Teacher's Perceptions of Technology Use in the Schools

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Abstract

Although many schools are equipped with the latest instructional technologies, multiple studies have indicated that more than half of the teachers equipped with computers only use them for administrative functions, and only half of their students report using technology more than once a week. Many faculty members lack the technological proficiency needed to take advantage of these new technologies, making them unable to bring these technologies into the classroom and leading to many standing unused in the classroom. This study analyzes teachers' perceptions of technology use in the classroom by surveying those who participated in the TeachUp! technology empowerment program created and developed by Digital Opportunity Trust USA, Inc. (DOT USA). The results show that teachers who were part of DOT USA's TeachUp! program perceived a significant increase in the areas of student engagement, student excitement, student acceleration of learning, and student proficiency with computer technology. The analysis has indicated that faculty members need not only to learn how to use technology at a basic level but also to learn how to integrate that technology into their curricula. In addition, newer teachers from digital native generations must be taught how their acquired skills can be used to integrate technology into the classroom curriculum to provide complex cognitive engagement for their students. It is essential that the role of the teacher as a professional in the classroom not be discounted when evaluating classroom curriculum development and strategy, including those that would integrate various technologies.

Technology in the classroom has come a long way since the 1980s. Today its usage extends well beyond graphing calculators, interactive whiteboards, I-clickers, laptop computers, and iPods. Prensky (2001) first coined the term "digital natives" to represent those younger generations that grew up with technology integrated into their everyday lifestyles. Since then, research has focused solely on digital natives as students (Lei, 2009; Stearns, 2006; Wood, 2006). Educators have noted that digital natives use technology differently from their parents and teachers, especially those who are members of nondigital native generations (Powell, 2007; Prensky, 2006). An abundance of research focuses on these digital natives in the K-12 classroom, but many digital natives have actually entered the workforce (Rainie, 2006) and have chosen the field of education—often as teachers or preservice teachers (Dutt-Doner, Allen, & Corcoran, 2005). Lei (2009) noted that the current research trend is to focus on digital natives as professionals pursuing careers in education. This trend includes research aimed at understanding these teachers in the classrooms, their perceptions, their use of technology, and their perceptions of the benefits for students who use technology in the classroom. This then takes an additional step as teachers must find ways to teach using technology, which provide complex cognitive engagement

that in turn allows students to invest themselves in the learning process (Warschauer, 2007). Central to these ideas is the concept of the teacher as a professional in the classroom comparable with a lawyer in a law firm or a doctor in a hospital. From there, one is able to value the perceptions and judgments of the teacher on technology use in the classroom and learning.

Teachers as Professionals

In the modern United States, the role of the teacher as a professional has become ambiguous. Professionalism is often discussed in terms of standards and performance (Rodd, 2006). Osgood (2006) described the neoliberal constructions of professionalism as valuing male attributes, including rationalism, competitiveness, and individualism. These same attributes from the consumer-centric mentality were

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also found to be similar to the perceptions of parents about teachers. Thus, this marginalization reduced teachers to the role of a service provider, rather than a professional.

In the United States, notions of professionalism are centered on accountability, whereas a popular Italian concept—the Reggio Emilia context—of professionalism in early childhood education describes professionalism in terms of trust. In the Reggio Emilia approach, the guiding principal is that programs should reflect the beliefs and values of the community. Therefore, various programs would differ based on the diverse communities practicing Reggio Emilia. In this approach, the understanding of the teacher as a professional, by the community and parents, allows the teacher to freely make autonomous and trustworthy decisions, as well as continue his or her professional development, which stems from observation, conversation, debate, and reflection on his or her personal work. Terzi and Cantarelli (2001) stressed that this reflection enriches the educator's knowledge and contributes to trustworthiness.

The professionalism of a teacher can also be compared with professionalism in other sectors such as law or medicine. As with professionals in these sectors, teachers work in an environment where their obligations are understood by tradition rather than specifically outlined in a job description (Scriven, 1988). Scriven (1988) acknowledged that the same models of evaluation used in other sectors should be applied to teaching because teaching is "best *conceived of* as a profession, whatever the proportion of teachers that rise to or reject that conception" (p. 3). Griffin (1990) offered four propositions to make teaching as attractive as other careers. These include perceiving teaching as intellectual, understanding that teachers are central to decision making in schools, understanding that the work of the teacher is determined and rewarded based on school needs and expectations as well as individual professional choices, and, finally, understanding that teachers engage in professional development to ensure that they maintain their understanding of their profession.

Finland has become a country with one of the world's highest performing educational systems due to education reforms seen in the last decade (Hargreaves & Shirley, 2008). Hansen (1998) stressed that Finland's success is a clear reflection of the overall acknowledgment of teachers as independent professionals. The new guidelines shifted power in schools to the local level and allowed teachers the authority to develop and define content based on prescribed guidelines (Hansen, 1998).

Arne Duncan, the U.S. Secretary of Education, hosted the first International Summit on the Teaching Profession in early 2011. Representatives from 16 countries met to discuss the current situation of education on the global scale. With the understanding that the quality of the teacher is the "single biggest in-school influence on student achievement," teacher-centric issues such as recruitment, preparation, support, retirement, compensation, and evaluation were discussed (Stewart, 2011, p. 93). Finland was again cited as attributing its success to the highly respected role of the teacher in the classroom (Stewart, 2011). While the education system in the United States may be more focused on student achievement as measured through standardized exams, it is essential that the role of the teacher as a professional in the classroom not be discounted when evaluating classroom curriculum development and strategy, including those that would integrate various technologies.

Teachers' Perceptions of Technology Use

Computers have changed the way that many teachers approach teaching. Teachers are now able to use computers to demonstrate dynamic processes in real time such as providing students with simulations of how gases behave at different temperatures in science classes (Hurwitz, 1999) or showing videos and movie clips of significant historical events, all of which allow the teacher to provoke deeper thought processes. Several older digital natives who have used computers, both in and out of the classroom, over the past two decades would recognize, as well as welcome, the necessity for an informal and critical approach to the use of computers in education (Loveless, 1999). Despite the enormous headway that computer technology has made, there is still a common misconception that computers and the Internet are the only useful technologies for the field of education (Lyle, 2009). However, education technology is actually spread throughout a broad spectrum of different technologies including, but not limited to, those used in "design, making, problem-solving, technological systems, resources and materials, criteria and constraints, processes, controls, optimization and trade-offs, invention, and many other aspects dealing with human innovation" (Lyle, 2009, p. 35).

There is a lot of research on the views of teacher's about technology use in the classroom. According to Cope and Ward (2002), experienced teachers who had little or no professional development in the use of technology in the classroom were less likely to use it in the classroom and were less likely to see the benefit of technology usage in the classroom. Royer (2002) found that the more teachers were involved in actually setting up classroom technology the more likely they were to use that technology for instruction (Royer, 2002). This is why it is important for teachers to receive technology skill training. This is not to say that the advancement of technology use in the classroom changes the role of the teacher. Wang (2002) found that teachers saw their roles as being more teacher centered and less student centered in classrooms that did not have computers. However, teachers did not think that they would teach differently or that their roles would be different in a classroom with computers. Savery (2002) noticed that faculty felt comfortable using technology such as email, overhead projectors, and videos. However, faculty felt that they used email more often for

instruction rather than for the students demonstrating a difference in the perceptions of the use of email (Savery, 2002). Wilson, Notar, and Yunker (2003) found that on the average, teachers used the computers 1.9 hr per week mainly to enter grades in elementary schools. Students spent even less time on the computers—only 1.5 hr per week. A study in Taiwan demonstrated a strong relationship between teacher training and the integration of technology into the curriculum. Hsu (2010) discovered that the better trained the teacher was in the use of technology, the more likely he or she was to successfully integrate it into classroom instruction. In a study of teacher perception of the values that are needed to be an "exemplary" user of technology in the classroom, it was found that teachers believe that a person has to be confident in his or her ability to use technology and committed to its use (Ertmer, Ottenbreit-Leftwich, & York, 2007).

In addition, Warschauer (2007) found that schools with a higher socioeconomic status integrated technology much more readily because teachers are confident that students have better access to computers and/or technology at home and therefore can complete homework in which technology is necessary for the completion. Schools with a lower socioeconomic status can compensate somewhat for this difference by providing laptops for home use, keeping the computer lab open after school, or using mobile labs more efficiently. Warschauer also stated that boys appear to use computers for gaming whereas girls tend to use it for networking and communication. Schools need to develop better strategies for incorporating technology into classroom instruction by using this information.

When middle school and secondary school teachers used web-based learning tools as part of their lessons, they perceived that their students were more successful as it appeared to significantly engage the students (Kay, Knaack, & Petrarca, 2009). Furthermore, the students also scored higher on tests. This study also found that teachers felt the web-based learning tools were easy for the students to use. The use of technology in the classroom allows students to engage in a more active way of thinking, literally a hands-on learning experience in which they are able to practice executing skills that would be impossible with a traditional book lesson.

Method

There has been an increase in the availability of new computer technologies, in terms of hardware and software, with the potential to engage K-12 students and increase their learning success. According to the International Society of Technology in Education's (ISTE) June 2008 Policy Brief, studies have shown statistically significant positive effects of education technology on student reading, literacy, and mathematical achievements. However, many teachers in schools with a high level of need, "high need" schools, lack the proficiency needed to take advantage of these new technologies and bring them into the daily classroom learning experience.

Digital Opportunity Trust USA, Inc (DOT USA), a Mississippi-based nonprofit, has created and implemented a technology empowerment program, TeachUp!, for teachers of "high need" students at 250 K-12 public schools in Mississippi and New Orleans over the last 4 years. The TeachUp! project focuses on providing teachers in high need schools with one-on-one coaching and training through an intern system to accelerate teacher proficiency in the use of education technology in the classroom to boost student engagement, success, and retention. At the same time, TeachUp! prepares the interns who provide the training for the professional world of education. Most interns during the time of this study would fall into the category of digital natives, those who have grown up with accessibility to technology.

The TeachUp! Program was started shortly after the Katrina hurricane to assist the Gulf Coast schools, which were in great disarray and need. In the years following this event, other areas such as the Delta were included. Various granting bodies provided the necessary funds for the program and required reports based on evaluations. This archived data included the Teacher Pulse Survey (TPS) that was initially created by the measurement and evaluation specialist to provide the information required by the granting bodies. As the program is continually evolving, in 2010, the TPS was reviewed, and the survey was sent to all the field experts to ensure that the questions were still appropriate. Additional questions were added to the May 2011 version of the survey because of a change in granting bodies and the accompanying addition of goals and objectives, but these questions were not analyzed in this article.

Teachers were given the upgraded TPS in November of 2010 and May of 2011, approximately at the beginning and end of one school year. The responses to specific questions by the districts studied were compared between the November 2010 administration and the May 2011 administration of the survey. Each of the rating questions used a 5-point Likert-type scale. The responses to the following questions were analyzed:

- Rate your DOT Intern on availability when you have a technology question or problem;
- Rate your DOT Intern's ability to solve technology questions;
- Rate the overall quality of support you receive from your DOT Intern;
- Rate your growth in technology proficiency since collaboration with interns;
- Rate your growth in morale since collaboration with interns;
- Rate your students on the following factors, since infusion of technology in your school;

- Student engagement;
- Student excitement;
- Acceleration of learning;
- Proficiency with computer technology;

- How familiar are you with instructional technology;
- How useful is technology in your teaching;
- Would you recommend technology usage for instructional purposes to other teachers?

Respondents were teachers from 44 school districts. Individual teacher responses were not recorded or marked. It was impossible to create matched pairs between the November and May administrations. The school district was used as the unit of measure in lieu of the individual respondent. To accomplish this, the individual ratings for each school district were summed and averaged. A total of 21 out of 44 school districts completed the survey in November 2010 and May 2011. The scores were then compared between the November and the May administrations using paired sample *t* tests. Further statistical analysis to examine the effect size of significant changes was also conducted.

Results

In November of 2010, 1,088 teachers responded to the TPS. In May of 2011, 1,037 teachers responded. Respondents were teachers from various school districts. Because individual teacher responses were not recorded, it was not possible to match individual pairs between the November and May administrations of the survey instrument. As such, the school district was used in lieu of the individual respondent. To accomplish this, the individual ratings for each school district were summed and averaged. A total of 21 out of 44 school districts completed the survey in November 2010 and May 2011. The averaged scores of the November 2010 and the May 2011 administrations were then compared using paired sample *t* tests. The mean and standard deviation for each question are listed in Table 1.

There were no statistically significant differences between the November and May survey responses for the following questions:

- Rate your DOT Intern on availability when you have a technology question or problem.
- Rate your DOT Intern's ability to solve technology questions.
- Rate the overall quality of support you receive from your DOT Intern.
- Rate your growth in technology proficiency since collaboration with interns
- Rate your growth in morale since collaboration with interns

However, there was a slight decrease in ratings on the May 2011 survey responses.

There were no statistically significant differences between the November and May responses to the survey for the following questions:

- How familiar are you with instructional technology?
- How useful is technology in your teaching?
- Would you recommend technology usage for instructional purposes to other teachers?

However, there was a slight increase in the ratings on the May 2011 survey responses.

There were significant differences between the November and May responses on the following questions with significant increases in the May ratings. The median, standard deviation, and effect size for each significant difference is listed on Table 2.

On the question, "Rate your students on student engagement, since infusion of technology in your school," the May 2011 response ($M = 3.9625$, $SD = .41377$) was significantly greater than the November 2010 response ($M = 3.6599$, $SD = .46363$), $t(1,20) = -2.79$, $p = .01$. The partial eta squared of .28 is considered a large effect size, and 28% of the variance was explained by the technology infusion through the intern presence.

On the question, "Rate your students on student excitement, since infusion of technology in your school," the May 2011 response ($M = 4.0527$, $SD = .44280$) was significantly greater than the November 2010 response ($M = 3.7489$, $SD = .48936$), $t(1,20) = -2.12$, $p = .05$. The partial eta squared of .18 is considered a large effect size, and 18% of the variance was explained by the technology infusion through the intern presence.

On the question, "Rate your students on acceleration of learning, since infusion of technology in your school," the May 2011 response ($M = 3.8794$, $SD = .35378$) was significantly greater than the November 2010 response ($M = 3.5598$, $SD = .57923$), $t(1,20) = -2.32$, $p = .03$. The partial eta squared of .21 is considered a large effect size, and 21% of the variance was explained by the technology infusion through the intern presence.

On the question, "Rate your students on proficiency with computer technology, since infusion of technology in your school," the May 2011 response ($M = 3.9165$, $SD = .34026$) was significantly greater than the November 2010 response ($M = 3.6109$, $SD = .41576$), $t(1,20) = -2.87$, $p = .01$. The partial eta squared of .29 is considered a large effect size, and 29% of the variance was explained by the technology infusion through the intern presence.

Discussion

Use of technology in the classroom by trained faculty leads to increased student achievement, closes achievement gaps, and decreases dropout rates (ISTE, 2008). However, although many schools are equipped with the

Table 1. Means and Standard Deviations

Question		n	M	SD
Rate your DOT Intern on availability when you have a technology question or problem.	November	21	4.1966	.39386
	May	21	3.9995	.47366
Rate your DOT Intern's ability to solve technology questions.	November	21	4.0619	.41999
	May	21	3.9255	.40824
Rate the overall quality of support you receive from your DOT Intern.	November	21	4.0296	.45420
	May	21	3.8442	.49926
Rate your growth in technology proficiency since collaboration with interns	November	21	3.4879	.52227
	May	21	3.4530	.63407
Rate your growth in morale since collaboration with interns	November	21	3.5517	.46726
	May	21	3.4523	.61561
Rate your students on *student engagement*, since infusion of technology in your school	November	21	3.6599	.46363
	May	21	3.9625	.41377
Rate your students on *student excitement*, since infusion of technology in your school	November	21	3.7489	.48936
	May	21	4.0527	.44280
Rate your students on *acceleration of learning*, since infusion of technology in your school	November	21	3.5598	.57923
	May	21	3.8794	.35378
Rate your students on *proficiency with computer technology*, since infusion of technology in your school	November	21	3.6109	.41576
	May	21	3.9165	.34026
How familiar are you with instructional technology?	November	21	3.0950	.21502
	May	21	3.2324	.36197
How useful is technology in your teaching?	November	21	3.4336	.24924
	May	21	3.4952	.22622
Would you recommend technology usage for instructional purposes to other teachers?	November	21	3.5699	.25208
	May	21	3.6107	.18394

Note: DOT = Digital Opportunity Trust.

Table 2. Means, Standard Deviations, and Effect Size

Since infusion of technology in your school, rate your student on	November		May		
	M	SD	M	SD	Effect size
Student engagement	3.66	.46	3.96	.41	.28
Student excitement	3.75	.49	4.05	.44	.18
Acceleration of learning	3.56	.58	3.88	.35	.21
Proficiency with computer technology	3.61	.42	3.92	.34	.29

latest instructional technologies, multiple studies have indicated that more than half of the teachers equipped with computers only use them for administrative functions, and only half of their students report using technology more than once a week (Abbott, 2003; National Teacher Survey, 2005). One reason that faculty are not using technology resources is lack of knowledge (Adams & Bonk, 1995). In addition, a lack of confidence in one's ability to use technology and a corresponding lack of commitment to using it can add to a teacher's reluctance to integrate technology into the classroom experience (Ertmer et al., 2007). Many faculty members lack the technological proficiency needed to take advantage of these new technologies, making them unable to bring these technologies into the classroom and leading to many standing unused in the classroom.

The "effective professional development of teachers in the integration of technology into instruction" is the number one factor for success (ISTE, 2008, p. 7). Faculty members need not only to learn how to use technology at a basic level but also to learn how to integrate that technology into their curricula (Baylor & Ritchie, 2002; Becker, 2001; Redish, 1997; Reynolds & Morgan, 2001; Roberts, 2003; VanFossen, 2001; Wenglinsky, 1998). Faculty training is the most significant factor that could improve attitudes toward the integration of technology in the classroom learning experience (Berson, 1996; The United States Department of Education, 2005; Reynolds & Morgan, 2001; Yildirim, 2000; Yildirim & Kiraz, 1999).

Teachers that were part of DOT USA's TeachUp! program perceived a significant increase in the areas of student engagement, student excitement, student acceleration of learning, and student proficiency with computer technology after the completion of the program in which they received training, coaching, and assistance in increasing the use of technology in the classroom to make their lessons more engaging and provide successful learning experiences from a program intern. With the understanding that teachers in the United States are professionals in the classroom, we give value to teacher perceptions of technology use in education and as such are able to determine that the integration of technology in the classroom is beneficial to the student.

Recommendations

DOT USA's TeachUp! program has addressed the need for teacher technology training by recruiting, training, and placing tech-savvy young professionals, typically digital natives, in "high need" public schools. These interns spend a year or more training, coaching, and assisting teachers in increasing their use of technology to make the classroom more engaging and provide a successful learning experience. This ongoing one-on-one mentoring and follow-up support is available to address teachers' daily challenges, alleviating the fear of the unknown while increasing knowledge, proficiency, and efficacy. The increase in the use of technology in the classrooms has resulted in growth in student engagement, excitement, acceleration of learning, and proficiency with computer technology over the year, as perceived by teaching professionals. Technology infusion through the DOT USA TeachUp! Program has had a significant effect on the students, and it is recommended that this type of professional development be tried in more school districts.

Faculty members need to learn not only how to use technology at a basic level but also how to integrate that technology into their curricula (Baylor & Ritchie, 2002; Becker, 2001; Redish, 1997; Reynolds & Morgan, 2001; Roberts, 2003; VanFossen, 2001; Wenglinsky, 1998). As well, further research needs to look specifically at the integration of technology into the curriculum at all levels of education.

Finally, there should be a clear focus on these digital natives who have entered the workforce as educators. Although the digital natives can be assumed to have some expertise in communication (females) and gaming (males), they do not necessarily have the expertise to use these technologies to facilitate and improve classroom learning. Digital natives must be taught how their acquired skills can be used to integrate technology into the classroom curriculum to provide complex cognitive engagement for their students (Warschauer, 2007). DOT USA's TeachUp! program allows for this specific type of learning to occur as the interns can work with their teacher counterparts at their own level of comfort. In the future, research should be conducted to discover the type of approach that works best with digital native teachers.

Declaration of Conflicting Interests

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