Envisioning Effective Technology Integration: A Scenario for English Education Doctoral Programs

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Abstract

As national teacher education and government organizations continue to endorse technology integration in K-12 settings, university doctoral programs in English education face a complex task. They are being called upon to prepare scholars who will contribute meaningfully to the latest corpus of research and also to prepare teacher educators who will be conversant in both traditional academic areas, as well as the cutting edge of the latest technology-enhanced (and frequently media-based) pedagogical and communicative tools. How should doctoral programs prepare students for such complex leadership roles? In answer to this question, this article presents a scenario describing effective technology integration in doctoral English education. It suggests specific ways of integrating technology into the three components of a doctoral English education program: coursework and comprehensive exams, teaching practicum, and research and dissertation.

Introduction

"What we need at the doctoral level in English Education," wrote Dwight Burton in a forward-looking *English Education* article in 1982, "is conservation rather than innovation—conservation in the quality and nature of distinguished programs." In the face of declining enrollment in teacher education programs, decreased funding for English education doctoral students, and a dwindling number of jobs for new graduates, Burton believed that English education doctoral programs across the nation should economize rather than expand. For Burton, this meant adhering to the six core components he had outlined nearly 20 years before in an address to the Conference on English Education. Programs built around these components—literature, linguistics, rhetoric and written composition, research methodology, the nature of learning, and the history and philosophy of American education—would continue to maintain the quality of the English education profession, while producing highly qualified graduates. "Basically," Burton concluded, "the well-prepared doctoral candidate of 1964 is still the well-prepared candidate today" (p. 147).

Over two decades later, it would be difficult to make a similar argument. The well-prepared English education doctoral candidate of 2005, this article argues, must master a body of knowledge and a range of skills that were simply nonexistent when Burton speculated on the future of the profession in 1982. In that year, the year that *Time Magazine* named the personal computer Machine of the Year, the recently marketed IBM PC came equipped with a 16-kilobyte memory, a floppy disk drive, and a monochrome monitor—and was priced at nearly $1,600, or approximately $4,000 in today's dollars. The Internet existed, but it would be 7 years before Tim Berners-Lee invented the World Wide Web, the software platform that made it relatively easy for anyone to gather and publish information online. Information technology was in its infancy, and Burton would have been farsighted indeed to include technology as a key part of the English education doctoral degree.

But today, as Lue, Kinzer, Coiro, and Cammack (2004) argued, technological changes in our society are profoundly affecting the nature of literacy and literacy practices. Indeed, technology has begun to transform the very concepts defining literacy, such as "language," "text," and "literacy" (Costanzo, 1994; Labbo & Reinking, 1999; Leu, 2002). Today in the United States, more and more people use email, gaming software, video conferencing, Web pages and Web logs to communicate, read, and write—at home and at work. These technological changes have important implications for literacy instruction, teacher education, and ultimately, doctoral English education programs.

The Need for New Expertise

The late 1990s and early 2000s saw unprecedented technology spending at the federal, state, and corporate levels, with billions spent putting Internet-connected computers in every classroom. As a result, two key indicators of digital equity, Internet connectivity and the student-to-computer ratio, have improved significantly in public schools across the nation, including those in low-income districts. The National Center for Education Statistics reported that in 2003, 99% of schools with high minority enrollment had Internet access, as did 99% of schools with over 75% of students on assisted lunch programs. Overall, 99% of all public schools have Internet access, regardless of enrollment size or location. Access within classrooms is also nearly universal, with 93% of rooms in public schools providing an Internet connection (Parsad & Jones, 2005).

The technology explosion has put a premium on teacher expertise, and in this area, traditionally underserved schools still lag behind. In 2003, 25% of schools with high-minority populations described the majority of their teachers as "beginners" in using technology, compared to only 15% of teachers in low-minority schools (Fox, 2005). Middle- and high-income students are also more likely than low-income students to have access to the Internet in multiple classrooms, where expert teachers can link technology with content-area learning (Corporation for Public Broadcasting, 2003). Furthermore, low-income districts spend less money training teachers to use technology than do high-income schools (Anderson & Becker, 2001). Unfortunately, such teachers have fewer support resources. Schools with low-income and minority populations are less likely to fund a full-time technology coordinator to assist teachers (Parsad & Jones, 2005).

At the beginning of the 21st century, then, it is technological expertise—the ability to use increasingly available technological resources in effective and economical ways—that measures the digital divide, more so than hardware or software. If students of every income bracket and color are to be critical consumers and producers of technology-created texts, teachers must know how to operate new technologies, evaluate the opportunities they present, and integrate them into their content areas.

Many public schools have taken important steps toward achieving these goals. Presently, 49 states have adopted, adapted, or referenced the *National Educational Technology Standards* (NETS) for students or teachers in their curriculum, technology plan, licensure, certification, assessment plan, technology plan, or other official scholastic policies. These broadly interdisciplinary standards, developed by the International Society for Technology in Education (ISTE, 2000, 2002), emphasize a vision of technological literacy that goes beyond a discrete set of isolated skills, beyond mere technical proficiency, into a wide range of academic and real-world applications.

Technology Expertise in English Language Arts

The role of technology is also expanding within English language arts instruction. At the K-12 level, technology-based skills and outcomes have been woven into English Language Arts (ELA) standards, benchmarks, and grade level expectations at the state and district levels. Professional organizations like the National Council of Teachers of English (NCTE) and the International Reading Association (IRA) have created position statements on composing with nonprint media (NCTE, 2003) and integrating literacy and technology (IRA, 2001). To support ELA students, teachers, and teacher educators, these organizations have sponsored a growing body of scholarship on the theory, research, and pedagogy of technology-enhanced ELA instruction. A sampling of recent NCTE publications includes *Literate Lives in the Information Age: Narratives of Literacy from the United States* (Selfe & Hawisher, 2004), *Multiliteracies for a Digital Age* (Selber, 2004), and *Weaving a Virtual Web: Practical Approaches to New Information Technologies* (Gruber, 2000). Emerging from this scholarship is the recognition that English language arts and digital technology are now inseparable. Digital technology, it asserts, has significant and lasting consequences for reading, writing, speaking, listening, and teaching.

Aligning NCTE's 1996 *Guidelines for the Preparation of Teachers of English Language Arts* with NETS for students, Pope and Golub (2000) recommended six principles for integrating technology within English education programs: Teacher educators should introduce and infuse technology in context, focus on the importance of technology as a literacy tool, model English language arts teaching and learning while infusing technology, evaluate critically when and how to use technology, provide a wide range of

opportunities for using technology within the content, find means of assessing technology-based English language arts projects, and emphasize issues of equity and diversity in technology. In establishing these principles for undergraduate English education programs, Pope and Golub (and also Bush, 2002) set forward a model for preparing future English language arts teachers to use technology. This model, as Bush argued, "goes beyond the concept of technical competence [to] consider these technologies within the critical framework of the English language arts classroom." Young and Bush (2004) further developed the model by suggesting methods by which English language arts teachers may evaluate technology for their own classrooms. NCTE is also currently working to revise its 1996 guidelines and will likely emphasize technology in its new document.

Technology Preparation in Doctoral English Education Programs

Clearly, English education doctoral programs play a crucial role in preparing teacher educators and future scholars, not only for the changing nature of literacy and literacy instruction, but also for leadership roles in modeling the full potential of powerful technologies. But to what degree are our doctoral programs, which are responsible for preparing teacher educators, equipping graduates for these roles? Though many of today's graduate students are adept at sending emails, browsing the Web, and using word processing, they often lack technology expertise for educational and research purposes. Most English education doctoral students have not observed or participated in focused curriculum-based technology preparation for educational and research purposes. Many of them are not part of the computer-raised generation, at least not to the extent that their current students are and future students will be. In the remainder of this article, then, we set forth what sound technology preparation in English education doctoral programs might look like for graduate students who too often have limited knowledge about technology as a research and teaching tool. Our model follows the typical structure of a doctoral program, which generally includes three components: coursework and comprehensive exams, teaching practicum, and research and dissertation.

To explore how technology might fit into each of these components, we engaged in what Lankshear and Knobel (2003) called scenario planning—or "plotting credible poles: between possibilities that, at one pole are not too 'bland' and, at the other, not too 'off-the wall.'" The goal of scenario planning, Lankshear and Knobel explained, is "to aim for making policies and decisions now that are likely to prove sufficiently robust if played out across several possible futures" (p. 26). Thus, in "plotting" the possibilities for doctoral programs regarding technology integration in this article, we speculate about the possible scenario for technology integration in English Education doctoral programs. This scenario consists of three supplementary scenarios, which are aligned with the three typical components of a doctoral program: Scenario 1: Coursework; Scenario 2: Teaching Practicum; Scenario 3: Research and Dissertation. In addition, in Scenario 4: Assessing the Doctoral Program in English Education, we provide doctoral programs with a tool to monitor the progress of technology integration. Our suggestions in each scenario are based on available scholarship, research, and practice, as well as on our personal experiences with technology as recent doctoral students and active English teacher educators.

Scenario 1: Coursework

In our scenario, the coursework in an English education doctoral program would be rich with technology. The means of integration might vary —we can envision a stand-alone model, in which technology within the English language arts is treated as a subject in

itself, or an infusion model, in which technology content and methods are incorporated into existing English education courses. Ideally, coursework in both models would include a theoretical consideration of the way the digital medium expands our concepts of text, reader, and writer; an exploration of the new literacies engendered by digital technology; and lastly, a broader discussion of the technology's sociocultural implications.

New Understandings of Text

Digital technology has changed conventional understandings of text, reader, and composition. As Jerome McGann (2001) and Espen Aarseth (1997) have argued, digital texts both remediate and expand existing print forms. With print texts, digital texts share common forms and common purposes. Simultaneously, however, digital texts possess characteristics unique to the digital medium, challenging our ideas about what texts are and how they work. Digital texts may be multilinear, linking to a multitude of other texts; dynamic, changing content in real time; indeterminate, with no definite beginning or end, and multimodal, incorporating visual, auditory, and other nonverbal elements. The digital medium has also generated new genres, such as Web pages, Web logs, multi-user virtual environments like MOOs (multi-object orientation) and MUDs (multi-user dimension), and collaborative writing platforms like wikis and threaded discussions, all of which have implications for teaching and research.

Translating print texts into digital format also alters the ways in which texts mean and the ways in which they are accessed. A s publicly accessible online archives make more and more texts available—from fiction to nonfiction, from classic to contemporary, from the academic to the mainstream—the study of texts will continue to change. Online archives have the potential to resituate print works within rich multimedia contexts, to expand the boundaries of texts through links to biographical, historical, and other connective texts, and to widen the canon to include previously marginalized writers and genres formerly underrepresented in the print medium.

New Understandings of Reader

Coursework in a technology-oriented English education program would also emphasize the changing role of the reader. As George Landow (1997) has contended, digital texts can expand this role by allowing the reader to follow nonlinear reading pathways, by encouraging the reader to annotate and recenter the text, and by presenting the reader with rich semiotic and semantic possibilities through multimodal content, such as video, audio, and other elements. Through these interactive processes, readers of digital texts become more "writerly" readers, collaborating with the author to cocreate the text.

In reading digital texts, readers must use a wide range of new literacy skills to formulate meaning. As Bruce (1 997) noted, "New technologies continually change literacies and evolving literacies transform technologies," as these technologies "participate in a transaction with the other technologies, texts, artifacts, physical spaces, and procedures" within any lite racy setting (p. 303). In this view, readers of digital material must know how to locate, evaluate, synthesize, cite, and use information judiciously. Increasingly, this information is taking on multimodal forms that incorporate images, video, sound, and other nontextual elements. Such texts require readers to recognize, evaluate, and create meaning within these variant modes of representation. And like the print media, the new media reinforce the values and ideologies embedded within our language and society at large. Readers must recognize and respond to these implicit and explicit cultural texts, not only in computer-mediated texts, but in film, television, music, and other popular media as well.

New Understanding of Composition and Its Sociocultural Implications

A discussion of composition—and the new meanings of composition implied by information communication technologies (ICTs)—would also play a central role in technology-oriented doctoral coursework. Such discussion might focus on the relationships between new technologies and composing, as well as on their impact on social understandings and the practices of writing. The new genre of the Web log, for example, might be examined as a means that may both enhance and limit actual content production, since such typically truncated entries demand more strategic thinking, planning, and presenting of information (Deysher, 2002).

Grabill and Hicks (2005) offer three lenses to guide such conversations: the rhetorical, the interactive, and the pedagogical. Each stresses the importance of seeing writing as an act of communication and a social practice. From a rhetorical perspective, Grabill and Hicks argue, discussions about writing with ICTs inevitably concern the impact of these technologies on all aspects of composing. Technological factors affect composing at all stages of contemporary content creation and distribution – impacting the text (the product), the means to produce it (the process), the ways to distribute it (publication), and even the target audience. Thus, several sophisticated strategies might be applied to develop a given argument.

Examining writing from the second perspective, the interactive, will allow doctoral students to see the way ICTs have affected the relationship between the writer and audience, the author and the reader. As Grabill and Hicks and other scholars (e.g., Porter, 1998) have noted, this relationship has begun to change. New channels for communication and publishing such as email, listservs, chat rooms, newsletter groups, and electronic publishing have brought composing and publishing closer together than ever, rendering exchanges of ideas between author and reader faster, easier, more frequent, and thus, more expected. Text composed for the electronic audience and distributed electronically is potentially accessible beyond time and space limits to any interested persons with access to digital networks. Such technologies make the reader-writer relationship more interactive than ever before, creating space for immediate response and continued dialogue.

Additionally, ITCs allow texts of whatever sort (audio, image, and video) to be produced, revised, and reproduced through the work of many other authors, distributors, and discussion moderators. We believe these changes force English teacher educators and scholars to ask questions about broader questions in heuristics, such as knowledge and knowledge construction, authorship and ownership of text, and literacy and literacy development. It is clear that these latter notions will be seen as less fixed, in light of literacy practices emerging alongside the digitization of composing and publishing. These new practices involve "distributed cognition, collaborative practice, and communities of practice" (Lankshear & Knobel, 2003, p. 165) among authors, readers, and publishers. As Lankshear and Knobel have pointed out, ideas such as these imply that knowledge and composing processes are no longer the product of an individual, but are more so a product of "a *collective* assemblage involving many minds and machines" (p. 167).

Thus, as composing and knowing become more collaborative, interactive, multimodal, multiformatted, and electronically distributed, doctoral programs will need to engage their students and faculty in considering these changes for literacy development and the English language arts curriculum. In their discussion of the pedagogical perspective, Grabill and Hicks (2005) stressed the importance of teaching writing for differing social spaces and the importance of global reach that digital networks enable. Teaching writing in this way prepares students to write for audiences of the Web and networks, using the

tools and strategies that these technologies afford them, to produce text both in an individual and in an interactive and collaborative mode. Doctoral programs provide an ideal space for thinking through the possible scenarios for writing instruction, in light of Grabill and Hicks's triple lenses.

Scenario 2: Teaching Practicum

An effective doctoral program in English education would also provide opportunities for graduate students to investigate how technology is changing the teaching of English language arts. Faculty members should engage students in inquiry and problem-based learning about technology integration, revealing its benefits and challenges as a way to help them develop their own scenarios for effective teaching with technology. Moreover, we anticipate that a technology-oriented teaching practicum will allow faculty members and doctoral students to see themselves as leaders of educational thought and practice in matters of technology in our field. Indeed in our experience, it is sometimes the doctoral students who lead faculty members in new directions in technology integration in instruction. During the teaching practicum, then, doctoral students should be given opportunities to explore theoretical models of technology integration; examine recent national standards for technology integration that are currently defining technological literacy instruction in K-12 schools; and practice the new means of teaching, learning, and collaborating that digital technology has made available.

Theoretical Models of Technology Integration

While technology has been implemented in traditional approaches to English language arts instruction, (e.g., word processing, Internet research, database use, and presentation software; Peck, Cuban, & Kirkpatrick, 2002), such uses, as Lankshear and Knobel (2003) pointed out, tend only to "perpetuate the old, rather than to engage with and refine or reinvent the new" (p. 29). Doctoral students need to explore new avenues for the teaching of English, which are becoming more available as new technologies emerge. Instead of discussing how to fit technology into existing ways of learning and thinking, doctoral students should be encouraged to seek new, authentic ways of doing these things with technology. Accordingly, doctoral students should experience and then critique alternative approaches and theories of teaching English using modern technologies. As part of such explorations, faculty members might expose doctoral students to dilemmas and problems from real classrooms in specific scenarios or research studies. Such experiences will enable doctoral students to experience and think through the theoretical underpinnings controlling the multiple-faceted nature of pedagogy for technology integration in our field.

Technology Standards

Another key element in preparing doctoral students involves national and state technology standards, as they apply to students, teachers, and teacher educators. Such standards have, in recent years, become an increasingly important part of the conversation about technology integration. The well-prepared English education graduate should be able to appraise these standards from multiple points of view, recognizing their function and emphases at the K-12 ELA education level (Level 1); at the undergraduate English education level (Level 2); and at the graduate English education level (Level 3). The doctoral student would spend time examining these standards within a larger technology-based course, where they can be situated within a rich theoretical and pedagogical context (Level 3). Ideally, they would then work with preservice teachers in the undergraduate English education program, teaching them the skills and critical thinking habits called for by ISTE NETS for teachers (Level 2), while modeling how to

align technology -based curricula with ISTE NETS for K-12 students (Level 1). This multilevel approach would be carried out within the English language arts context, so the interdisciplinary ISTE standards could be further measured against state standards and benchmarks within the field.

To illustrate with an example, one of the six interdisciplinary technology standards established by ISTE (2000) NETS for students involves communication. According to the standard, students must be able "to use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences . . . . [to] use a variety of media and formats to communicate information and ideas effectively to multiple audiences" (p. 282). One of the most interesting communication media to emerge in recent years is the Web log, or blog, which is a Web site featuring regularly updated, chronologically ordered posts. In blogging, communication is central, making the blog a suitable tool for multiple educational purposes, as a growing body of scholarship attests.

An English education doctoral student might first encounter the Web log in a stand-alone or technology-infused graduate course, where blogging would be contextualized within broader theoretical considerations, such as those occurring in the online essay collection *Into the Blogosphere (http://blog.lib.umn.edu/blogosphere/)*. One appropriate essay here, for example, would be Charles Lowe and Terra Williams's (2004) examination of the rhetorical effects of online publishing. Arguing that "[public] weblogs can facilitate a collaborative, social process o f meaning making"(Weblogs as Social, Public Writing Spaces, para. 10), this article might be used in support of the ISTE standard on telecommunication, which recommends technologies that allow for collaborative and interactive publishing. At Level 3 in other words, technology standards are scrutinized from the theoretical positions that emerged from course readings and discussions.

At Level 2 doctoral English education students would examine how blogging might fit with interdisciplinary technology standards for teachers. Blogs might be used to give preservice teachers the skills necessary to pass the state examination. In states like Michigan, which does not currently require technology training, coursework, or testing for initial licensure (Fox, 2005), but nevertheless has implemented technology standards for teachers (Michigan Department of Education, 2002), there is a particularly urgent need for well-prepared professors to model successful integration of technology for preservice teachers. The goal of doctoral programs should be to produce model technology users, who may then use their own methods courses to prepare a new generation of innovative practitioners—teachers who can connect static technology standards to dynamic technology applications and to state English language arts benchmarks. The English teaching profession is already home to no small number of such practitioners. Will Richardson (2003), to cite a representative example, has illustrated how student Web blogs can improve discussion, both in and out of the classroom, and remains the primary apologist for "edublogging" within a writing context.

Finally, at Level 1, the discussion of blogging would be rooted in the practice of teaching English language arts. Here, doctoral students would ask, "How does blogging meet interdisciplinary standards for K-12 students? How does it support English language arts standards and benchmarks?" Blogs might be examined as way to make online publishing easier than ever before, to give students new purposes and genres, to promote ownership of writing, to provide a new platform for process-oriented pedagogy, and to offer real-world audiences to student writers.

Hands-On Experience

Even more importantly, doctoral students should have the opportunity to develop and teach technology-based lessons both to their peers and in real classrooms. At Western Michigan University, doctoral students teach undergraduate English education courses in a wireless laboratory equipped with student laptops, desktop computers, high-resolution scanners, an overhead data projector, and a smart board. In this technology rich environment, graduate instructors and doctoral faculty members have integrated and modeled various technology applications: undergraduates and graduates have learned to use literary MOOs for role-playing activities, wikis as collaborative writing spaces, Web logs as reading journals, electronic portfolios as alternative assessment devices, digital video and image capture as means for developing multigenre literary units and classroom Web sites as powerful teaching and publication tools. Integrating these new technologies also challenges doctoral students to devise appropriate means of assessment, as they learn and then model how to evaluate technology-based learning and assignments. Technology can also be used to encourage reflective teaching: Using Web logs or asynchronous discussion, doctoral students might monitor their own progress in facilitating the learning of their students.

Scenario 3: Research and Dissertation

The final stage of the doctorate in English education involves research, which frequently occurs within ELA classrooms at the primary, secondary, or collegiate levels. To equip doctoral students for such research, English education programs must emphasize that with new technologies come new ways of acting, thinking, learning, understanding, and consequently, new ways of researching. In some sense, new technology tools add both to the focus and method of research in a contemporary networked society.

The studies cited in this article illustrate that technology within an educational context is the frequent subject of research. Many of these studies employ traditional methodologies, such as face-to-face interviews or classroom observations. When technology is used as a research tool, it is often limited to particular hardware or software applications, as in using digital video recorders to capture events from selected classroom observations, or asynchronous discussions to gather data. Even in these cases, however, technology is often used to facilitate more traditional methodology, rather than as a means to invent new ways of data collection and analysis.

But some recent studies have begun to explore technology as a methodology tool. Sade-Beck (2004), for example, examined the methodological issues resulting from the use of qualitative research methodologies, such as online observations, interviews, and content analysis of supporting materials. Other studies explore in-depth the ethical issues in online research, ranging from privacy and human subject protection (Berry, 2004; Walther, 2002) to strategies for ethical conduct of research. These strategies employ methods such as content-based digital video and bulletin board (Haga & Kaneda, 2005), the online interview (Bampton & Cowton, 2002), or observation of online communities (Storm, 1996). Still other studies explore the technology's impact on academic research paradigms (Berkowitz, 2004; Dahlberg, 2004). Certainly, these studies expand our notions of research process. These new opportunities and techniques require not only new technology and Internet skills, but more importantly, as Anderson and Kanuka (2003) observed, "creativity and an ability to manipulate the world in different ways" (p. 5).

English education doctoral programs are fertile ground for providing doctoral students with new research opportunities. In the shared process of designing and executing a research study, faculty members and doctoral students can reflect critically on changing research paradigms, new standards for ethical conduct, shifting researcher roles, and innovative means of data collection and analysis. Such meta-methodological reflection (Dahlberg, 2004) is essential for helping doctoral students not only to improve their methodology skills, but also to help them extend their understandings of electronic research (e-research) and other technology-related methods.

More importantly, English education doctoral programs can provide students with real opportunities to use the latest technologies to conduct meaningful research. Such skills are essential to sustaining productive scholarly activity after they graduate. Many doctoral students lack the maturity of seasoned researchers for a lack of mentored supervision and ample opportunities to actually engage in research other than the dissertation study itself while they are still in graduate schools (Labaree, 2003). In our own experiences with doctoral students, this lack of research experience, in general, parallels students' lack of experiences with technology-based research and other forms of technology-supported scholarly activity, such as digital video content analysis, observation and record of human motor-sensory behavior with the help of computer tracking systems or online interviews.

The Literature Review Process and Information Literacy

During the initial stages of the dissertation, the technology-related skill of information literacy becomes especially important. Information literacy is crucial for developing and writing quality literature reviews. As Boote and Beile (2005) noted, information literacy goes much beyond mechanical information retrieval. Such literacy skill requires a thoughtful, systematic, and conceptual approach to information search, information evaluation, and information use for research purposes. Unfortunately, this type information literacy is not always part of the formal curriculum in doctoral programs. For these reasons, developing information literacy has to become a critical component in literacy methods courses for graduate students. Through such coursework, doctoral students might refine their information literacy skills by completing brief literature reviews on a topic of their interest, using the search engines, subject directories, specialized databases, subject experts, software for storing and retrieval of information, and bibliography software.

Methodology Design and Technology

As doctoral students design research plans, they make critical decisions about appropriate methodology. Such decisions cannot be made, however, without understanding how technology enriches and complicates traditional research methods. Both quantitative and qualitative technology-based research involve possibilities and challenges, and each has unique theoretical underpinnings. Denzin (2004) suggested, for example, that online qualitative research relies on *hybridity*, or the "movement back and forth between real and virtual sites, research about the Internet as well as Internet research. There also is movement back and forth between online environments, traditional social research methods, and research sites" (p. 2). This understanding also acknowledges that an online qualitative researcher moves back and forth between multiple theoretical perspectives and paradigms. As Denzin argued, online research and other technology-supported methodologies do not privilege one method over another, but rather involve multiple methods and practices, including semiotics, content analysis, narrative, discourse, archival and phonemic analysis, tables, graphs, and numbers.

To ease the process of data collection, classification, analysis, theory building, and data storing, doctoral students in English education programs should be introduced to software that can assist them in this complex and multilayered process. The qualitative analysis software NUD*IST (Non-numerical Unstructured Data Indexing, Searching, and Theorizing, 2003), for example, can be very helpful in coding data into larger and conceptually organized units of analysis. Working with this and similar programs can be time-consuming, however, and doctoral programs should offer students support and ample opportunities to learn about qualitative data analysis software and quantitative data analysis software (e.g., SAS or SPSS) throughout the research process. At the same time, doctoral students should realize the limitations of such software. As Taft (1993) warned, data analysis software can facilitate data management and interpretation processes, but it cannot critically examine categories of data and reach decisions about their meaning and relevance.

Publication of Research Results

Finally, in learning about technology-based research processes in English education doctoral programs, doctoral students need to know how to disseminate their research results. Publication venues should not be limited to traditional paper-based channels, but include scholarly Web sites, email listservs, peer-reviewed online journals, or even virtual conferencing (Anderson & Kanuka, 2003). These new technologies, as Anderson and Kanuka have observed, can reduce the time for publication and break physical barriers, as the audience can potentially be anyplace and anytime in the world. Additionally, many alternative venues encourage interaction between reviewers, authors, and the audience and may allow doctoral students to introduce themselves to the scholarly community.

In summary, the three scenarios described in this work emphasize the importance of English doctoral programs in providing doctoral students with ample opportunities to explore and experience modern technology's implications for content, instruction, and research in their field, the crucial components in any doctoral program. As agents of change in their future institution, doctoral students must be able to model meaningful technology integration within the content and pedagogy of English language arts, thereby enhancing and transforming traditional understandings of our discipline. These transformations cannot take place, however, without re-examining and introducing some substantial changes to doctoral programs on the programmatic and institutional levels. Scenario 4 provides doctoral programs with a tool to assess and monitor their progress in this direction.

Scenario 4: Assessing the Doctoral Program in English Education

English education doctoral programs might begin by identifying the current levels of technology integration, attitudes, resources, and faculty expertise. Originally developed for undergraduate teacher preparation programs, the Gap Analysis Tool (New York State Education Department [NYSED], 2003) offers a workable framework for English Education doctoral programs. Based on works of Fullan (1993, 2001), Hall and Hord (1987), and Norris and Soloway (1997), the GAT framework offers six broad categories for consideration: moral purpose; understanding key elements of implementation, including beliefs, approaches, and materials and resources; building relationships; creating and sharing knowledge; organizational contexts; and coherence, commitment, and sustainability.

The New York State Education Department (NYSED) team defined moral purpose as "making a difference, having a broad impact, or focusing on what people need" (p. 5) and understanding of key elements of implementation as understanding the multidimensional realities of change and orchestrating them in the way to accomplish the goals of the organization. Borrowing from Fullan (1993), the team identified "changing beliefs, introducing new materials and using new teaching approaches" (p. 5) as critical dimensions for implementing change. For an English education doctoral program, moral purpose and understanding of key elements of implementation might indicate a willingness to change beliefs, approaches, and perceptions of technology integration. Often, these attitudes are evident in the mission statement of an institution, which can provide a conceptual framework for new ways of thinking about technology integration and acting upon this new thinking through policy, regulations, and programmatic changes on an institutional level.

We also consider creating knowledge and developing partnerships both inside and outside the organization or institution to be critically important, especially for our doctoral students, the future leaders in research and the theory of practice in our field. Partnerships with K-12 schools of other higher education institutions afford doctoral students opportunities to implement technology-related research projects, as well as a supportive environment to test, evaluate, modify, and refine theory and theory of practice about technology integration. Doctoral programs in English education should seek to facilitate these productive partnerships.

The NYSED team defined organizational context as "how things get done in an institution" and extended it to "how an organization defines itself and perceives it work, as well as the values it holds and practices it promotes" (p. 15). Within an English education framework, we see organizational context as appropriate infrastructure base, whether it consists of material or human resources and their expertise. Faculty members and doctoral students cannot be made entirely responsible for dealing with these issues, but should develop, in conjunction with their institution, long-term plans for supervising and continuously upgrading equipment and its maintenance, technical support, staffing, and professional development cadre. We agree with the NYSED team that to affect programmatic change in doctoral programs within institutions, their leaders must build in coherence, commitment, and sustainability plans to support the change process and the individuals committed to this change.

Effective Technology Preparation in English Education: A Final Vision

We began this article by suggesting that being conservative is no longer the best policy for doctoral English education programs to pursue, at least in regard to technology. In the aftermath of the technological eruption of the past two decades, such programs must develop a vision for effective technology preparation of doctoral students. We hope the scenario expanded on here has helped to conjure such a vision, and we offer a summary of its most salient features:

1. *There is an urgent need for technology expertise at the highest level of English language arts education.* As the digital divide between affluent and poor schools, high-income and low-income homes, and white and non-white families continues to disappear, technological expertise, or the ability to use available technology resources effectively and economically, is of critical importance. Our K-12 schools and undergraduate institutions have recognized the importance of expertise for students and teachers alike, crafting and implementing local, state, and national technology standards that have begun to define technological literacy in a broad, interdisciplinary way. Within the ELA, technology integration

is gaining momentum, evidenced by the scholarship, research, and practice at the K-12 and undergraduate levels. We have found that doctoral programs in English education lack an organized and systematic approach toward technology integration.

2. *English language arts education and technology are no longer separable*. This article has attempted to illustrate the intertwining of ELA instruction and technology, specifically in the areas of content and pedagogy. We have argued that digital technology has altered the way we conceptualize text, expanded the act of reading, changed the process of composition, engendered new literacies for navigating the information medium, restructured the relationship between educator and student, and created new ways of learning and teaching. In short, nearly everything we do as English educators intersects on some level with the technology that surrounds us. This being the case, technology can no longer be devised as *only* a research, teaching, or productivity tool; within the ELA framework, it must be considered in broad sociocultural terms, inseparable from our daily literate and scholarly existence.

3. *Doctoral English education programs have a particular responsibility to prepare graduates in technology integration.* Doctoral English education programs must prepare their graduates to be agents of change in their future institutions. As future teacher educators, graduates must be able to model meaningful technology integration within the content and pedagogy of ELA; as future scholars, graduates must be equipped to use technology-based research tools and methods; as future members of the broader academic community, graduates must approach technology as a subject in its own right, examining it with the theoretical lenses and critical tools that are available to them. Doctoral programs might begin by assessing their own institution's progress and planning for technology integration, perhaps by using the GAT framework discussed here.

Ideally, the doctoral program would emphasize the content and pedagogical approaches our scenarios have described, though we realize that our recommendations, like those made by Burton over two decades ago, are subject to change. As new technologies and accompanying literacies emerge, our best policy is to maintain the high standards that Burton set forth for our profession, while widening our discipline to include those technologies that will continue to shape our teaching and our research. In this area of technology integration—perhaps more than any other area in our field—there is still much work to be done.

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