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Understanding Tech-Savvy Teachers: Identifying Their Characteristics, Motivation, and Challenges

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Enormous funds have been expended to support integration of technology into the K-12 classroom environment and overall, not much has changed in the classroom with teachers who are not regular technology users. This study identified “tech-savvy” educators and examined the ways in which they report having learned what they know, challenges they identified in using the technology instructionally, and ways they used educational technology for professional and instructional activities. Through the use of a survey, several interviews, and a focus group, these educators described their motivation to be life-long learners, confidence to integrate instructional technology into their personal and professional lives regardless of the internal and external constraints placed upon them, and their views on funding, time, and support for their technology integration efforts.

Keywords: technology implementation; teacher professional development; teaching/learning strategies; teachers’ lives, technology integration; motivation

INTRODUCTION

The federal government and numerous teacher professional organizations have called for teachers to be ready to use and teach with technology. The goal for universities and school districts then is to ensure this happens at the preservice and inservice levels. Enormous funds have been expended to support these efforts and yet, not much has changed in the classroom (Cuban, 2001; Laffey, 2004; Norris, Sullivan, Poirot, &

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Solloway, 2003). The National Center for Educational Statistics (NCES, 1999) reported that less than twenty percent of current teachers reported feeling very well prepared to integrate educational technology into classroom instruction. According to Goddard (2002), as technology is integrated into classrooms and curriculum, teachers need to effectively integrate the technology into their curriculum to maximize the perceived benefit of the technology being used. The unfortunate result of preservice and inservice professional development appears to be that very little transformation in teaching and learning has occurred. Wang, Ertmer, and Newby (2004) measured preservice teacher self-efficacy beliefs toward technology integration into their classrooms and found that a lack of self confidence directly influenced their level of computer use. Thus, many entities have recognized that without focused and purposeful energy on the part of both the teachers, as well as the institutions, educators in K-12 schools are unable to maximize the potential of educational technology.

Research has tended to design programs that attempt to implement strategies to change practice and frequently, when the support and funding disappear, so does the change in practice (Cuban, 2001; Pelligrino, 2004; Sandholtz, Ringstaff, & Dwyer, 2000; Schrum, 1999). This study sought to examine how educators who are already tech-savvy learned the knowledge and skills they have, use technology available at their schools, motivate themselves to overcome challenges they identify, and to recognize any unique attributes of their personal or professional practice that enhance their use of technology both professionally and personally, especially when there is no additional funding or support in technology provided for them. For purposes of this study, we defined those educators who identify themselves as being comfortable with technology, using it extensively in their personal lives, and employing it professionally in teaching and student learning as “tech-savvy.” They also affiliated with others in an organization dedicated to the promotion and encouragement of technology integration in educational applications.

LESSONS FROM LITERATURE

Becker (2000) examined the differences between “exemplary” and more typical computer using educators along the dimensions of teaching environments, personal backgrounds, and teaching practices. His study (completed in 1994) concluded that these individuals taught in a variety of schools but they shared the characteristic in which resources “had been used to nurture and support the kind of teaching practice” that would provide opportunities for teachers to develop their skills in technology (Becker, 1994, p. 289). They also had more well-rounded educational experiences than other teachers and a greater personal commitment to life-long learning. But these data were gathered, in technological terms, a lifetime ago and it is worth reexamining teachers’ classroom environments, personal backgrounds, and teaching practices to understand how tech-savvy teachers are acquiring their skills and using technology.

In the past twenty years, a gradual transformation has occurred in public education; now, teachers are being required and expected to use educational technology in one form or another in their classrooms (Collier, Weinburgh, & Rivera, 2004). With continual increases in new technology, many school districts have or are in the process of adopting new methods to improve communication, teaching, and learning. Underlying these new methods are the hopes that teachers will learn the skills to effectively use technology as an effective part of their instruction (Guerrero, 2005). Due to the increased pressures placed upon teachers to use technology by school districts, the federal government, and professional organizations, expectations to use technology to prepare teachers at the preservice and inservice levels have risen (ISTE, 2000). The No Child Left Behind Act of

2001 (US Department of Education, 2001) also added pressure by increasing technology expectations for teachers and sought to make high-stakes testing more pervasive than ever before (Amrein & Berliner, 2003). Even though massive amounts of money have been spent on training educators, a notable difference in technology integration in the classroom has not materialized (Cuban, 2001; Laffey, 2004; Norris, Sullivan, Poirot, & Solloway, 2003; Williams & Kingham, 2003). Overall, we might conclude that current preservice and inservice programs geared toward increasing classroom technology integration have not been very successful.

Studies on the status of technology in schools. The promises of technology to transform education led to large expenditures on hardware, software, Internet access, and peripherals. The research firm Market Data Retrieval claims that over 80% of public schools in the United States have broadband service, which suggests that many educators have seen some form of technology related to the Internet in their schools (Lindquist, 2004). The spending has created an infrastructure in which nearly 100% of public schools in the United States have access to the Internet, compared with 35% in 1994; more importantly, 93% of instructional rooms have Internet access compared with three percent in 1994. Additionally, 95% of those rooms had broadband access, reflecting the growth of improving speed and access over the past ten years (Parsad & Jones, 2005).

It is also worth noting that “in 2003, the ratio of students to instructional computers with Internet access in public schools was 4.4 to 1, a decrease from the 12.1 to 1 ratio in 1998, when it was first measured” (Parsad & Jones, 2005, p. 7). Today, modern technology, including laptops, is being used to try to reduce the student to computer ratio even further. For example, many states are passing initiatives which involve one-to-one student to laptop computer learning, where each student and teacher is equipped with a laptop computer (Chessler, Rockman, & Walker, 1998; Lowther, Ross, & Morrison, 2001; Lowther, Ross, & Morrison, 2003). Yet even with modern technology in so many schools, the evidence suggests it is not being utilized in the way that it has been envisioned by policy makers, administrators, and districts. Typically, classroom teachers have been blamed for this lack of use (Cuban, 2001).

Many schools have attempted to provide professional development programs to prepare teachers to integrate technology into their curriculum. It appears that when support and funding disappear, so does change in practice for technology programs. Furthermore, brief classes or workshops without ongoing support seem to create few substantive changes in curriculum and classroom practice (Cuban, 2001; Pelligrino, 2004; Sandholtz, Ringstaff, & Dwyer, 2000).

Efforts to teach preservice and inservice educators. In addition to the efforts established by school districts, universities have also provided classes and professional development for teacher candidates. These efforts were expanded through the Department of Education’s PT3 grant program from 1999 through 2003. Some PT3 studies looked at the barriers and challenges to technology integration, such as alignment with the curriculum, peer support, and faculty involvement (Brzycki & Dudd, 2005; Staples, Pugach, & Himes, 2005). Other studies addressed the growing challenge in modern education to remediate the fact that most teachers still feel uncomfortable using technology in their teaching (Schrum, Skeeel, & Grant, 2002/2003; Seels, Campbell, & Talsma, 2003; Strudler & Grove, 2002). However, Burns, and Polman (2006) did find that teachers who understood the research behind the integration of classroom technology and the expectations from parents and school administration seemed to be more comfortable in their integration of technology into their classrooms. With all of the support and training seemingly provided, many teachers are still viewed as resistant to integrate technology on a more frequent basis into the teaching and learning process.

THEORETICAL FRAMEWORK

We examined the results of this study through the lens of Fullan (2001) which guided our conception about the challenges to changing educational practice. His notion of a recursive and difficult process included three stages: initiation or adoption, implementation, and continuation or institutionalization. Additionally, Fullan (2001) suggested that teachers as learners require time to gain knowledge and then weave that knowledge into what they know and do in their instructional lives. This seemed particularly appropriate when examining the use of educational technology.

Fullan (1990) depicted professional development as including those activities which are intended to improve skills, attitudes, understandings, or performance in present or future roles. He demonstrated a positive correlation between attendance at faculty development activities targeting technology integration and an increase in usage levels of technology in teaching practices, yet this most likely would not be the case unless the those in attendance had sufficient motivation to be there. Aside from the professional development that schools provide, we were also interested in the other ways in which teachers learn about technology. We examined the information from our participants through these steps in hopes of discovering specific characteristics, challenges and motivations that were indicative to their learning and adoption process. The four specific questions that guided this study were:

1. What do “tech-savvy” educators report regarding their access to, and use of, technology for instructional and professional activities?
2. What methods do these educators use to learn the knowledge and skills they have?
3. Do any characteristics of these educators emerge consistently?
4. What challenges and motivation do these educators report in their use of technology for professional and instructional activities?

METHODS

This study was designed to understand the characteristics, motivational forces, and challenges of tech-savvy educators. Given the complexity of human behaviors, attitudes, and beliefs, this study has been designed to utilize a mixed methods approach including survey, interview, and focus group data. This research approach is effective in collecting both quantitative and qualitative descriptive data (Miles & Huberman, 1984; Onwuegbuzie & Leech, 2004; Reichardt & Cook, 1979) that this study sought to understand. Many experts in the social sciences believe that combining qualitative and quantitative tools in this fashion presents a viable method for inquiry and exploration in educational research (Patton, 1990; Reichardt & Cook, 1979).

Recently, Bauer and Kenton (2005) utilized both survey and interview data in a study designed to explore and understand the difficulties that tech-savvy teachers have had to overcome in their classrooms. Likewise, Lai and Pratt (2004) used a mixed method approach both surveying and interviewing school computer coordinators to gain an in-depth understanding of the characteristics of education technology leaders. This combination of quantitative and qualitative methods is common among educational researchers because it combines the relatively convenient collection of descriptive data through questionnaires with the depth and flexibility of interviews and focus groups designed to more fully explore participants’ experiences, attitudes, values, and interests (Creswell, 2002; Gall, Gall, & Borg, 2003).

PARTICIPANTS

One of the goals for this study was to investigate how tech-savvy educators are integrating technology into their classrooms. In order to do this, we identified a group of teachers who met our definition of tech-savvy, meaning those who were comfortable using and integrating technology in their classrooms. The participants for this study were current members of the Western State Coalition for Educational Technology (WSCET). WSCET members were primarily public school teachers who were advocates for instructional technology use in their schools. The participants work in rural, suburban, and urban school districts across this western state. All members of the organization were invited to participate. Ultimately, 77 study participants took the online questionnaire; fifty-one participants (66%) identified themselves as classroom teachers. Other participants were either school administrators or various technology specialists working in schools. We focused the results on the classroom teachers, since our goal was to understand those tech-savvy educators. Of the fifty-one, 57% were female and 43% male. The vast majority (80%) was over the age of 40 and had been teaching for more than 10 years. Just over half (55%) of the participants teach at the elementary level, while 27% and 14% teach junior high and high school respectively. The most common subject area taught among the secondary teachers was science (6), followed by business and technology (5 each). Other subject areas taught included history (4), English (3), Math (2), and Religion and Health (1 each). Sixty-one percent of the participants reported that they teach in suburban area schools and the other forty percent of teachers were divided equally between urban and rural schools.

DATA SOURCES

An online survey was constructed to gather participants' perspectives and experiences in learning about, using, and implementing technology for their professional and instructional activities. Members were initially contacted through WSCET's listserv and were invited to participate in an online survey. Those who chose to answer the survey were also invited to participate in a focus group at WSCET's annual conference or to volunteer for an individual interview. All participant identities in this research study were protected with pseudonyms. Ultimately, 77 individuals completed the online survey, three individuals participated in the focus group, seven interviews were conducted through e-mail and one interview was conducted in person.

INSTRUMENTS

The primary quantitative instrument used in this investigation was a 15 item online questionnaire generated through an online survey resource (see Appendix A). The survey was developed to provide a range of information about the respondents' use of technology. Since this survey was not designed for determining causality or correlation, nor was it intended for generalization across populations, but rather to gain a picture and description of these individuals' perceptions, the survey was not pilot tested prior to this study. Simple descriptive statistical analysis was used to understand the results.

PROCEDURES

Members of WSCET were invited to participate in the survey through a posting on its web site, and through its newsletter. The online survey was posted and anonymity was assured. Typical sampling bias issues surrounding the use of online surveys were not an

issue as all participants, members of WSCET, had access to web browsers, and it was assumed that each participant possessed the basic technological skills to navigate the instrument. Additionally, individuals were invited to participate in individual interviews (in person or through email) or in a focus group held at the organization's annual conference. While a small number did participate in the focus group (seven teachers) and in individual interviews (eight teachers).

Qualitative methods utilized in this investigation included the semi-structured interviews, a focus group, and open-ended questions as part of the online survey. Through the use of open-coding (Strauss, 1987), data were examined seeking emergent themes (Compte & Preissle, 1993) by each researcher and compared as part of the analysis (Merriam, 1998). While the findings from these qualitative approaches may not be generalizable to other tech-savvy populations, they are invaluable in gaining insight into the attitudes, beliefs, and experiences of the tech-savvy population this study sought to investigate.

RESULTS

The results of the data are presented as answers to the research questions with which the study began. That is, we looked at the access to and use of technology as well as the characteristics, motivation, and challenges these tech-savvy educators described and identified. Within each category, specific themes emerged which are unique to tech-savvy teachers.

Research Question 1: Access to and Use of Technology. Every one of these participants had access to technology at home and at school. The teachers reported that word processing, PowerPoint presentations, and Internet research were the three most common uses of technology for instruction with students in their classrooms. The amount of personal time and money invested by these teachers is evidence of a strong personal commitment toward using technology in the classroom. These teachers also spend a great deal of personal money purchasing technology equipment and software for their classrooms and students. Two-thirds of the participants noted that this amount was in excess of \$100 dollars annually, while many reported spending into the thousands each year. One teacher concluded, "When you consider the actual machinery of technology (cameras, computers, storage devices) as well as the photo paper, printer ink, tapes, cassettes, software, etc., I spend approximately one-fourth of my yearly salary on technology." Similarly, nearly all of these tech-savvy teachers noted that they spend personal time preparing and planning to use technology in their classroom. In fact, most respondents (73%) estimated working a minimum of one extra hour every day just to integrate technology into their teaching. For example, one teacher described her willingness to sacrifice personal time, "There is never enough time to do all you want to do. Some teachers head for home when the time is up, but I put in many hours and still cannot do all the things I'd like to do." Their willingness and desire to utilize technology in the classroom, demonstrated through the sacrifice of personal resources, offered insight into the character of these teachers.

Research Question 2: Learning about Technology. Approximately one-half of this study's participants have received technology training through professional development classes and district inservice courses. Three-fourths have increased their technology skills through conferences and workshops as well. Remarkably, nearly all (94%) of the tech-savvy teachers reported that they are self-taught when asked about their use of technology in the classroom. Furthermore, these teachers sought ways to acquire and learn about technology on their own without the help of funds, or additional monetary compensation from their school. Approximately half (51%) of these teachers reported

spending at least \$100 or more of their own money on professional development and additional technology training each year. It is important to note that most, if not all, of these teachers make a considerable effort to learn about, acquire, and use technology when there is no additional support from government or business grants, university researchers, or private donations.

Research Question 3: Shared Characteristics. These educators appear to share a level of confidence that enabled them to take risks in their teaching and were more willing to try new things; they also believed they could troubleshoot their way out of a possible computer difficulty. It may be that this confidence and willingness to take risks have allowed these teachers to become self-taught tech-savvy educators. As one teacher put it, "I'm smart enough and confident enough in my abilities to learn new things that I'm not intimidated by it." Another teacher commented, "I am fearless!" This confidence appears to help tech-savvy teachers overcome a fear of failure in using technology in front of increasingly tech-savvy students.

One characteristic of the teachers in this study was humility. While they were extremely confident, they were also quite willing to put aside their egos in front of their students in the service of promoting student learning. An elementary school teacher described the learning relationship she has with her young students by explaining, "I have kids that come and show me, and teach me, and I don't know, that just doesn't threaten me, and I see them teaching me as much as I teach them." Another participant commented, "Having the kids...sitting down with laptops and kind of teaching each other, and teaching me; I learn stuff." This willingness to place learning ahead of personal pride or ego is a characteristic which may separate tech-savvy teachers from those who do not integrate technology into their teaching.

Another characteristic that teachers revealed was their strong desire for continued or "life-long learning." While these teachers tended to be over the age of 40 and had extensive classroom experience, nearly all of them (94%) claimed that they have learned to use technology "on their own." This clearly demonstrated their willingness and continued desire for new knowledge and personal development. Rather than becoming stagnant, these teachers have a thirst for new and creative ways to help students learn. When asked to explain her willingness and motivation for using technology, one teacher stated it is due to a "curiosity and a desire to find new ways to teach and excite students." This attitude is consistent with other participants in this study who also have a commitment to meeting student needs through the use of technology, including sacrificing personal time and money for continued training.

Research Question 4: Motivation and Common Challenges. Inspiring students to engage, perform, and become life-long learners is a central issue in education and thus a significant concern for educators. In this study, the majority of the respondents mentioned using technology because of its perceived ability to motivate students in learning. The participants responded that they use technology because it is fun and challenging for their students as well as for themselves. One teacher commented, "Students like technology. It makes learning less like work and more like fun." These teachers are integrating technology into their teaching because they feel that "technology engages the students," which they believe promotes better learning.

Deci and Ryan (2000), in their self-determination theory, offer an explanation about why some educators may be attracted to technology. This theory incorporates three basic fundamentals of autonomy, competence, and relatedness. Teachers who are using technology, according to this research, are doing it because it is possibly fulfilling these three inherent needs. "There can always be problems," said one teacher, "but seeing the sparkle in the eyes of the kids when they are enjoying what they are learning is worth it."

These teachers realize that using technology has risks that may cost some class time, but the rewards outweigh them.

Additionally, teachers in our study attributed student success to technology because they believe that every student gets involved and more particularly, because technology can appeal to diverse learning styles. Participants thought that all students, regardless of their learning style, were able to experience success and learn while using a computer or other forms of technology. “An added benefit is that technology engages students. Let them work on a computer and even your most reluctant learner produces and learns!” said one teacher. Computers allow for autonomy, because each student can choose his/her own level of difficulty and pace in which to complete an assignment. They can also determine the amount of help they receive and have more control over their own learning (Eggen & Kauchak, 2004).

According to our data, another important impact is that technology ties learning to the real world. Teachers thought students were able to connect with technology since they were learning future job skills and becoming proficient in programs and technologies that they anticipate using in future careers. One teacher commented,

You can't engage learners without giving them a sense that the topic ties to the real world. There is no lack of interest if I bring out the video camera or tell students we will be working on the computers. ... Students recognize real-world, meaningful uses of these tools.

This notion of learning for the future ties directly to the relatedness aspect of Deci and Ryan's theory (2000). One teacher responded, “Not using technology in our classrooms is an educational malpractice in my book. We are hired to prepare our students for their futures, and, let's face it, technology is the future.” Another teacher referred to technology as “the new measure of literacy, because it is the way we communicate.”

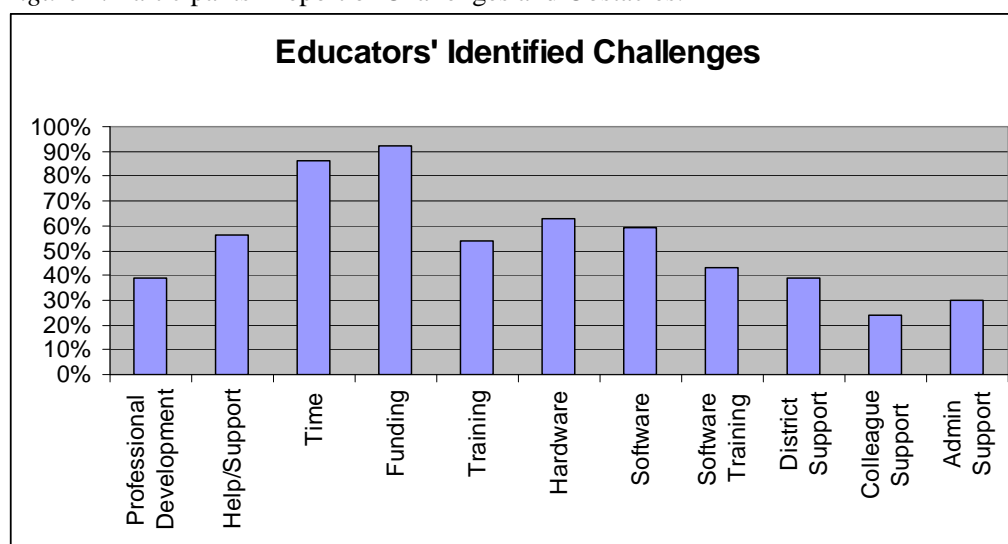
Tech-savvy teachers in this research felt that technology also helped to create life-long learners, a significant goal of education. Teachers expressed a concern that their students develop a love of learning beyond the classroom and that technology helps to do this. For example, they felt they could use it as a tool to educate students on how to access information through Internet researching skills, a key component to becoming a life-long learner. Teachers also reported that their students continue to develop competency and increase their self-esteem. The participants also think that technology allows for their students to use more creativity in completing assignments. One teacher reported, “It gets boring doing the same things every year and computers allow for a creative outlet.” Another commented, “I see huge smiles from my students when technologies are used. They enjoy the opportunities and even enjoy the challenges.”

Finally, teachers felt motivated to use technology because it increased their own feelings of self-efficacy. The participants believed that they were better teachers because technology allowed them to be more creative and improve their teaching. Bandura (1997) viewed self-efficacy as the belief in a person's capabilities to be able to participate in a given task to produce a desired result. The success that one has when a task is achieved produces mastery experiences, which lead to greater feelings self-confidence (Brophy, 2004). The respondents felt that they were better teachers because they are able to enliven their lessons through the use of technology. Equally important, participants enjoyed the sense of accomplishment they experienced when they mastered a new technology and subsequently shared their knowledge with their students. In this manner, the students could have similar feelings of success.

Overcoming Challenges. As new technology emerges, it should provide increased benefits for the user (Norman, 1993); however, upon compilation of the data from the

focus group, interviews, and online survey, the themes of funding and time emerged as ongoing challenges to these educators' goals to implement technology. As can be seen in Figure 1, educators found several challenges to their use of technology. While not surprising, lack of time and money have consistently been found as challenges in current literature on technology implementations (Bauer & Kenton, 2005; Becker, 2000; Cuban, 2001). Yet these themes are still compelling and worth understanding.

Figure 1. Participants' Report of Challenges and Obstacles.



Tech-savvy educators indicated that they are not greatly challenged by lack of support from colleagues (24%), administrators (30%), or the school district (39%). Overall, funding and time remain overarching challenges, as one teacher declared, "Money and equipment are still a challenge to obtain; the time to implement also presents a challenge." Another explained, "Most of what I learned in the use of technology has been on my own. Only in the last few years has help been given." Even when time and funding were not provided, many of these "tech-savvy" teachers sacrificed their own resources so that they could continue to teach with technology.

Funding. According to 92% of the survey respondents, the most common concern was the challenge of funding for training and for hardware/software. Many participants indicated that they spend several hundred to several thousand dollars of their own money annually on technology for their classrooms and personal use. One educator commented on her personal expenditure of money; when asked how much she spends, she responded by saying,

Tons of money. You'll think I'm crazy but because it isn't spent all at once, you have no idea unless you actually keep track. I have taught for eight years. The first two years I spent \$3,000 out of my own money - Thank goodness my husband was primary supporter and he was also okay with me doing this!

However, after initial investment, many respondents indicated that money and time spent on training was reimbursed at either the school or district level. Some reported, "This is usually covered by the school or district," and that the "School will cover professional development costs." Others mentioned grants as a source of funding, as one teacher commented, "There appears to be a major lack of funding to provide instructional

technology beyond the basic computer in the classroom...by far, the technologies used in my classroom have been the result of my personal time writing grants.”

Even though lack of training was reported as an obstacle to educational technology use by 54% of the tech-savvy educators, they reported funding was a major obstacle to seeking that training. Data indicated that most spend several hundred dollars each year of their own money on technology training and professional development. One educator stated, “I’ve learned by doing and taking classes at UEN [State Education Network].” Another hinted at the underlying cause of the challenge of funding, “For my extra efforts, I get a stipend of \$300 per year from the district. That hasn’t increased in twenty years.”

Time. A significant personal and professional constraint was time. This was prevalent throughout the data; eighty-six percent of the respondents mentioned time as a major challenge in instructional technology use. The identified time constraints lead the tech-savvy population to use their own time to complete technology driven tasks (e.g., test making, research, creation of PowerPoint presentations, etc.). Their own time after school is also used to trouble shoot or explore technology issues. One teacher, when asked about the challenges to technology use, remarked, “Time and technical problems. I hardly have enough time to do everything that is expected. I find that I will dive into something technical and it seems to take extra time because something goes wrong. But because I’ve had troubles, I’ve learned a great deal about computers!”

Also, many tech-savvy educators indicated that they were the unrecognized “technology-specialist” at their schools. Because of their assumed technology “expertise,” they were typically using their own preparation time to assist their colleagues with technical problems. One educator stated what many other tech-savvy educators were reporting, “My frustration is, I’m spending a lot of time helping people troubleshoot and I can’t get to my own projects.”

A major finding of this study concluded that most of the tech-savvy educators believed that technophobia of other teachers kept technology out of many teachers’ classrooms. One teacher explained,

Technophobia is still a problem with at least half of our faculty. If all teachers were willing to apply their Microsoft updates monthly, update and use their virus and spyware software weekly, or at least remember how to log-on, my time helping them would be reduced to maybe one or two hours per week.

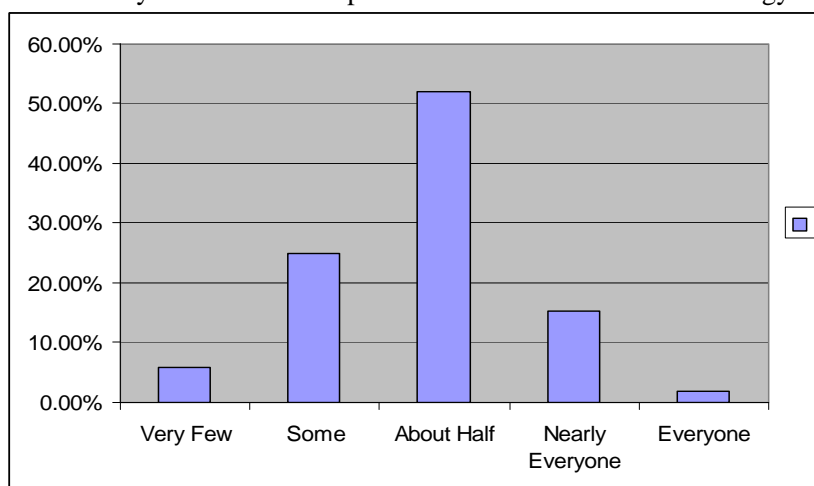
Even with the time constraint, tech-savvy educators continue to utilize technology for their own enjoyment and education. One educator stated that he devoted, “about an hour *a day*. Because I enjoy it.” And another mentioned, “I work on the computer daily. I love to learn new ways of doing things. This love for technology and the ability to take risks helps to compensate for the lack of time.” The major concern of these tech-savvy teachers regarding time was not in having enough, but in being able to use their own time to work on their individual projects. Their time was reported as being consumed by other faculty members who have not yet acquired basic technology skills.

Technology Implementation Failure. Respondents were also invited to assess the use of technology in their schools. One-half indicated that approximately 40%-50% of their school’s faculty use technology for instruction, while a very small number suggested that all teachers in their school use technology for instruction, and 30% thought that 25% or less use technology instructionally. Figure 2 provides these data.

However, the data indicated that there are many reasons technology integration in the classroom fails. One participant noted that “There are those teachers who are very uncomfortable with technology and things and would rather focus their efforts on people and feelings.”

One goal of this study was to determine what tech-savvy educators felt were the reasons other teachers do not integrate educational technology into their classrooms and curriculum. The two most prevalent responses included fear or intimidation, and time. Other reasons mentioned to explain why some teachers do not integrate educational technology included (a) age difference, (b) lack of knowledge/training, (c) large class sizes, and (d) lack of funding. It was suggested that some teachers fear it will not work properly during class, and then valuable teaching time will be lost while trying to fix the problem. One teacher reflected, “Time, money, and fear of the technology not working properly. They don’t want to have to have a backup plan because it takes too much time.”

Figure 2. Tech-savvy Educators' Perceptions of Other Educators' Technology Use.



According to McNierney (2004), negative reinforcement through the lack of technology support and staff is one reason teachers shy away from instructional technology. Data showed that this resistance was based on experience (i.e., years working with technology) and number of years teaching. One participant commented, “Our younger teachers use technology a lot. . . . A few of the older teachers don’t even check their email because they don’t want to be bothered by technology.” However, a paradox seemed to emerge where a majority of teachers in this study were 40+ in age and still felt that age (older) was a factor which caused a lack of technology integration for many teachers.

DISCUSSION

The teachers in this study reported that they gained enormous satisfaction from “life-long” learning and being viewed by their community and peers as “professionals” because of their technology use. Yet these teachers expressed frustration at the same time because they become occupied with troubleshooting menial technology tasks as a result of their expertise. This finding relates directly to other findings that teachers who participate in professional activities are more likely to become effective technology-using educators (Becker & Riel, 1999). They found “that the more extensively involved teachers were in professional activities, the more likely they were to a) have teaching philosophies compatible with constructivist learning theory, b) teach in ways consistent with a constructivist philosophy, and c) use computers more and in exemplary ways” (p. 2). Pisapia (1994) also identified that teachers who use technology as a tool (e.g., teaching for understanding) tend to follow Becker & Riel’s (1999) findings.

Participants in this study strongly believed that using technology was not only a professional responsibility, but also made them more effective teachers. Nearly all of the participants used technology because it was enjoyable to their students and themselves, which directly relates to Deci and Ryan's (2001) self-efficacy beliefs. It appears too that teachers who integrate technologies into their teaching and learning practices may have greater involvement and participation from their students in the learning process. These teachers felt that by using technology, teaching and learning improved.

Much research has been devoted to determining factors that inhibit or stifle the effective integration of technology into classrooms. These factors may be explicit challenges that include access to technology (Norris, Sullivan, Poirot, & Soloway, 2003), time constraints (Schrum, 1999), and general conditions (O'Bannon & Judge, 2005). They may also be more personal and implicit challenges such as personal characteristics, attitudes, and the nature of the culture of a school (Becker & Riel, 1999; Strudler, & Grove, 2002). Significantly, it appears that

... given sufficient access to computers, professionally active teachers will use them in exemplary ways, and given their greater involvement in leadership activities and informal collaborations with peers, teacher leaders are in a position, with sufficient authority and time, to help other teachers move towards being more accomplished users of computer technology. (Becker & Riel, 1999, p. 2)

This study provides added support to the conclusion that those teachers who use technology display characteristics that promote attitudes of continual learning, risk-taking, and curiosity. They are recognized by others as possessing knowledge of computers and other technologies, and are considered leaders in the field of technology use. Also, that they will continue to seek out ways of learning about technology, acquiring new technologies, and finding new ways to incorporate technology into teaching and learning.

The data from our study confirm the belief that teachers using technology and teaching their students to use it enhances their students' learning and preparation. They further believed that technology may promote creativity and collaboration for their students. This perspective was summarized by Swain and Pearson (2001),

We must educate all teachers and students to use the computer as a productivity tool as well as a tool for learning, research, networking, collaboration, telecommunications, and problem solving. Always using drill-and-practice software does not allow students to participate in meaningful and engaging learning environments. (p. 12)

The results of this study and others have also raised an issue that affects students throughout the country. According to a national study (National Center for Education Statistics, 1999), high poverty schools have access to fewer computers with multimedia capabilities and Internet connections. Without these capabilities, it is likely that computers will be used as a vehicle for drill and practice, writing, or to instruct or inform the user which supports a traditional model of education (Pisapia, 1994). This is in opposition to using the technology for productivity, investigation, problem solving, or problem generation. Unfortunately, teachers in poor inner city and rural schools encounter more challenges in integrating technology into their classrooms, both because the support infrastructure is much less available and because they have significantly less training than teachers in wealthier schools (Kleiman, 2000). The current study supports

these results in which almost half of the participants were from rural or inner city schools and reported that they do experience challenges in lack of time, funding, and support. Additionally, most of our teachers reported that when technology was not provided for them, they use their own funds to acquire technology in order to use it in their classrooms.

CONCLUSION

This study sought to gather information from identified tech-savvy educators to understand how they acquire and use technology and to create a picture of their characteristics, motivation, and challenges. The results were not surprising or revolutionary; however, they support results from a wide variety of previous studies. Through this research we now have an enhanced understanding of the ways in which these teachers have learned what they know, how they conceptualize what it is that they do, and a glimpse into their motivation for integrating, using, and learning about technology. The data demonstrated that these tech-savvy educators make willing sacrifices in personal time and money to improve their skills and knowledge in using technology.

The data showed that these tech-savvy educators have a great deal of access to technology in the classrooms and homes. If they cannot achieve the level of access they need at school, they will provide it in their own ways. They use their own money, work with their administration, and even write grants to provide what they deem essential to their students.

These educators used technology in their professional activities and found it to be a rewarding experience. It not only provided enhanced self-efficacy, but also helped engage students in learning in their classrooms. The data also showed that these educators are considered to be technology resources in their schools that are available to help other colleagues; the perceived drawback is that they tend reduce their own time to work and learn. Moreover, the data provide further confirmation on time, funding, and support complications that typically interfere with their ability to do more with technology in their professional and instructional lives.

While each of our respondents was an individual, as a group they did demonstrate some common characteristics. They were very confident in their abilities as educators, and as technology problem solvers. They were also remarkably humble in their abilities but did acknowledge their hard work in the professional lives. They also shared a commitment to continuing or “life-long” learning. These characteristics also may assist them in overcoming the obstacles they identify, which include time, money, and support. One question to consider is if these are things that they bring to all aspects of their lives, or if there are ways to encourage the development of these characteristics in all our educators.

Based on the answers to the research questions, it is clear that those educators in our schools who are not “tech-savvy” have a need for assistance. A divide exists, as evidenced by the tech-savvy teachers’ views of them, between those who embrace the technology and those who do not. Future research might try to better understand what these educators perceive as obstacles to their use of technology, their beliefs about motivating students and the place of technology-integrated activities in our schools, and their own ability to learn to use the technology.

Clearly, more research is needed that will begin to explicate ways of solving some of the challenges that teachers face in using technology as well as the issues that prevent technology integration and implementation for teacher candidates and beginning teachers. Several new research questions were generated through this study. Given that the age of

our participants was largely over 40, it is possible that newer teachers require more support for experimenting with technology. Would more mentoring or pairing technology using cooperating teachers with preservice teachers during student teaching increase their ability and willingness? Would more support in their first few years of teaching help them become risk takers? Would it help if school districts provided a variety of ways to take classes and participate in technology professional development? What are the best practices for teacher educators and cooperating teachers? Are there supports that will encourage university professors to model technology use in methods classes? What professional development activities really do make a difference in practice? Are some of the characteristics we identified simply part of these educators' fundamental DNA or is it possible that risk-taking and life-long learning behaviors can be fostered and encouraged?

One suggestion is to provide technology professional development activities that would help to increase novice teachers' feelings of self-efficacy and confidence when using computers. Teachers could be given opportunities to team-teach with tech-savvy teachers in order to provide them with instructional and technical support.

This research study provided just a glimpse at a small number of teachers from one state and yet, the data were closely aligned with other studies. We hope other researchers will join us to take the next steps in determining what it will take to assist more educators to join this innovative and courageous group of teachers who have the motivation to pursue life-long learning, humility to work with technology, confidence to integrate educational technology into their personal and professional lives, and who sacrifice their own time and resources regardless of the constraints placed upon them.

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APPENDIX A Survey

1. Where did you learn to use technology during your training as an educator? Please check all that apply.

Preservice courses/experience	District in-service courses	In-school training
Personal choice university course	Professional development courses	On your own
Other (please describe)		

2. How many years have you been using technology (i.e.: desk computers, laptop computers, Smart boards, LCD projectors, PDA's, digital cameras, video cameras, Internet, E-mail, and associated software) in the following ways? (Please indicate number of years in the blank)

In your classroom? _____

Teaching (instruction, student involvement) _____ years

Professionally/administratively (grades, lesson preparation, with out student involvement) _____ years

Personally (at home, recreationally, communications) _____ years

3. How do you utilize technology for instruction with students? (Please check all that apply)

Web-based assignments	Internet research	PowerPoint presentations
Word processing	Inspiration mapping/webs	Moviemaker/Pinnacle
Web-based discussion groups	E-mail	Other (please describe)
Alternative assessment opportunities		

4. What technology resources are available in your school for use with students? (Please mark “yes” or “no” for each resource; if “yes,” please mark how available they are to you)

Technology resource yes__ no__	School availability				
	Never	Rarely	Occasionally	Often	Always
Library computers yes__ no__	Never	Rarely	Occasionally	Often	Always
Computer lab yes__ no__	Never	Rarely	Occasionally	Often	Always
Mobile computer lab yes__ no__	Never	Rarely	Occasionally	Often	Always
Classroom laptops yes__ no__	Never	Rarely	Occasionally	Often	Always
Laptop lab yes__ no__	Never	Rarely	Occasionally	Often	Always
Classroom desk computers yes__ no__	Never	Rarely	Occasionally	Often	Always
LCD projectors yes__ no__	Never	Rarely	Occasionally	Often	Always
Smart boards yes__ no__	Never	Rarely	Occasionally	Often	Always
Digital camera yes__ no__	Never	Rarely	Occasionally	Often	Always
Camcorder yes__ no__	Never	Rarely	Occasionally	Often	Always
VHS/DVD player yes__ no__	Never	Rarely	Occasionally	Often	Always
Overhead yes__ no__	Never	Rarely	Occasionally	Often	Always
Other: (describe)	Never	Rarely	Occasionally	Often	Always

5. On a scale of 1-5 please mark how often you use the following technology resources instructionally. (Please check 1-5 for each resource where 1 = not applicable or not available and 5 = daily use)

Technology resource	1 NA	2 Yearly	3 Monthly	4 Weekly	5 Daily
Library Computers					
Computer Lab					
Mobile Computer Lab					
Classroom Laptops					
Laptop Lab					
Classroom Desktop Computers					
LCD Projector					
Smart Board					
Digital Camera					
Camcorder					
VHS/DVD Player					
Overhead Projector					
Other					
PDA or a Handheld Device					

6. If you are a certified/licensed teacher, please provide a brief description of how you use technology in your classroom. (If you are a school/district technology specialist please skip to question #8.)

7. What challenges are you faced with in terms of instructional technology use, both instructionally and professionally? (Please mark yes or no)

Instruction/Professional Development	Yes	No
Instant Help/Support	Yes	No
Time	Yes	No
Money/Funding	Yes	No
Training	Yes	No
Hardware Problems	Yes	No
Software Upgrades	Yes	No
Software Training	Yes	No
District Support	Yes	No
Colleague Support	Yes	No
Administrative Support	Yes	No
Other	Yes	No

8. Please provide details on what you believe are your major challenges from question #7 in terms of instructional technology use.

9. Given the challenges that you've identified, what motivates you to continue to use technology?

10. What percent of your school's faculty use technology instructionally?

11. What personal characteristics do you possess that have led to your use of technology?

12. How much of your own money do you spend on technology?

13. How much of your money do you spend on professional development (i.e. attending conference, purchasing books, reading magazines, etc.)?

14. How much of your own time do you spend on improving your technology skills and knowledge?

15. How much of your own time do you spend outside of contract hours to integrate technology instructionally in your classroom?

Demographic Questions

1. What is/are your position(s) at your school? Check all that apply.

- teacher
- administrator
- technology coordinator (certified position)
- technology specialist (classified position)
- other

If you are a teacher, please answer the following three questions:

2. What subject(s) do you teach?

3. What grade level(s) do you teach?

4. How long have you taught?

5. Please indicate your gender.

Male __ Female __

6. Please check the age group in which you belong.

- 20-30
- 30-40
- 40+

7. What type of school district do you work for?

- Urban
- Suburban
- Rural