National Educational Technology Standards and Technology Beliefs and Practices of Social Studies Faculty: Results From a Seven-Year Longitudinal Study

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Abstract

This paper presents the findings from the third survey administration of a longitudinal study that explores the beliefs, practices, and efficacy of social studies faculty members from across the United States in terms of instructional technology use. The findings of this study demonstrate that familiarity with the *National Educational Technology Standards*, as well as confidence with technology, are related to the frequency and type of technology that social studies faculty members utilize in their courses. This survey is particularly significant because it reports on the field's beliefs and practices over time, and results can influence policy, funding, and future research.

Technology has had a profound influence on the field of social studies education, particularly the disciplines of history, government, geography, and economics. Specifically, the Internet has transformed these disciplines by providing access to historical materials (Cohen & Rosenzweig, 2006; Martin, Wineburg, Rosenzweig, & Leon, 2008; VanFossen & Shiveley, 2000) and economics resources (VanFossen & Herman-Ellison, 2006) that otherwise would be difficult or impossible to obtain. The transformative effect was illuminated in mid-2007, as the website youtube.com hosted political debates, and ordinary citizens were invited to ask direct questions to political candidates.

The National Council for the Social Studies (NCSS) (1994) noted that the "effective use of technology…can add important dimensions to students' learning" (p. 165). The organization's 2006 position statement on technology argued, "We need to consider the role of technology in students' daily lives and its implication for classroom practice" (NCSS, 2006). Further, the government has an increasing presence on the Internet, and citizens have the opportunity to use technology to find government information, communicate with elected leaders, learn about election candidates, and participate in campaign activities (VanFossen, 2006).

Teaching technology skills holds unique importance in social studies education. To best prepare young people to become citizens of today's global society, teachers must help students develop technology literacy skills. Students must have familiarity with technology, because many of the foundations upon which the American democracy rests are increasingly interwoven with technology. Social studies teacher educators, thus, are called upon to prepare teachers who will use technology to foster citizenship skills.

In a broad sense, the goal of teacher education is to prepare preservice teachers to be able to teach specific content and skills in order for them to provide effective learning experiences for their students. The National Commission on Teaching and America's Future (1996) supported this notion in their call for teachers who "know their subject matter so thoroughly that they can present it in a challenging, clear and compelling way" (p. 6). An integral component of teaching, however, is to prepare the children of today for the world that awaits them tomorrow, which in the early 21st century entails an increasing reliance on technology, computers, and the Internet as media to communicate, collaborate, and compete in the global economy described by Friedman (2005) in *The World is Flat*.

The inclusion of technology into the teaching and learning environment is also supported by the U.S. Department of Education. The agency authored its *National Education Technology Plan* in 2004, foreshadowing Friedman's (2005) portrayal of a burgeoning world economy, while simultaneously describing the young people of today as a generation immersed in a digital age. These students are not only comfortable with technology, but also dependent on the Internet and other technology resources in their daily lives. This portrayal is consistent with Prensky (2001). He characterized people born no earlier than 1984, for whom technology has been, generally speaking, a part of their upbringing, as digital natives (p. 1).

In addition, the National Center for Education Statistics (NCES, 2001) reported that "integrating technology into instruction was taught in all or some teacher education programs at all of the 4-year institutions with teacher education programs for initial licensure" (Kleiner, Thomas, & Lewis, 2007, p. 6). The NCES also noted, however, that the reporting of technology integration is not an indication of depth or quality.

Technology Standards

In order for K-12 students to experience social studies that optimizes the advantages of available technology, they must be taught by teachers who have both the wherewithal and confidence to integrate technology into their instruction. An effective method for augmenting this capacity is the use of content-specific technology instruction within a teacher education program. Researchers have argued that the provision of this type of training to preservice teachers results in a direct impact on their subsequent efficacy with its use (Crowe, 2007; Mason, Berson, Diem, Hicks, Lee, & Dralle, 2000).

In an effort "to better serve the needs of 21st century work, communications, learning, and life," the International Society for Technology in Education (ISTE) developed the *National Education Technology Standards* (NETS*) for Students* in 1998. The NETS were developed with the guiding principle that citizens must be able to use technology effectively to contribute to an increasingly technology-infused society. The standards were based on the premise that technology can enable students to become:

- Capable information technology users
- Information seekers, analyzers, and evaluators
- Problem solvers and decision makers
- Creative and effective users of productivity tools
- Communicators, collaborators, publishers, and producers
- Informed, responsible, and contributing citizens (ISTE, 2009)

The *NETS for Teachers* (ISTE, 2008) presented standards for preservice teachers and are aligned with National Council for the Accreditation of Teacher Education (NCATE) standards. These standards are divided into licensure areas (i.e., elementary social studies or middle grade social studies) and are accompanied by lesson plans that demonstrate exemplars of technology integration in the content area. However, despite the NCATE standards and the NETS, Berson, Mason, Heinecke, and Coutts (2001) pointed out that the extent to which preservice teachers are trained to teach with technology depends to a large degree on the beliefs and practices of their content-area methods instructors.

Technology and Social Studies Teacher Education

Technology in the social studies has a unique nature. The integration of technology into social studies teacher education has steadily grown over the past decade (Bolick, 2004; Friedman & Hicks, 2006). Bolick (2004) reported, "We have amassed not only a long list of research and practitioner publications, we also have a focused group of social studies scholars dedicated to investigating the integration of technology into the social studies" (p. 130). To best understand the diffusion of technology

into social studies teacher education, one must recognize the distinctive characteristics of the discipline.

Ten years ago, two of the current authors attempted to address this deficiency, initiating a nationwide, longitudinal study of social studies teacher education faculty in order to ascertain their beliefs, practices, and organizational contexts in terms of technology integration in their courses. The results of this 1999 survey were that, in general, social studies faculty did not use technology to a large degree, though many respondents indicated its use in preparation of word processed lesson plans, email communication, and accessing information on the Internet (Berson, Bolick, Coutts, & Heinecke, 2003). Subsequently, a follow-up study was completed in 2001, showing use of technology at a greater rate than previously reported, particularly with email communication (an increase from 54.3% of respondents to 70.6%) and Internet use (41.3% to 61.1%) (Berson et al., 2003, p. 7).

The third iteration of the survey, conducted in 2006, demonstrated the continued trend toward increased technology usage. For example, creating webpages for instruction grew from 8.6% in 1999 to 24.4% in 2006, and accessing information from the Web increased from 41.3% to 82.4%. Perhaps even more significant is that in 2006, 92% of the respondents reported feeling confident in their general use of technology (Bolick, Berson, Friedman, & Porfeli, 2007).

This change in faculty use over time has also been reflected in a modification of the NETS (ISTE, 2007). This change, termed "the next generation" of standards, concentrates "more on skills and expertise and less on tools." As Rogers (1995) pointed out in his book *Diffusion of Innovations,* the longer technology is present in a particular culture, the more likely an increased amount of people will use it. Due to the presence of technology in the field of social studies for over a decade, an increase would be expected in the number of faculty who would report using it. Bolick et al. (2007) indeed found that social studies faculty members use technology on a more frequent basis than they did at the turn of the 21st century.

Types of Technology

Technology has a unique relationship with the field of social studies, but the definition of technology has changed over the last decade. Not only has the Internet become nearly ubiquitous in American K-12 schools and classrooms (Parsad & Jones, 2005), differences in cost and overall infrastructure have contributed to greater accessibility.

To frame the discussion of technology in this paper, two types of technology have been identified in schools. Although combining technology applications into two broad categories may obscure the intricacies of certain software, categorizing them as *generalist* and *specialist* was the most illustrative method of presenting these and most consistent with our data. Generalist technologies are composed of software that is more ubiquitous within the public domain, and generally speaking, although they can be used to enhance social studies instruction, they could just as likely be used for noninstructional activities. They are relatively older, more common, and more ubiquitous

technologies compared to the specialist technologies. As a result, they are not only more commonly found in schools, but are likely to have been included in a technology class within a teacher education program. Examples of generalist technologies include word processed lesson plans, social studies software, email, WebCT/Blackboard, and web-based discussion tools.

Specialist technologies are composed of software that was not explicitly created for the social studies environment, but have distinct applications for teaching and learning social studies. These technologies are relatively newer than the generalist technologies and have specific, unique characteristics that are not necessarily intuitive. A user would need to be cognizant of the software itself and also versed in its educational applications in regard to teaching and learning social studies. Moreover, this software enhances social studies instruction by fostering a constructivist environment in line with the literature on best practices of teaching social studies. Examples of specialist technologies include videoconferencing, webpages for instruction, lesson plans with spreadsheets/databases, digital media, presentation hardware, and gaming software.

The aforementioned 2006 study brought to light changes that had taken place since the turn of the 21st century in terms of social studies faculty members' technology integration and attitudes toward its use. The vast majority of respondents (92%) noted that they were confident with technology use (Bolick et al., 2007). Therefore, this paper reports on the extent to which familiarity with the NETS and confidence are associated with the integration of specific technology applications in social studies methods classes.

Methodology

This paper describes the third administration of a survey of technology use among social studies teacher education faculty members across the country. Similar to previous administrations, the survey was divided into four parts: general information, technology use in social studies methods courses, personal use, and organizational support and barriers. Moreover, each version of the survey was comprised of both Likert-scale items and open-ended responses. However, unique to this survey was that it was conducted over the Internet.

All members of the College and University Faculty Assembly (CUFA) were invited to participate in the study via an email sent to the CUFA listserv and via an announcement made at the annual CUFA business meeting. CUFA, a national organization affiliated with the National Council of the Social Studies, is the home for social studies teacher educators and social studies researchers. The organization disseminates research and scholarship on social studies education at its annual conference. CUFA also publishes the premier social studies research journal, *Theory and Research in Social Education.* (The CUFA website is http://www.ncsscufa.org/.)

The CUFA membership was invited to participate in the study via an email sent in November 2005. Follow-up emails were sent to the CUFA listserv in December 2005 and February 2006. The response rate was

29.8%, as 88 of the approximately 295 CUFA members participated. Given some missing data, 77 of the 88 participants were included in this study. The data gathered from the survey were analyzed using descriptive statistics for the Likert-scale items, and grounded theory was used for the open-ended responses, which "allow[ed] the theory to emerge" from the data (Strauss & Corbin, 1998, p. 12).

Further analysis of the data was conducted to investigate the relation between the NETS and technology use in social studies teacher education. Three items on the survey measured familiarity with the NETS standards, including the National Education Technology Plan, as well as with the National Educational Technology Plan for teachers and students. Responses to these questions served as markers to determine the influence of the NETS on technology use in social studies teacher education. Cronbach's alpha for these items was determined to be .88, which suggests that the measure is quite reliable.

Results

The respondents to the survey were a homogeneous population of white faculty members who have taught from 3 to 5 years and were nearly evenly divided between male and female (85.2% taught at NCATE-accredited institutions). The descriptive statistics and the correlations among the global confidence, NETS, specialist and generalist variables were computed (see Table 1). Additionally, the skewness of all of the variables was computed, and all were found to be within acceptable limits (±1). The control variables demonstrate relationships with the predictors and/or the outcome; therefore, they were included in the regression model.

The regression models demonstrate that the interaction between NETS and confidence predicts the use of generalist technologies, while NETS and confidence independently predict the use of specialist technologies (see Table 2). Moreover, the R^2 estimates suggest that NETS and confidence explain substantially more variance in the use of specialist technologies relative to generalist technologies.

The moderator model of generalist technologies is depicted in Figure 1. In order to generate a readily interpretable figure, the predictors and the outcome were standardized (mean = 0 and SD = 1), and arbitrary NETS groups were created to reflect those that were 1 standard deviation above and below the mean (NETS 1 and NETS -1, respectively) and those that were at the mean (NETS 0). The figure demonstrates that a 1 standard deviation increase in confidence tended to yield about a 0.5 standard deviation increase in the use of generalist software for those participants who scored 1 standard deviation below the mean (NETS -1) on the NETS variable. On the contrary, the figure demonstrates that a 1 standard deviation increase in confidence yielded only about a 0.03 standard deviation increase in the use of generalist software for those participants who scored 1 standard deviation above the mean (NETS 1) on the NETS variable. In other words, confidence had a much greater impact on the use of generalist software for those not familiar with NETS relative to those who were familiar with NETS.

Table 1
Means and Standard Deviations of the Control, Predictor, and Outcome variables and the Intercorrelations Among Them

Variable	*M*	*SD*	1	2	3	4	5	6
1. Age	3.05	1.1	___	.61**	-.03	-.20	.03	.23*
2. Years as faculty	3.02	1.6		___	-.01	-.27*	.08	.03
3. Confidence	2.34	1.7			___	.52**	.55**	.25*
4. NETS	141.8	9.1				___	.56**	.33**
5. Generalist	13.54	4.4					___	.42**
6. Specialist	15.42	2.8						___

$* p < .05, ** p < .01.$

Table 2
Regression Model of NETS, Confidence, and Type of Software Use

	Standardized Betas	
	Generalist	**Specialist**
Control Variables		
Age	.22	.11
Years as a faculty member	.13	-.07
Predictor Variables		
NETS	.03	.38*
Confidence	.29*	.39*
Interaction of Confidence and NETS	-.24*	.05
R^2	.29	.41
N	75	75

Note. The variance inflation factors (VIF) were computed for the three regression models to assess for the impact of colinearity among the predictors. The VIF values fell between 1.3 and 1.8 and are clearly below the 10.0 threshold that would suggest potential colinearity problems.
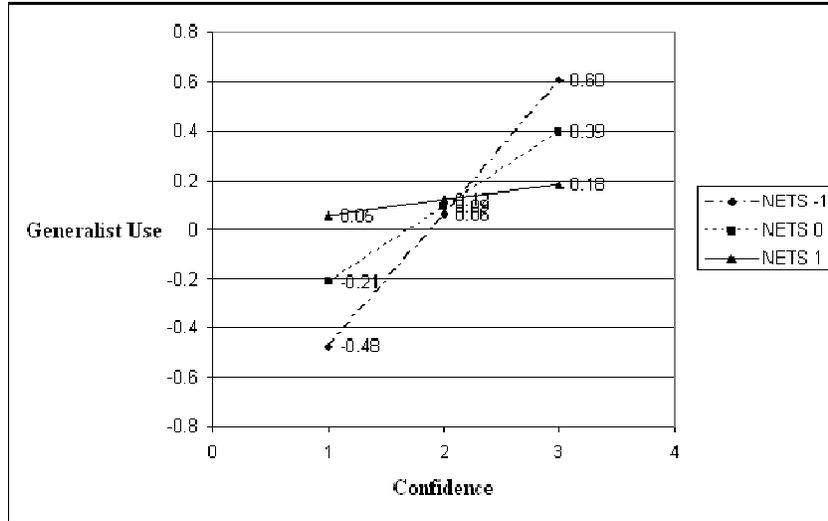
$*p < 0.05$

Figure 1. *Moderator model of NETS, Confidence, and Generalist Software Use.*

 The direct effects regression model of specialist technologies is depicted in Figure 2. Once again, the variables were standardized, and the same arbitrary groups were employed to generate the plots in a way that makes them readily interpretable. The first plot holds confidence constant, and the second holds NETS constant in order to generate the plots demonstrating the impact of each predictor independent of the other predictor and control variables. The plots demonstrate how specialist software use (in standardized metric) is a function of NETS and confidence. A 1 standard deviation increase in NETS and confidence tends to respectively yield about a 0.36 and 0.38 standard deviation increase in the use of specialist technologies.
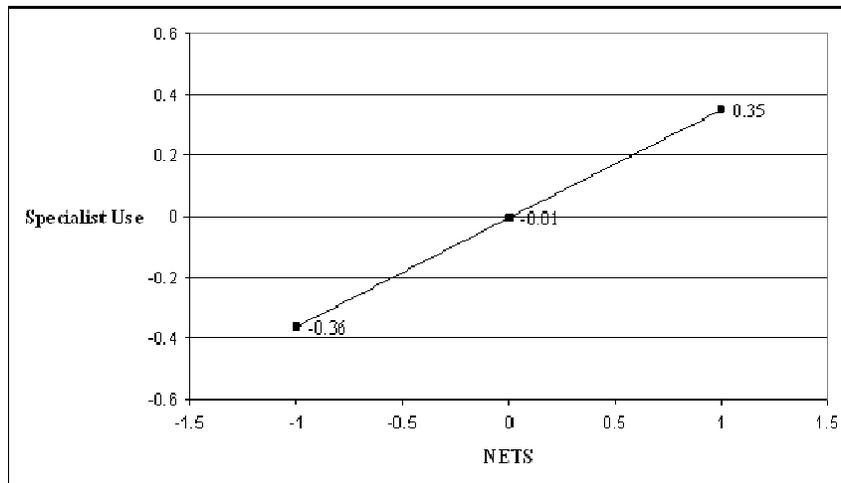

Figure 2. *Direct effects of NETS and Confidence on Specialist Software Use.*

Discussion

The results of this study parallel the philosophy of technology adoption and adaptation outlined by Rogers (1995) as well as the 2007 NCES report on technology use in teacher education (Kleiner et al., 2007), as there has been a steady expansion in the number of faculty members utilizing as well as teaching with technology. However, this research has explored not only the general diffusion of technology into instruction but also the specificity of integration by exploring correlations between NETS familiarity, confidence in technology use, and implementation.

Results of the correlational and regression analyses indicated that when controlling for demographics, familiarity with the NETS and confidence in technology use and instruction predict technology implementation. In other words, if a teacher educator/researcher is confident *and* is familiar with the NETS, that teacher educator/researcher tends to use specialist technologies (applications which can promote social studies instruction by fostering an environment in which students actively work with and think about social studies content) more frequently in teaching. The opposite holds true as well. Of the two predicting variables, familiarity with the NETS is a stronger predictor.

Unlike specialist use, familiarity with the NETS and confidence interact to yield generalist technology use. For those faculty members familiar with the NETS, changes in confidence have little impact on generalist technology (relatively older, more ubiquitous) use. For those who are less familiar with the NETS, increasing confidence leads to more frequent use of generalist technology in the classroom. Stating it another way, confidence has a greater impact on teacher educators/researchers unfamiliar with NETS and a much weaker impact on teacher educators/researchers familiar with the NETS. The effect of confidence on generalist technology, therefore, hinges on familiarity with the NETS.

NETS "communicates the developmental nature of becoming an effective integrator of instructional technologies as well as the interrelationship between higher education institutions and local schools" (Cunningham, 2001, p. 10). This epistemological framework may differentiate technology innovators from later adopters, and as familiarity with NETS becomes more prevalent, the standards may further stimulate dynamic instructional practices. However, it is important not to overlook the demographics of the survey respondents. Because the vast majority of respondents have between 3 and 5 years of experience teaching in higher education, the assumption may be made that they are junior faculty members and younger in age, so the data may be more indicative of their views. As newer faculty members are hired, technology use may be viewed with increasing importance and relevancy.

While technology alone will not produce effective social studies instruction, it is nearly ubiquitous in teacher education and K-12 schools. As teacher educators are charged with preparing future teachers, it is necessary to measure the extent to which familiarity with national technology standards and confidence with different types of technology

are associated with the integration of technology hardware and software in social studies teaching methodology courses.

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