Teachers’ Attitudes towards Technology – Considerations for Designing Professional Development

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Abstract

To best design technology integration professional development, one must have a clear understanding of teachers’ attitudes and beliefs regarding its practice. Students enrolled in Learning with Technology, a required course in an online Masters in Education degree program, completed a post-course reflection assignment. Students were practicing teachers or certified education professionals. An analysis of 225 responses to an essay question regarding attitude towards technology integration is shared. Results indicated the majority, 52%, had positive feelings about and were integrating technology, 28% had positive feelings but cited obstacles to integration, 13% were fully integrating, and 7%, were not integrating. The most common obstacles to integration included skills, efficacy, access, and time. Implications for the design of technology integration professional development activities are shared.

Background

“Despite a steady wave of how-to workshops and some longer-duration seminars, infusing technology into curriculum and teaching practices remains elusive for many teachers.” (Plair, 2008, p.70). Compared to the availability of technology, technology integration, defined by Lambert, Gong, and Cuper (2008) as “teachers utilizing content and technological and pedagogical expertise effectively for the benefit of students’ learning” (p. 386), is often deficient in today’s classrooms (National Center for Education Statistics, 2000). According to the National Center for Education Statistics (2000), 99 percent of full-time public school teachers have computer and Internet access in their schools, but only 39 percent integrate technology into their lessons. In general, teachers are comfortable using technology for personal use or developing instructional materials, but they do not integrate it into instruction (Ertmer, 2005). If access is not the problem, what leads to inadequate integration and what can be done about it?

Various factors have been found to explain teachers’ integration, or lack thereof; most relate to existing beliefs and attitudes. Hall and Martin (2008), for example, ascribe the lack of integration to self-efficacy. Their research revealed a statistically significant correlation between teachers’ self-efficacy beliefs regarding computer skills and their integration of technology into instruction. Similar findings were uncovered by Piper (2003). Others attribute teachers’ integration to existing beliefs about teaching and learning (Frederick, Schweizer, and Lowe, 2006; Kanaya, Light, and McMillan Culp, 2005; Tondeur, Hermans, van Braak, and Valcke, 2008). Kanaya et al. (2005), for example found a direct relationship between perceived benefits of technology integration and existing pedagogical beliefs. Chen (2008), on the other hand, assigned the lack of integration to perceived external factors and to limited or incorrect understanding of constructivist instruction. He states, “Teachers may have incomplete or incorrect understanding of proposed ideas and may hold conflicting beliefs without noticing the inconsistency” (2008). For example, Loveless (2003) found that teachers were in support of technology, but believed that technology should be taught as its own subject. How does one modify these conflicting beliefs and correct or complete these understandings?

One way to improve the rate of integration is via professional development (Brinkerhoff, 2006). Professional development provides teachers with opportunities to explore new technologies and develop new skills (Oncu, Delialioglu and Brown, 2008). The support and guidance offered in professional development helps teachers to develop the confidence to practice those skills (Brinkerhoff, 2006; Overlaugh and Lu, 2008). Also to be considered are the words of Ertmer (2005) who states, “If beliefs are formed through personal experience, then changes in beliefs might also be facilitated through experience.” By providing professional development for teachers to learn
about and practice technology integration, teachers may come to correct conflicting or complete incomplete understandings. Even with the best of intentions, however, professional development is unlikely to be successful without a pre-assessment of teachers’ attitudes and beliefs. “A greater focus on assessing teachers’ attitudes and beliefs,” according to Hall and Martin (2008), “during professional development could result in a higher transfer of skills and knowledge to classroom practice” (p. 3). Content and practice alone cannot make up for the delivery of a training mismatched to its audience. Professional development programs should be designed to complement and build upon existing attitudes and beliefs.

Research Questions

Having a clear grasp of teachers’ preexisting attitudes and beliefs could help trainers to design more effective professional development activities (King, 2002; Windschitl and Sahl, 2002). The current study focused on the identification of teachers’ attitudes and beliefs towards technology integration. In addition, the author sought to uncover perceived obstacles. The purpose of the present study was to address the following research questions.

1. What are teacher’s beliefs and attitudes towards technology integration?
2. What obstacles prevent teachers from integrating technology into instruction?

While question #2 was not directly asked, the author anticipated that this issue would surface in response to question #1.

Data Collection

The analysis was conducted with data collected from May 2008, end-of-course reflections submitted in Learning with Technology, a required course in an all online Masters in Education degree program at a Midwestern university. The assignment was part of the regularly assigned curriculum and required students to respond in 100 words or less to the question “What was your attitude towards technology before you took this course?”

Prior to the course, the author knew she was going to analyze the reflections, so she inserted into the directions a declaration of intended research and a waiver. The declaration stated:

The College of Education is conducting a qualitative research study about teachers' use of technology in their classrooms. All responses will remain anonymous, and associations will not be made to your place of work. You contribution will be used to help teacher education programs better understand technology use strengths, weaknesses, achievements, and areas of need.

The waiver stated: “I authorize the College of Education to use my responses on this assignment as part of its qualitative research study.”

At the time this course was offered, the college offered two degree programs, both leading to a master’s in education. Programs were designed such that all cohorts took the same courses at the same time. In the spring term of 2008, there were 1346 students enrolled in the course, thus offering a large sample from which to draw. Of those students enrolled, 500 turned in this last assignment (worth 5% of their grade). Because the degree programs are completely online, all essays were submitted electronically for grading. A review of the submissions indicated 450 initialled the waiver, 149 did not, and 5 submitted blank assignments. A random sampling equal to 50% (225) of submitted, waiver initialled assignments were analyzed.

Analysis and Summary

To group responses, the author used a web-based text visualization tool called Wordle (www.wordle.net). To use Wordle, one simply drops text into the online text box and a word collage image appears. The image allows users to see how frequently words appear in a given text, drawing each word at a size proportional to its frequency. In other words, the size of a word is proportional to that word’s frequency. All sampled essay responses were dropped into the Wordle text box. The most frequently cited words were noted and used to develop coded categories:

- 1A Didn’t care, didn’t do
- 2A Cared, but saw obstacles so didn’t do
- 3A Cared, but just used myself
- 4A Cared, was doing some integration(learning from)
- 5A Cared, was doing integration (learning with)
Regarding categories 4A and 5A, many respondents cited a report from their required readings called *Laptops for Learning: Final Report and Recommendations of the Laptops for Learning Task Force* (Barrios et al., 2004). This report distinguishes between “learning from” technology and “learning with” technology. Learning from technology “is akin to the old ‘sage on a stage’ notion of teaching. The technology is used solely to deliver or broadcast information to students” (p. 6). Learning with technology, on the other hand, “empowers students with the tools to take responsibility for their own learning” (p. 6) and it “requires a higher level of thinking and problem solving” (p. 7). Because this distinction was often explicated, it was built into the coding.

As a result of this analysis, another theme emerged: obstacles to integration. Most respondents indicated a number of obstacles that lead to their attitude and/or prevented them from integrating more technology. The author grouped and coded these responses as well. These categories included:

- 1B Lack of knowledge about/skills to provide
- 2B Lack confidence/efficacy to use
- 3B Lack of resources/access
- 4B Not enough time to learn
- 5B Students are too young or unskilled
- 6B Non-supportive administration

**Results**

**Audience**

Participants were practicing teachers or certified education professionals, including librarians and social workers. The majority, 191 (85%), were employed by urban school districts; the remaining were employed by suburban school districts. While there was a distributed sampling of grade levels at which these professional taught/worked, the majority, 96 (42.6%), were at the elementary school level. Of the remaining, 15 (6.6%) were at the pre-kindergarten/ kindergarten level, 39 (17.3%) were at the middle school level, 34 (15.1%) were at the high school level, and 41 (18.2%) did not indicate.

In regards to specialty areas, a wide variety of subject areas taught was represented: librarian (1), math/science (1), nurse (1), technology (1), vocational (1), language arts/science (2), foreign language (3), language arts/social studies (4), art (5), music (5), physical education and/or health (5); English, reading, or language arts (6), social studies (8), science (13), math (15), special education (28), and generalists teaching most subject areas (83). The 42 students who did not indicate their grade level also did not indicate their specialty area.

Some demographics – age, gender, race –could not be determined because they were not requested. The demographics for all students enrolled in the course at that time, however, could be determined based on college enrolment data. The gender report indicated that 95% (1285) were female, 4% (47) were male, and 1% (14) did not report their gender. The ethnicity report indicated that 70% (944) were White, non-Hispanic, 13% (177) were African-American, 6% (82) were Hispanic, 7% (100) did not indicate their race/ethnicity, 2% (29) Asian or Pacific Islander, <1% (6) were “other”, <1% (3) was multi-ethnicity, and <1% (1) was American Indian or Alaskan Native. The age report indicated that 8% (106) of students were 20-30 years of age, 13% (181) were 31-40 years of age, 10% (128) were 41-50 years of age, 11% (152) were 51-60 years of age, 18% (24) were 61-70 years of age, and <1% (1) was 71 plus years of age.

**Attitude towards Technology Prior to Instruction**

A review of responses to the question, “What was your attitude towards technology before you took this course?” revealed a varied, but not equal distribution of attitudes towards technology integration (See Figure 1). The majority, 52% (117), was using some technology in the classroom, but the level of integration would be best described as “learning from” technology, rather than “learning with” technology. The typicality of a “learning from” behavior mirrors findings in a 2003 U.S. Department of Education’s Integrated Studies of Educational Technology report. That report indicated the computer related activities most often exercised by teachers with their students included writing, improving computer skills, doing research using the Internet, using computers as a free-time or reward activity and doing practice drills.
Examples of responses at a “learning from” level are:

- “Before I started this course, I must admit that I inadvertently focused more on learning from technology than learning with technology. I would assign Internet projects to my students that wouldn't really teach them much.”
- “This class opened up my eyes in regards to what I was viewing as ‘embracing technology’ in my classroom. What I thought was sufficient, wasn't really sufficient at all.”
- “Prior to taking this course, I felt pretty confident of my technology skills. Little did I know that I wasn't even hitting the rim of the basket”
- “I felt technology was an important aspect of my students' lives. Even with these thoughts, I found it difficult to integrate the technology into my lessons without changing everything completely.”
- “I don’t think I was ever resistant to technology, just unaware of all it can do for me and a teacher and my students in their learning.”

The comments indicated that while these students (teachers) thought that they were adequately integrating technology, they came to realize they could have been doing much more. It is also apparent some of their misconceptions may have stemmed from a lack of knowledge about how to go about integrating technology at a “learning with” level.

The next most largely represented attitude was that technology integration was important, but due to perceived obstacles, they did not put that belief into practice, 28% (63). Obstacles cited ranged from non-supportive administration to lack of knowledge and skills. These obstacles are described in the next section.

A small percentage of respondents, 13% (30), were fully integrating technology at a level at which could be described as “learning with” technology. Examples of responses are:
“I am not a digital native but was a migrant to it long before this course. It started off more than a decade ago with me. I can effectively develop a student centered inquiry based, self-directed learning environment with equitable assessment.”

“I am comfortable using technology in my classroom and actively plan lessons using the computer as a component all day long. I find access to a computer a wonderful and effective way to reach my special education students.”

“The essential question when I begin this course was how do I guide students in ways that put them in charge of showing their understanding and knowledge through activities that provide the context for authentic learning, using technology and at the same time addressing the learning standards required by the district and the state.”

In reviewing responses such as the one above, it was apparent that they were using technology to empower their own students. In all cases, it was also apparent they wished they could be doing more.

As for the remaining coded attitudes, “Cared, but just used myself” and “Didn’t care, didn’t do” were expressed by 4% (8) and 3% (7), respectively, of the remaining sampling. Examples of responses are:

“I felt that technology was a part of our culture, but I guess I did not see the real relevance of technology in the classroom.”

“My attitude towards technology before I took this course was negative. I did not understand why it was necessary to incorporate technology into the classroom. I grew up with limited use of technology tools during my elementary and secondary education; therefore, I never saw it as a means necessary to increase student achievement and instructional practices.”

“I believe my attitude towards technology prior to this course was not very important. I do use a computer at home and at work to create documents and send e-mails…”

Respondents appeared to use technology in their own lives, but did not see value in bringing it into the classroom. These findings were consistent with Chen (2008) who found that all teacher participants used various technologies for personal use, instruction planning, and administrative work, but very few used technology to achieve instructional goals other than covering curricular content, preparing students for examinations, and highlighting important concepts. Fortunately, in the current study, every “didn’t care, didn’t do” or “cared, but just used myself” respondent later expressed in his/her post-course reflection that as a result of what was learned in the course, he/she was now going to take small steps to integrating technology. This change reflects a very positive outcome of technology integration professional development.

**Obstacles to Integrating Technology**

Rogers (1995) states people are more likely to adopt an innovation if the innovation offers a better way to do something, is compatible with their values, beliefs, and needs, is not too complex, can be tried out before adoption, and has observable benefits. It became apparent, when reviewing responses, the obstacles were rooted in factors conflicting with perceived attributes. The most commonly cited obstacles were: lack of knowledge about/skills to provide (92), lack confidence/efficacy to use (28), lack of resources/access (26); not enough time to learn (11), students are too young or unskilled (5), and non-supportive administration (3) (See Figure 2).
Some respondents reported more than one obstacle and others reported none. Examples of responses are listed below. Next to each statement, in brackets, is the obstacle(s) coded:

- “I have only been teaching for five years, and have always thought about the use of technology. During my first two years I was busy learning the curriculum and trying to manage twenty-eight students. I felt like I didn’t have room in my curriculum for technological lessons.” [Obstacles: time; knowledge/skills]
- “I was negative toward technology because the resources that are available to me at my school are limited. The computers in my classroom are old and run very slowly. It is also difficult to download any new software and I only have Internet access on one computer. I also didn't have ideas on how to integrate technology in my kindergarten classroom.” [Obstacles: access; young students]
- “Five weeks ago if someone were to ask me about technology in my school, I would roll my eyes and reply, ‘What technology? We barely have computers.’ That would be the end of the conversation and I would move on to a new topic.” [Obstacle: access]
- “I have always felt that I have the basic skills needed to work with technology, but the thought of having my students use it to learn scared me! I felt like I did not know where to begin.” [Obstacle: confidence/efficacy].
- “I was unaware that standards for teaching with technology even existed.” [Obstacle: knowledge/skills].
- “My initial attitude toward technology before I took this course was negative because the word technology reminded me of my deficiencies as an educator.” [Obstacle: confidence/efficacy].
- I have always been an advocate for technology and new experiences [but], I was often frustrated by the schools limited resources as well as lack of ideas. [Obstacles: access; knowledge/skills]

It becomes apparent after reviewing these comments and the frequency chart that reasons vary in type and number. Many are consistent with perceived obstacles uncovered by Demetriadis, Barbas et al. (2003). The most commonly obstacles found in their research were: (1) material conditions (including an insufficient number of computers and insufficient technology expertise); (2) difficulty integrating technology into the regular curriculum and instruction; and (3) lack of supervisory and technical staff. Perceived obstacles, real or not, should be addressed in the design of professional development.

**Limitations**
There are a variety of factors that could keep one from generalizing the results of this analysis to other populations. The first factor that could influence the findings is that students (teachers) enrolled in this course chose to earn their degree online. Students enrolling in an online degree may have a more favourable attitude towards technology than those enrolling in an on-campus degree program. Another factor that could influence the findings is the large percentage of students (teachers) who work for an urban school district. Access to technology, availability of professional development resources, and the study body demographics in urban school districts can vary from that found in suburban or rural districts. A third factor to consider is the timing of this assignment, in this course. Despite the assignment directions requesting students (teachers) to consider their attitudes towards technology integration before the course, their perceptions may have shifted during the course. A fourth factor to consider was the large percentage of females enrolled in this course and degree problem. It is possible females may integrate technology into the classroom to a greater or lesser degree than males.

Implications

Teachers’ attitudes and beliefs should be carefully considered in the design of technology integration professional development. This analysis indicates many teachers believed technology integration was important, but didn’t know how to do it. It was also uncovered that some had mixed feelings, some of which were rooted in perceived obstacles related to skills, self-efficacy, access, and time. Ideally, the majority of teachers should be fully integrating technology in their classrooms. Incorporating skill-building activities and suggestions for authentic applications into professional development would help to build teachers’ efficacy towards and appreciation for technology integration.

Technology integration professional development may require more than the typical lecture and drill method of instruction. As with any new skill, technology integration professional development should delivered in a supportive environment emphasizing authentic practice. Jan Hawkins, former director of the Center for Children and Technology at the Education Development Center, Inc. abides by four primary guidelines when combining professional development and technology:

- Intensive sessions where teachers are able to explore new ideas and materials;
- Follow-up support over an extended period of time with mentors;
- Ongoing, reflective conversations with colleagues doing the same job and trying to make similar changes; and
- Observation of other teachers in their classrooms. (1997, p. 215)

Despite the date of Hawkins’ article, 1997, her authentic, collaborative prescription is constructive and consistent with Brinkerhoff (2006) and Overlaugh and Lu (2008). She emphasizes a mode of delivery that develops skills and fosters efficacy, two of the top three primary obstacles indicated in this analysis’s findings.

Regarding efficacy, Linnenbrink and Pintrich (2002) indicate its development is facilitated by providing opportunities for success within one’s range of capabilities and then gradually developing new skills. This suggestion is in line with Hawkins (1997). Self-efficacy is not the result of will-power, but actual success Beck (2004). To improve self-efficacy towards a given skill, Weiner (1986) suggests linking behavioral outcomes such as engagement with achievement. This means professional development should provide opportunities to link success to strategy use, rather than just effort.

Regarding access, another common obstacle, a teacher may want to integrate technology, but due to a real or perceived lack of resource, cannot. For example, a respondent stated:

I have always held a positive attitude toward technology. I use the Internet regularly in my personal life, but I did little to integrate it into my classroom. Part of the reason for this was simply a lack of access. I did not have a classroom computer until two months ago.
Lack of access or resources was cited by twenty-six respondents. In most cases lack of access meant having only one computer in their classroom. This means professional development should include tips for integrating technology when access is limited. Kathy Shrock provides a host of resources on her Guide for Educators website in a section entitled: “The One Computer Classroom: A Review of the Internet Literature.” Integrating thematic station-based work, scheduling, or using a projector, are three simple ways to overcome the one computer, one classroom obstacle. Strategies like these could be incorporated into professional development, particularly when access is a perceived obstacle.

Also to be considered when addressing access is students’ (of the teachers) access to technology at home. As one respondent stated in her reflection, “My students are low-income minorities and less than five, when asked, have access to a computer at home.” In such situations, student experiences with technology are more likely to be concentrated on computer basics and support for academic remediation then on using technology to enhance the learning and critical thinking process (Warschauer, Knobel, and Stone, 2004). Teachers, therefore, must be trained how to teach these basic skills within the context of authentic, rich lessons.

The strength of obstacles should not be underestimated because nary was the teacher who was strongly passionate about technology and not integrating technology at a “learning with” level. The analysis indicates obstacles, real or not, must be dealt with in professional development. Heeding existing perceptions and attitudes in the design and delivery of professional development will result in a higher transfer of knowledge and skills (King, 2002; Martin and Hall, 2007; Windschitl and Sahl, 2002). The hope, consequently, is that improved knowledge and skills will lead to an increased percentage of teachers who help their students to learn with as well as from technology.

Conclusions

Ertmer (2005) indicates, “If we truly hope to increase teachers’ uses of technology, especially uses that increase student learning, we must consider how teachers’ current classroom practices are rooted in, and mediated by, existing pedagogical beliefs” (p. 36). As one respondent so eloquently put it, “I have come to the conclusion that we as educators must accept change in order to implement 21st century teaching so that our students become 21st century learners.” Finding ways to elicit that change through well-planned technology integration professional development is an obstacle that can be overcome.

To better address technology integration professional development for teachers, one should have a clear picture about teacher’s attitudes and beliefs towards technology, including their perceptions about how technology can help them to become better teachers and how technology can help their students. Knowing “the motivation to learn depends largely on the learner’s personality, the nature of the thing or skill to be learned, and the learner’s perceptions of the value and difficulty of learning it” (Keller, 1993, p. 4), considering these perceptions is critical to the successful design of technology integration professional development. Keeping in mind “the most important investment a school board, administrators, and parents can make in a school system is to ensure that teachers continue to learn” (American Federation of Teachers, n.d.), taking extra steps to ensure professional development is effective is well-worth the effort.

References

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