University Research Grant Proposal

Submitted by
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Project Title:
The Technology Difference in Teaching

Statement of Problem
As the presence of technology continues to increase in K-12 schools, it becomes ever more important to identify and understand the factors that lead to so-called "effective" use of technology to support teaching and learning with technology. One strategy that can help toward achieving this goal is to study the background and evolution in the practice of teachers who already use technology intensively in their classrooms: "model technology-using teachers."

Two broad categories of factors have been identified to account for teachers' use of technology: situational/contextual factors and philosophical factors.

Looking first at situational/contextual factors, Rowand (2000, p. 1) reports on a survey conducted by the National Center for Education Statistics which found that "…twenty-three percent [of teachers responding] reported feeling well-prepared to use computers or the Internet in the classroom, and an additional 10 percent reported feeling very well prepared. Teachers with fewer years of experience and those with more hours of professional development felt better prepared to use computers and the Internet for classroom instruction." Cuban, Kirkpatrick, and Peck's (2002) study of two Northern California high schools offered the explanation that at least in those two schools, "Serious and occasional users of technology have continued routine instructional practices [without technology] because of contextual factors rather than individual factors of hostility to technology, inertia, or passive resistance" (p. 827). Other factors such as exposure to technology in pre-service training, ongoing professional development opportunities focused on technology, the daily schedules (longer blocks of time are better than the typical 50-minute class), and a supportive administration —especially the school principal—have also been found to influence levels of technology integration in classroom teaching.

From a philosophical perspective, Becker (2000) conducted a national survey of teachers' use of technology in their daily practice. His study identifies several characteristics that differentiate teachers according to the amount *and* types of technology use. Key among the findings is that technology-using teachers' "…personal philosophies support a student-centered, constructivist pedagogy that incorporates collaborative projects defined partly by student interest" (Becker, 2000, p. 3). Self-identification with the constructivist philosophy of education is a strong predictor of sustained technology use, which again raises the question of *what* experiences or factors motivated those teachers into a constructivist practice in the first place.

What the existing literature does not address in adequate detail are questions dealing with *how* technology-using teachers became sophisticated users, and in particular, how their personal

teaching philosophy evolved. Becker (2000) and many others have found, for example, that ownership of a personal computer for use at home is correlated with increased use of technology in teaching, but this is not consistent for all teachers (more for elementary teachers, less for middle and high school teachers, Becker, 2000).

It appears to be a recursive problem: technology-using teachers do so because they are constructivists, and they are constructivists because they use technology. But neither the use of technology nor a preference for constructivist ideas and practices are "natural" occurrences, and it seems counterintuitive to assert that either one comes first or that one is a required condition for the other. There are teachers who use technology extensively in their daily practice but who are not constructivists, yet they may be considered "efficient" teachers when judged only by their *frequency* of technology use, even if Becker (2000), Cuban, Kirkpatrick, and Peck (2002), Sandholtz, Ringstaff, and Dwyer (1997), and others would argue that they are *not* the models that other teachers should emulate given their *type* of use. The constructivist practitioner is generally presented as closer to the "ideal" because, it is assumed, she or he are better able to develop and support higher-order thinking, motivation, knowledge, and skills in their students (Norton & Wiburg, 1998; Jonassen, Howland, Moore, and Marra, 2003), whereas the non-constructivist is seen to be "pouring new wine into old skins"—teaching in the same way but with technology, to the same content, in a transmission model that emphasizes memorization versus understanding. Furthermore, attempts to classify all technology-using teachers into either constructivist or "transmissionist" hide the continuum of levels of comfort with, and integration of, technology that most teachers go through, usually over several years (Sandholtz, Ringstaff, and Dwyer, 1997).

In sum, a better understanding of the links between the personal philosophies and situational/contextual factors of "model" technology-using teachers is a primary goal of this research. Against this background, the research questions guiding this project are:

- What are the personal characteristics of current technology-using teachers in K-12 classrooms?
- Are there common traits in the professional development paths that allowed constructivist technology-using teachers to get to this point, including their pre-service exposure to technology?
- How do technology-using teachers describe their classroom practices involving technology?
- What are the common classroom practices regarding the teaching of content area subjects?
- What are the assessment strategies relied upon by technology-using teachers for non-traditional, technology-supported student work products and learning outcomes?
- How have the beliefs and attitudes of technology-using teachers evolved as a consequence of becoming increasingly proficient and comfortable with technology? In particular, regarding their beliefs about the roles of teachers and students?
- What have been the key sources (e.g., books, videos), events (e.g., visits to classrooms that made an impression, courses, training), people (e.g., colleagues, mentor), or personal interactions (e.g., with students, with parents) that have had the greatest influence on technology-using teachers?

- How do technology-using teachers plan their future professional development, and where do they look for opportunities (e.g., district, hardware or software vendors, Internet, etc.)?

Methods

The research project consists of a quantitative survey of a purposive sample of about 300 technology-using teachers in the greater Bay Area. One source of respondents will be the "Apple Distinguished Educators" database. Another will be lists provided by the Santa Clara County Office of Education, local school districts with whom our department maintains working relationships (e.g., San José Unified, Cupertino Union, Milpitas Unified), and professional groups (e.g., Computer-Using Educators). A survey questionnaire will be mailed out, and respondents who send in completed surveys will receive a $15 gift certificate to either Borders or Barnes & Noble to compensate them for their time.

I anticipate conducting a follow-up study which will take an in-depth, qualitative look at selected practitioners from the survey respondents in the current study to gain a more fine-grained understanding of the issues.

As rationale for this programmatic approach, the overall intention is to combine quantitative and qualitative approaches to develop a more detailed definition of a "role model" or "persona" that summarizes the desired characteristics of practitioners (Bannan-Ritland, 2003, p.22), a "composite" of the best practices among all those observed. Such a "composite" could begin to externalize the mostly implicit images that faculty in schools of education carry and communicate to future teachers—our students— which also include our often-unspoken expectations for their practice in their own classrooms.

Timetable

April 2003	Compile lists, advertise study to create purposive sample
May 2003	Finish draft of survey instrument, submit to Human Subjects
June/July 2003	Pilot-testing and revisions to survey instrument
Aug/Sept 2003	Surveys distributed
Sept-Dec 2003	Coding, data input, statistical analysis
Jan-June 2004	Submit conference paper(s), draft journal article

Relevance to Past and Future Research or Teaching

This study continues my research interests on the roles of technology in education, going back to the time I was Research Director for the Apple Classrooms of Tomorrow (ACOT) program. At Santa Clara, the opportunity to work in a teacher preparation program and to launch a new Masters emphasis in "Teaching and Learning with Technology" allows me to delve deeper and look at questions that will allow me to make a significant contribution to the field.

During Spring quarter 2002, as part of my ED450 MA-level course titled "Teaching with Technology," two teams of students working under my supervision worked on research projects titled "Identification and documentation of model constructivist teaching practices incorporating technology in K-12 classrooms" and "Student Experiences with Technology: Attitudes, Behaviors, and Perceptions of Value" that included drafting of questionnaires, which will facilitate the development of the survey instrument for the present study.

During Summer 2002, my colleague Carol Giancarlo and I co-taught ED271, "Instructional Technology for Teachers" in cooperation with the Cupertino Union School District. This was a "situated" experience since the course was taught at the Teacher Development Center located inside Portal Elementary School. A conference paper reporting on this experience will be presented at the SITE 2003 (Albuquerque, NM) conference in March 2003, and an article has been submitted for publication to the Journal of Computing in Teacher Education.

The insights and knowledge gained from this study will benefit my research and teaching in other ways too. As mentioned earlier, my plan is to conduct a follow-up qualitative study with in-depth interviews of a subset of this study's participants. Additionally, I expect that the design of the ED271 course, particularly when delivered on campus vs. at the school, will benefit from the information this study will yield on what "model" technology-using teachers do and how they got there.

Two other areas of activity that will benefit from this study are the design of the "Electronic Portfolio Lab" (funded by a grant from the Fletcher Jones Foundation), and opportunities for future research for my graduate students in the "Teaching and Learning with Technology" MA emphasis. For the former, having a deeper understanding of what resources current technology-using teachers identify as having had the most influence on their professional development will help us select equipment, software, and services that are made available in the Lab.

While I have been successful getting grants in support of our department's technology needs, this internal grant is specifically in support of my research agenda.

Publications, Results, or Final Reports of Recent Internal Grants
A report to the Technology Steering Committee for a grant to purchase a Mobile Laptop Cart for the Department of Education is due in Summer, 2003. The cart includes 16 laptop computers with wireless capability, a wireless access point, and a laser printer. It is being used successfully by several members of our faculty in a variety of courses.

Itemized Budget with Justification

- Photocopying of survey questionnaire (est. 10-15 pages) x 300 (15x300=4,500 pages x $0.05/page, plus est. 8.25% tax)	$245
- Mailing supplies: Envelopes, 300 x 2 = 600 @ $0.05 =	$ 30
- Postage: Send and receive survey, 300 x ($0.74 x 2) =	$444
- Research Assistant	
Coding and input survey data for statistical analysis	
• Coding: 50 hours (10 minutes for each of 300 surveys)	
• Data Input: 50 hours (10 minutes for each of 300 surveys)	
• Library research: 30 hours	
• Total: 130 hours @$10/hour plus benefits est. at 5%)=	$1,365
- Stipends for survey respondents: $15 x 200 = (Assumes 66 percent response rate)	$3,000
Total:	$5,084

References

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