in the drive for integrating technology to be: preparing students for the workforce and increasing student knowledge and skill. Career and Technical Education teachers must continue to prepare youth for workforce essentials and doing so includes effectively integrating technology. Educators of all content areas should assume responsibility to prepare students to thrive in the world when they leave our classrooms. Utilizing technology and having appropriate skills to integrate this technology will allow students to succeed in any environment.

Rakes, Fields and Cox (2006) suggested that the teacher's confidence level of integrating technology and their beliefs of the impact on student achievement is a considerable factor of what takes place in the classroom. Educators need to be adequately trained to effectively integrate technology into the curriculum. According to Young (2005), the entire cycle of faculty proficiency development is complex because of the emphasis of developing technical skills without improving instructional practices that lead to enhanced learning. Technical skills are mandatory for integrating technology, but learning to effectively integrate that skill into the learning environment is equally as important.

Statement of the Problem/Purpose of the Study

The purpose of this research study was to examine the degree to which certified education professionals utilized Web 2.0 technology applications. This study also researched if there was a significant difference between the groups based on demographic data. Additionally, barriers preventing use of these technology applications and training/professional development (PD) that is received and/or needed was also examined. The research problem of this study was to determine the degree of use of Web 2.0 technology applications by certified education professionals and examine differences among various groups as well as reasons for these differences.

Research Questions

1. To what degree do certified education professionals use interactive online technology applications?

2. What are the differences among various demographic groups in relation to their use of interactive online technology tools?

3. To what extent do the barriers preventing use of Web 2.0 applications as reported by certified educators affect the use of this technology by the educators?

4. What statistical effect does training/professional development in the area of Web 2.0 technology applications have on the use of this technology?

Review of Related Literature

Use of Technology Across the Curriculum

Students are using technology like never before. The reality of teachers learning technology one step ahead of students is constant in this digital age. Klopfer and Yoon (2005) asserted that constructively promoting the educational advancement of today's young, technology-confident students requires implementing new technological tools creatively. Remarkably, Web 2.0 is transforming into a fully collaborative space and the control of content has been decentralized to allow everyone to create, publish, subscribe, and share information (Asmus, Bonner, Esterhay, Lechner, & Rentfrow, 2005). Hur (2011) suggested that technology has increased in the K-12 setting because of the usability and interactive nature of Web 2.0.

The most popular Web 2.0 tools have been designated as social networking sites, podcasts, blogs, wikis, and social bookmarking sites (Solomon & Schrum, 2007; Richardson, 2006). Cheon, Song, Jones, and Nam (2010) provided the functionality of Web 2.0 applications to include commenting, conferencing, editing, sharing, and tagging. The globalized society of the twenty-first century allows teachers and students the opportunity to communicate and collaborate at any time. In addition, Cheon et al. (2010) described Web 2.0 technology as being different from traditional software "in that it provides diverse Web-based applications, such as media production, graphic tools, and online office tools, at little cost" (p. 53). Implications have been made that budget constraints are

barriers to integrating technology, but Web 2.0 tools are relatively inexpensive, if not free. "This next generation Web offers unique opportunities for educational application in inquiry practice, collaboration, communication and individual expression, and literacy" (Drexler, Baralt, & Dawson, 2008, p. 272).

Barriers

Ertmer (1999) defined barriers as any dynamic preventing or restricting teachers' use of technology in the classroom. Several researchers (Earle, 2002; George, 2000; Whitehead, Jensen, & Boschee, 2003) found technical support, teacher expertise, time for planning, budget and pedagogical applications to be barriers when integrating technology into the classroom. Redmann and Kotrlik (2008) reported results of a follow-up study that indicated the barriers were significantly lower in 2007 when compared to 2002. The highest rated barrier was the same as in 2002, which was adequate time to develop lessons that utilize technology. An and Reigeluth (2011) reported lack of technology, lack of time, and assessment as leading barriers to creating technology enhanced classrooms. In addition, Whitehead, Jensen, and Boschee (2003) identified state educational agencies lacking resources and funding as a major barrier to integrating technology. Furthermore, Budin (1999) proposed that school systems were more concerned with acquiring the hardware and software technology instead of implementing staff development and planning for integrating technology effectively. Educators expressed a high level of anxiety when technology was placed into the classroom without proper Professional Development (PD) and curriculum consideration.

Professional Development/Training

Professional development (PD) should be set at a high priority when integrating technology into the classroom. Many teachers are aware that technology has the capacity to enhance teaching and learning, but just as many teachers are not aware of the benefits technology can offer them as professionals in carrying out the implementation of the curriculum in their classrooms (Whitehead et al., 2003). Redmann and Kotrilik (2004) established that integrating technology was more prominent with teachers that had a higher perception of their overall teaching ability. Teachers that felt confident and competent were more likely to integrate technology and try innovative techniques. According to Young (2005) for PD to be successful, the proper equipment, software, and technical support services should be available. Whitehead et al. (2003) suggested in-service programs aim for teachers and administrators to develop competencies in using a variety of technology applications. Jongpil, Jaeki, Jones, and Nam (2010) proposed that current training approaches heavily emphasize tool-dependent learning and focus on how to use technology; however, change must take place in teacher education to train teachers to become learning dependent and emphasize how to learn with technology. Okojie and Olinzock (2006) also suggested that in-service teachers develop a positive attitude towards learning and using various technologies in the classroom and extending their desire to explore new technologies as they emerge. In today's society, educators must engage in lifelong PD to keep up with changing professional demands, technology integration being one (Scott, 2008).

Methods and Procedures

Participants

Superintendents and/or school principals from various school systems across a state in the southeast were contacted to obtain permission to survey participants during faculty/in-service meetings at the beginning of the school year. Upon granted permission, a survey administrator attended in-service sessions at designated school systems. The population for this study included all certified education personnel at each of the

participating schools. A brief introduction/ overview of the research was provided to participants. By completing the survey and returning to the researcher, respondents were granting their consent. Eight hundred forty-two surveys were returned to the researchers and entered for data analysis. Technology training and PD in the area of implementing Web 2.0 tools in the classroom were provided to participating schools and school systems and individualized based on the results of their data by the researchers who conducted this study.

Research Design

A quantitative survey instrument, Interactive Technology Applications Survey, was developed by the researchers in this study to gather demographic information and data from certified education professionals in regards to their perceptions about Web 2.0 applications. The basis for the items on the survey was derived from the review of literature and the research objectives of this study. To ensure the validity of the scores and the usability of the survey instrument, a panel of expert university faculty members was asked to evaluate the content. Panel comments, input and recommendations were considered and incorporated into the final instrument. Cronbach's alpha was calculated to measure homogeneity of items. The coefficient alpha of .911 among the 13 items assessing participants' use of Web 2.0 applications indicated very high instrument reliability.

The respondents were asked various demographic and background questions in the first section of the survey instrument. Next, participants were asked if they used each of the 13 Web 2.0 technology applications. If the respondents reported using the Web 2.0 application, they were next asked to report how often they used the technology using the following three-point Likert-type scale, with 1 = Rarely, 2 = Sometimes, and 3 = Often. In the following two sections, teachers were asked to identify barriers preventing use of Web 2.0 technology applications and various questions in regards to training received for interactive online technology applications. The review of current literature provided a basis for topics that were evaluated in the survey.

Data Analysis, Findings and Results

Descriptive statistics were used to organize, summarize and describe collected data. Analysis of variance (ANOVA), t-test and Pearson product-moment correlation were the statistical procedures used to examine the data. Eight hundred forty-two (N=842) education professionals participated in this study. Of the respondents who completed the survey, the majority 749 (89%) were teachers; 37 (4.4%) were administrators; 23 (2.7%) were counselors and 33 (3.9%) were media specialists. The education professionals included in this study were certified in the following areas: administration (n=69); language arts (n=157); counseling (n=24); career and technical (n=47); business (n=25); elementary (n=377); math (n=131); PE/health (n=68); social studies (n=135); science (n=129) special needs (n=85); foreign language (n=9) and fine arts (n=26). Of the population that participated in the study, 168 (20%) were male and 673 (80%) were female. Thirty-four schools within seven school systems in one state in the southeastern United States were included in this research study.

Research Question 1: To what degree do certified education professionals use interactive online technology applications?

The participants were asked whether or not they used the 13 categories of Web 2.0 technology applications. If they answered yes, the respondents were then asked to report how often they use the technology using the following three-point Likert-type scale: (1) Rarely; (2) Sometimes; and (3) Often. Overall, certified educators reported social networks, events, music, and social news networks as the most used

educational Web 2.0 applications; while, social bookmarks, blogs, cloud computing, and podcasts were the least used. Of the Web 2.0 applications participants stated using, social news networks, music, pictures, and video sharing were used most often; whereas, blogs, social networks, and cloud computing were reported as being used rarely. Table 1 reflects the percentages of participants' use and frequency of use of Web 2.0 applications as reported by all educators in this research study.

Research Question 2: What are the differences among various demographic groups in relation to their use of interactive online technology tools?

The sum score for use of the 13 Web 2.0 technology applications was compared to various demographic groups. An analysis of variance (ANOVA), t-test, or Pearson product-moment correlation was conducted to find the subsequent results. With an alpha level of .05, current position (administrator, teacher, counselor, media specialist) [$F(4, 842) = 2.426$, $p = .047$]; type of school (city, county) [$t(840) = 4.296$, $p < .001$]; Title I school (yes, no) [$t(840) = 2.463$, $p = .014$]; years in education [$r(828) = -.153$, $p < .01$]; and age [$r(797) = -.169$, $p < .01$] were all significant. However, highest degree (bachelors, masters, specialist, doctorate) [$F(3, 836) = 1.570$, $p = .195$]; certification level (B, A, AA, alternative) [$F(5, 798) = 1.042$, $p = .392$]; and gender (male, female) [$t(839) = -1.054$, $p = .292$] were not significant. No further tests were necessary. The participant data for these various demographic groups is reported in Table 2. The mean age for all educators was 40.69 years, whereas the mean number of years in education was 13.58 years.

Research Question 3: To what extent do the barriers preventing use of Web 2.0 technology applications as reported by certified educators affect the use of the technology by the educators?

The sum score for the frequency of use of the 13 Web 2.0 technology applications was compared to barriers preventing use of the interactive online technology applications. T-tests were conducted to find the subsequent results. With an alpha level of .05, lack of necessary knowledge and skills [$t(836) = 4.960$, $p < .001$]; lack of personal interest [$t(836) = 2.846$, $p = .005$]; and lack of PD and training [$t(836) = 4.380$, $p = .012$] were all significant. However, budget constraints [$t(836) = -1.234$, $p = .218$]; lack of time [$t(836) = .166$, $p = .868$]; lack of administrative support [$t(836) = -1.076$, $p = .282$]; and IT limitations [$t(836) = -.596$, $p = .551$] were not significant. Table 3 outlines the barriers preventing use of the Web 2.0 technology applications and the frequency, percent, and standard deviation for each barrier. Lack of time, lack of necessary knowledge and skills, and budget constraints were the highest reported barriers; whereas, lack of administrative support and IT limitations were the least reported barriers.

Research Question 4: What statistical effect does training/professional development in the area of Web 2.0 technology applications have on the use of the technology?

When educators were asked if they had received any training and/or professional development (PD) for using Web 2.0 technology applications, 511 (61.3%) stated no and 321 (38.5%) reported yes. Next, participants were asked if they had received training/PD was it regarding how to use or implement the technology. Three hundred twenty-four (39.1%) of the respondents reported receiving training/PD on how to use the technology; whereas, 192 (23.1%) stated their training/PD was on implementation. Finally, educators were asked if they received training/PD, would they be more likely to use Web 2.0 technology applications. The majority, 710 (85.6%), reported they would be more likely to use the technology with training/PD. The sum score for use and frequency of use of the 13 Web 2.0 technology applications was compared to these same questions regarding training and PD received and/or needed. T-tests were conducted to find the subsequent results,

and all statistical tests were significant. With an alpha level of .05, received any training/PD as compared to the sum score for use [$t(830) = -7.549$, $p < .001$]; training/PD was related to how to use the technology as compared to the sum score for use [$t(825) = -5.956$, $p < .001$]; training/PD was related to how to implement the technology as compared to the sum score for use [$t(827) = -4.553$, $p < .001$]; more likely to use technology if received training/PD as compared to the sum score for use [$t(824) = -2.598$, $p = .010$]; received any training/PD as compared to the sum score for frequency of use [$t(830) = -10.176$, $p < .001$]; training/PD was related to how to use the technology as compared to the sum score for frequency of use [$t(825) = -9.120$, $p < .001$]; training/PD was related to how to implement the technology as compared to the sum score for frequency of use [$t(827) = -6.339$, $p < .001$]; and more likely to use technology if received training/PD as compared to the sum score for frequency of use [$t(824) = -3.185$, $p = .002$] were all significant.

Conclusions, Recommendations and Implications

Participants stated social news networks, music, pictures, and video sharing were used most often. Adversely, blogs, social networks, and cloud computing were reported as being used rarely. Sixty one percent of participants reported they do not receive any training and/or PD for using Web 2.0 technology applications. The highest reported barriers preventing the use of Web 2.0 technology applications were a lack of time, lack of necessary knowledge and skills, and budget constraints. Reported barriers are consistent with the findings of previous studies. Current position, type of school, Title I school, years in education, and age were significant demographic groups in relation to their use of interactive online technology use. Highest degree, certification level, and gender were not significant.

A majority of certified educators reported they would be more likely to use technology with training/PD. Hence, the need for continual PD for certified educators is paramount as current levels of PD are questionable according to survey results. Furthermore, it is recommended PD emphasize how technology can be implemented. Due to budget constraints being an identified barrier by participants, providing additional funds for PD is suggested. Thus, additional research is recommended to determine the level of funding for providing high quality training/PD and the actual money spent for training/PD. It is recommended that the study be repeated in future years; however, the study should be expanded across a wider geographic area. Information gathered from the completion of the study can be valuable to teacher educators at the university level and to school leaders at the district and school levels due to their direct impact on the technological skills acquired by certified educators.

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Tables

Table 1
Percentages of Use and Frequency of Use of Web 2.0 Technology Applications

	Use		Frequency of Use[b]		
Web 2.0 Application[a]	No	Yes	Often	Sometimes	Rarely
Blogs	74.2	25.8	30.2	34.9	34.9
Cloud Computing	65.5	34.5	30.8	34.6	34.6
Events	38.7	61.3	34.5	36.0	29.5
Music	44.3	55.7	43.0	35.8	21.2
Pictures	45.6	54.4	39.4	37.2	23.4
Podcasts	62.6	37.4	37.2	37.2	25.6
Question/Reviews/Ratings/Polling/Surveys	48.0	52.0	28.9	37.9	33.2
Social Bookmarks	76.8	23.2	24.3	45.3	30.4
Social Networks	36.4	63.6	32.3	33.5	34.2
Social News Networks	44.1	55.9	48.5	30.0	21.5
Video Sharing	57.7	42.3	39.4	38.4	22.2
Virtual Learning Network	59.2	40.8	33.4	37.6	29.0
Wiki	56.7	43.3	33.4	36.1	30.5

[a] *n = 842 for each category.*
[b] *If respondent answered yes to use, then they were asked to rate the frequency of use.*

Table 2

Participant Data of Demographic Groups

	Groups[a]	*n*	Percent
Current Position			
	Administrator	32	3.8
	Teacher	746	88.6
	Counselor	18	2.1
	Media Specialist	46	5.5
Gender			
	Male	168	20
	Female	673	80
School Type			
	City	275	32.7
	County	567	67.3
Highest Degree			
	Bachelor	314	37.6
	Master	435	52.0
	Specialist	77	9.2
	Doctorate	10	1.2
Certification Level			
	B	279	35.0
	A	391	49.0
	AA	114	14.3
	Alternative	14	1.8
Title I School			
	Yes	328	39.0
	No	514	61.0

[a] = All Education

Table 3

Barriers Preventing Use of Web 2.0 Technology Applications

Barriers	n	Percent	SD
Budget Constraints	235	28.0	.449
Lack of Time	524	62.5	.484
Lack of Necessary Knowledge & Skills	356	42.5	.495
Lack of Administrative Support	16	1.9	.137
Lack of Personal Interest	179	21.4	.410
Lack of Professional Development & Training	223	26.6	.442
IT Limitations	173	20.6	.405

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