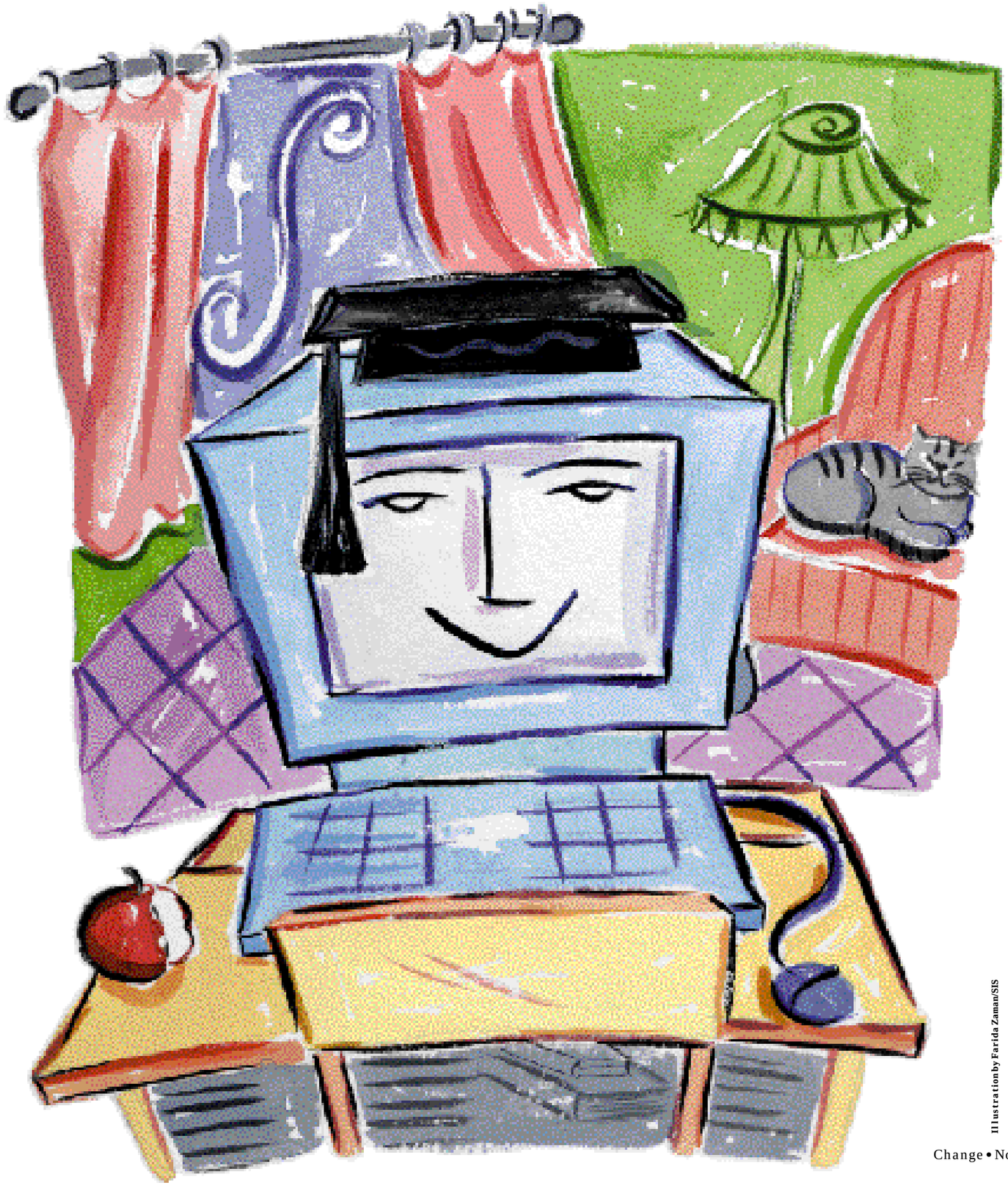

Illustration by Farida Zaman/SIS

New-Media Scholarship

A Call for Research

By Joseph M. Moxley

When print emerged, universities failed to recognize its importance and almost managed to marginalize themselves into oblivion. With a new major transition upon us, such benign neglect simply will not do. Yet the challenges universities face in responding to an increasingly digitized and networked world are staggering. Universities need a vision allowing them to express their dearest values in new forms, rather than protect their present form at the expense of their most fundamental values

—Jean Claude Guédon, *Conseiller*, 1998

In Victor Hugo's novel *Notre-Dame de Paris*, set in 1482, the priest remarked "*Ceci tura cela*": this book will destroy that building. He meant not only that printing and literacy would undermine the authority of the church but also that "human thought... would change its mode of expression, that the principal idea of each generation would no longer write itself with the same material and in the same way, that the book of stone, so solid and durable, would give place to the book made of paper, yet more solid and durable."

What will be lost [in the late age of print] is not literacy itself, but the literacy of print, for electronic technology offers us a new kind of book and new ways to write and read. The shift to the computer will make writing more flexible, but it will also threaten the definitions of good writing and careful reading that have been fostered by the technique of printing

—Jay David Bolter, *Writing Space:The Computer, Hypertext, and the History of Writing*, 1991

As Jean Claude Guédon and Jay Bolter suggest, new technologies are extending the missions of universities and the work of academic researchers. In response to digital libraries, hypermedia, and new communication technologies, universities are struggling to re-conceptualize literacy, disciplinary knowledge, research methodologies, interdisciplinarity, and the faculty reward system.

Researchers interested in literacy and composition studies can and should play a leadership role in helping faculty and graduate students across disciplines navigate information resources, collaborate online, and find their voices as digital researchers and scholars. We need to understand better the resources that faculty and graduate students need to employ to publish effective multimedia research. We need to explore why more than half of the nation's graduate students fail to reach the finish line while others take longer than necessary to complete theses and dissertations.

How can we support ABD (All But Dissertation)

Joseph M. Moxley is a professor of English at the University of South Florida.

students' needs as writers? How do intellectual copyright issues impinge on e-publishing of research? What authoring platforms are likely to be archivable in the years ahead? These questions are neither insignificant nor academic: Thanks to digital libraries, theses and dissertations have become more than an academic hurdle; they are now documents with the potential to reach millions of readers.

GraduateSchools.Edu

As the popular press has frequently noted, technology is transforming society. Adults today face a constantly changing workplace, and technology is driving many of the changes. For example, in 1970, corporate spending on technology represented 5 percent of expenditures; in 1991, the figure had risen to 30 percent; and by 2000 it had reached 50 percent. Interestingly, it took 35 years for radio to attain a 25 percent market, 26 years for TV, 15 years for PCs, and only seven years for the Internet. Just as paper was once ubiquitous, tools like Microsoft Office have now become commonplace. Being literate now involves much more than deciphering a bus schedule; nowadays, students must be facile at mastering new software.

Technology is exerting an equally powerful influence on graduate education and scholarship, altering how we construct, define, and publish knowledge. Thanks to technology, academics can share drafts of documents with students and colleagues over the Internet; they can use the Internet to remain current about research findings; they can break the boundaries of the traditional linear text and one-inch margins; they can integrate animation, graphics, audio, and video.

Yet technology also threatens the very existence of traditional graduate schools. Perhaps because of historically low unemployment rates (themselves substantially driven by the good economic times created by advances in the technology sector), there was a 1 percent drop in graduate enrollments each year between 1996 and 1998. Graduate education is still a booming enterprise: In 1998, approximately 420,000 students earned master's degrees; 43,000 students earned doctorates; and 1.8 million students were enrolled in graduate programs.

But graduate schools face more competition than ever before. Private industry now spends over $100 billion on corporate training. Online universities—like Magellan University, Western Governors University, Sylvan Learning Systems, the University of Phoenix, and, most recently, Harcourt Brace—challenge the authority and value of traditional universities. Like everyone else, research universities are struggling to understand the new rules for education, questioning how graduate programs can dedicate time to training students to use the new tools while still providing the comprehensive instruction students need in disciplinary knowledge and methodologies.

The creation of digital libraries of theses and dissertations is one of the most significant and exciting recent changes that have occurred across disciplines in graduate education. The Networked Digital Library of Theses and Dissertations (NDLTD) is the largest university-led effort.

Conceived in 1987 at a meeting involving University Microfilms International (UMI) and Virginia Polytechnic Institute and State University (VT), and realized in part through efforts by Virginia Tech's Ed Fox, Gail McMillan, and John Eaton, the NDLTD now holds approximately 7,268 ETDs (electronic theses and dissertations) and 17,763 scanned ETDs at 25 member institutions. The NDLTD archives bachelor's and master's theses in addition to dissertations. Presently, over 105 universities have signed letters to join with Virginia Tech in building the NDLTD, and soon their students' research will be available (see http://www.ndltd.org/members). Presently, five universities require students to complete ETDs for graduation: Virginia Tech, West Virginia University, East Tennessee State University, the University of North Texas, the University of Texas at Austin, and the University of Florida. In May 2002, BYU will host NDLTD 2002. Previously NDLTD conferences have been hosted by Caltech, USF, and VT.

Requiring students to author ETDs introduces graduate students, faculty, and libraries to electronic publishing. Electronic theses and dissertations enable a university to celebrate and distribute the intellectual products of its graduates and to introduce its students to the "Knowledge Age." Usage of the NDLTD is startling: in contrast to traditional print theses and dissertations, which average only a few requests each year, some of the popular research studies located at the NDLTD have been downloaded thousands of times.

Until Virginia Tech archived ETDs, few researchers requested VT's theses and dissertations. Between 1990 and 1994, for example, only 3,967 theses were requested from VT's 15,335 approved theses and dissertations. In contrast, in 1996, Virginia Tech received 25,829 requests for ETD abstracts and 4,600 requests for ETDs themselves. By 1999 (January-August), VT had received 143, 056 requests for abstracts and 244,987 requests for ETDs. As of October 1999, the most popular ETD at VT had been requested over 75,000 times. Remarkably, by 2000-2001, VT had received 1,565,151 access of the 3,393 ETDs in its collection. (See VT's download statistics at http://scholar.lib.vt.edu/theses/data.)

Clearly, the NDLTD improves worldwide access to information across disciplines, and enables research universities to distinguish themselves as creators and publishers of up-to-date significant content. In the days ahead, graduate students and researchers will judge a university by evaluating the quality of its virtual library of ETDs.

Now that access to graduate research has been so vastly improved, however, we must pay more attention to what graduate students need as authors. Interestingly, initiatives like the NDLTD have put pressure on universities to evaluate the quality of graduate student writing. In the past, universities have overlooked graduate students' and faculty members' needs as writers by treating the act of writing as a simple process of recording thoughts rather than a powerful way to generate knowledge and learning.

Graduate programs focus on discipline-specific training, often providing little support to improve written communication. Graduate students and faculty are well trained in the theories, practices, and research methodologies of their disciplines, but frequently are unaware of effective writing habits, readability guidelines, and marketing strategies. Many hold misconceptions about writing, believing, for example, that one needs large chunks of time to write, that one should separate thinking and research from the writing process, or that one should edit rough drafts as opposed to practicing process writing (see Moxley in *Resources*).

Graduate students' and faculty members' lack of familiarity with the practices and attitudes of professional writers may explain why so few faculty publish more than one or two books during their careers. Writing is rarely treated as a lifetime apprenticeship, and students and faculty often are left to discover independently the conventions of discourse within the disciplines as well as successful writing strategies.

Critics commonly argue that today's college students cannot write. Less frequently do we question whether faculty can write, or if universities are providing the resources they need to write effectively under changed conditions.

Rarely do universities give academic, graduate-level credit for writing courses or provide courses in multimedia authoring. Simple yet powerful tools like Endnote are left for individual students and faculty to find, evaluate, and implement. The price, at times, has been incomprehensible academic gobbledygook—stacks and stacks of essays so poorly written that they invite well-deserved parody (see http://www.physics.nyu.edu/faculty/sokal/index.html). Faculty frequently express concern about the quality of graduate student writing as a reason not to put graduate students' scholarship and research on the Web. As one of my colleagues remarked when we first set up our ETD Task Force at the University of South Florida, "What? You mean people are actually going to read these things?"

Critics commonly argue that today's college students cannot write. Less frequently do we question whether faculty can write, or if universities are providing the resources they need to keep up with how to write effectively under changed conditions. Recently, however, both individual academics and their professional organizations have questioned whether scientists contribute to scientific illiteracy by writing poorly. In an essay in *Science*, for instance, James Glanz contends "the flood of unexplained acronyms, cryptic symbols, endless sentences, and nightmarish graphs prevents scientists from communicating with one another, not to mention the rest of the world." The editors of *Nature* have called for more readable scientific writing in response to a study by Donald Hayes that found that articles in *Nature* since 1947 had become progressively more difficult to read.

Meanwhile, graduate students with English as a Second Language (ESL) backgrounds and others who are strong in math but poor in writing are left to sink or swim—and sink they do. Teachers of ESL graduate students frequently report that their students have difficulty with the level of writing required for a thesis or dissertation. This is particularly an issue in science and engineering disciplines, which have a large concentration of non-U.S. citizens seeking graduate degrees. In 1995 these disciplines had the highest percentages of non-U.S. graduate enrollment: engineering at 36 percent, physical sciences at 32 percent, and biological sciences at 24 percent. While English is the first language for many non-U.S. citizens, a 1993 Council of Graduate Schools report found that the nations of China (People's Republic and Taiwan), Korea, and India accounted for 52 percent of doctorates awarded in this country to non-U.S. citizens.

Clearly, the NDLTD has put a spotlight on graduate theses and dissertations. As a consequence, research universities will be increasingly challenged to create programs to address their graduate students' needs as writers and researchers. Indeed, the value of our graduate programs may soon be measured by the quality and innovativeness of our digital libraries.

What Questions to Address Through Research

To facilitate students' needs as writers of ETDs, we need better research on the specific ways in which information technologies alter graduate education. We need to investigate what kinds of training faculty and graduate students need in order to feel comfortable using new communication technologies. We must stop treating information technologies as an add-on, as an afterthought. For just as the act of writing is a powerful way of generating thinking, so too are new media. At the University of South Florida, for example, we are examining the particular ways students and faculty use software (or don't use software) to develop their projects. (See the Sample Research Study Box.)

The Florida research project is an exciting pilot. Still, we understand that our work is merely preliminary. The creation of the NDLTD has presented a significant opportunity for interdisciplinary research—an opportunity for faculty across disciplines to reflect on how we define, construct, and present knowledge. Some of the important research questions that interdisciplinary researchers will need to grapple with as we debate the shape and content of scholarship to come include the following.

1) *Are Our Graduate Programs Preparing Graduate Students for New Media Literacies?*

Those of us who work to facilitate new-media scholarship can expect resistance—and, indeed, the resistance we confront is itself worthy of study. As James Morrison, editor of *On the Horizon*, remarked in a recent address, arguments about literacy and writing tools are not new. Consider three claims:

> Students can no longer prepare bark to calculate problems. They depend instead on expensive slates. What will they do when the slate is dropped and breaks?
>
> —1703 (Teachers' Conference)

> Students depend on paper too much. They no longer know how to write on a slate without getting dust all over themselves. What will happen when they run out of paper?
>
> —1815 (Principal's Association Meeting)

> Students depend too much upon ink. They no longer know how to use a knife to sharpen a pencil
>
> —1907 (National Association of Teachers)

Debates about whether pens are reliable writing instruments now seem silly. But controversies about the degree to which

A Sample Research Study

My colleagues and I—Terry Beavers, information technologies; Bruce Cochrane, biology; Ilene Frank, library; Anita Callahan, engineering; and Rosann Collins, MIS—are currently analyzing how Microsoft's Office 2000 can be used to better support students' needs as writers of multimedia scholarship, as well as faculty members' needs as mentors of electronic theses and dissertations. Over the past two years, we have hosted workshops for graduate students providing them with Web space and training in using features such as Word's Tracking, Commenting, and Roundtripping; Frontpage's Database Wizard; and Endnote's "Cite While You Write." We have presented to students models of online research and writing portfolios, models of exemplary ETDs, and workshops on streaming multimedia. Thanks to support from Time Warner and USF we were able to sponsor 33 graduate students for one year, giving them high speed Internet access. In return we required students to maintain a weekly database reporting on progress and reflecting on how using communication technologies affect their composing and mentoring. Hoping to inspire USF to require ETDs and hoping to involve as many faculty and students as possible, we have presented at campus conferences, published in university magazines, and sponsored a national conference on ETDs for NDLTD.

We are looking at ways in which communication technologies can improve graduate education, particularly academic scholarship. Following Walter Ong, who theorized "Technologies are not mere exterior aids but also interior transformations of consciousness," we are researching how technologies alter specific aspects of graduate education, including mentoring relationships, topic selection, intellectual property, writing processes, and publishing practices.

In the preliminary stages of our investigation, we are focusing on uses of the Office 2000 suite, but we expect to look eventually at additional related tools for writers, including bibliography, and quantitative and qualitative data analysis packages. We chose to focus first on Office 2000 because it is used by so many other members of the NDLTD. Office 2000 includes all of the necessary components (word processor, database, spreadsheet, presentation graphics, electronic mail) needed to author a thesis or dissertation, and all of these components can be used to produce HTML code, as well as native-format documents. The package also has powerful features for collaboration and multimedia authoring. Outlook—Microsoft's e-mail and scheduling tool—can serve as a framework for document workflow, scheduling, sharing, and exchange. For example, regardless of their locations in time and space, faculty can use Outlook to provide students with an integrated set of reviews and links to grammar and punctuation references.

From any document in Office 2000, faculty and students can use NetMeeting to synchronously discuss documents, including audio/video-based discussions. They can invite scholars outside the committee to respond to drafts. Numerical data, as well as graphical representations of it, can be published using Excel in such a fashion as to permit limited manipulation and re-analysis from a Web browser. More extensive analyses can be formed by "roundtripping" the data back into Excel.

As we work with Office 2000 tools in proposal preparation, research, and thesis/dissertation writing, we are continually asking "What tools are really useful? What motivates or dissuades innovative use of tools?" As part of our study, some graduate students are maintaining journals in which they reflect on how their use of software tools influences their research, writing, and relationships with mentors. In turn, some faculty are reflecting on ways the tools influence mentoring, scholarship, and teaching and learning. Ultimately, we expect our research will reveal ways faculty and graduate students can use software tools to critique and develop theses and dissertations, and unveil insights into what training and resources are necessary. We believe this work is an important first step toward transforming our graduate programs so they better prepare students for the Knowledge Age. Available on http://dmi.usf.edu.

images and video can or should replace text in dissertations are more immediate. For example, when I shared a draft of this article with a colleague in an English department at a research university, he expressed horror—horror that I am willing to value visuals, video, and sound in students' dissertations. While I understand his position, I believe this isn't a prudent time to close our eyes and hope everything stays the same.

Using graphics, audio, video, and interactive features raises new questions and training issues. If our students (and faculty) are to be prepared for the Digital Age, they need courses in the use of digital libraries, word processing beyond simple keyboarding, multimedia authoring, archiving, and Web publishing. Yet even progressive graduate school administrators balk at the notion of offering academic credit to students for learning software tools.

Using images, sound, and animation involves rhetorical decisions as sophisticated as those required by traditional prose. Plus, we need to teach our students to be critical of the tools of technology where appropriate, to question how they encourage certain kinds of thinking, and to question who benefits from certain ways of using them. In light of the ways new technologies are altering how we communicate, analyze, and present data, we need to research whether our graduate programs are integrating appropriate software tools into their graduate curricula, ensuring students possess the following contemporary literacy skills:

- Ability to author a range of documents, from traditional printed texts to online help and multimedia-rich documents (for example, audio, video, interactive forms, hypertext links, and real-time discussion).
- Ability to locate, critically assess, and cite sources of information derived from non-text sources (such as online databases, digital libraries, Web pages).
- Ability to write online and learn independently and collaboratively—online.
- Ability to understand and employ interdisciplinary and cultural conventions, perspectives, and terms.
- Ability to use sound and visuals rhetorically.

2) *How Can Information Technology Tools Facilitate Research and Writing Processes?*

Because they facilitate collaboration, mutual criticism, and document sharing, today's communication tools can better support students' needs as writers and researchers. Nearly half of the graduate students enrolled in master's or PhD programs in America fail to complete their theses and dissertations. Certainly some fail to finish because they lack the skills and academic background necessary to complete doctoral work. And a weak academic job market, together with favorable business hiring conditions, discourages some talented students from completing their research and scholarship. But most graduate programs have competitive entrance requirements, so it seems likely that some students may fail because they are not receiving the support they need to find their voices as scholars and researchers.

Lacking the necessary peer support, many graduate students find writing theses and dissertations an isolating experience. In the face of this problem, though, most universities fail to establish appropriate support groups or resources. Failure to complete planned research, divorce, financial difficulties, and a seemingly endless treadmill are a familiar result for large numbers of graduate students and ABD-stage junior faculty. Depending upon the discipline, students may take five to 10 years to complete a dissertation after reaching the ABD stage. More than half of these ABDs no longer live on or near their university's campus, but most institutions fail to treat ABDs effectively as "distance learners" or to provide virtual support resources for them.

Yet we know a lot about how to address these difficulties (see *Resources*). For instance, Raymond Kluever's study of ABD doctoral students and graduates identified good communication with the committee as critical to completion of dissertations. Robert Boice, in turn, found that social support for writing helped reduce writing blocks for academicians. John Cuetara found in his study that the quality and quantity of advisor-advisee contacts were significantly related to depression and writing blocks during the dissertation. Similarly, M.J. Dillon et al. found that weekly feedback from faculty was critical to the successful completion of master's theses.

Graduate students usually meet with only one member of their thesis committee at a time, and frequently they hear conflicting ideas about how to conduct and report research. New information technologies can transform the dissertation process in light of these difficulties, making it a significantly less isolated experience. Faculty can respond to students' research online, no matter where they are in the world. Today's electronic literacies, in sum, present numerous opportunities for innovative researchers to address questions like the following:

- How can collaboration tools best be used to provide students with an integrated set of research and thesis reviews, regardless of faculty members' and students' locations in time and space?
- How can collaboration tools be employed to allow students to invite outsiders to contribute to the development and presentation of their ideas?
- How will digital libraries of ETDs affect the process of composition? For example, how will authors respond to the possibility that literally thousands of researchers may download their ETDs?
- How will the conventions of academic discourse change? For example, will dissertation committees allow students to write to various audiences, including lay audiences as well as technical audiences?
- How will the use of copyrighted material change?
- What new kinds of compositional demands will be placed on writers when they attempt to develop theses and presentations in a multimedia-rich format?
- How will greater access to information affect the topics that graduate students choose to address and methodologies that they use to generate knowledge?
- Will there be a dramatic increase in knowledge sharing because of greater access to literature reviews and bibliographies?
- Will digital libraries of ETDs enhance interdisciplinary, cross-cultural research?

3) *What Training Do Students Need?*

Students and faculty often have a "typewriter" mentality when it comes to producing scholarly products. For example, many do not know how to use styles or templates. In spite of this, standards of scholarship are evolving, creating new challenges for academic researchers and scholars. Graduate students and faculty have many cutting-edge software tools to choose from, but the burden falls to the users to find, access, integrate, and learn how to use them.

Today's students and faculty are unsure about which multimedia tools will be archivable, and thus accessible to future generations. Even graduate students at progressive universities are reluctant to experiment with new-media technologies. Presently, for example, the vast majority of works in the cur-

Resources

■ Boice, Robert. "Increasing the Writing Productivity of 'Blocked' Academicians." *Behaviour Research and Therapy,* Vol. 20, 1982, pp. 197-207.

■ ———. *Professors as Writers: A Self-Help Guide to Productive Writing*, Stillwater, OK: New Forums Press, 1990.

■ Cuetara, John. "The Relationship Between Dissertation Writing Experiences and Doctoral Training Environments," *Education*, Vol. 112, No. 2, 1991, pp. 233-241.

■ Dillon, M.J., H.M. Kent, and R.W. Malot, "A Supervisory System for Accomplishing Long-Range Projects: An Application to Master's Thesis Research," *Journal of Organizational Behavior Management*, Vol. 2, 1980, pp. 213-227.

■ Kluever, Raymond C. "Dissertation Completers and Non-Completers: An Analysis of Psycho-Social Variables," ERIC ED407885, March 1997.

■ Moxley, Joseph. *Publish, Don't Perish: The Scholar's Guide to Academic Writing and Publishing*, Westport, CT: Praeger, 1992.

■ ———, and Todd Taylor. *Writing and Publishing for Academic Authors, Second Edition*, Lanham, MD: Rowman & Littlefield Publishers, Inc., 1997.

■ Ong, Walter. *Orality and Literacy: The Technologizing of the World*, London and New York: Routledge, 1982.

rent NDLTD library are traditional linear texts saved in Portable Document Format (PDF). Clearly, students and faculty need help to envision new thesis and dissertation genres that provide views for different audiences, that incorporate streaming audio and video, and that employ visual rhetoric in startling new ways. To better meet faculty members' and graduate students' needs, we need to address the following research questions:

• What training and resources do universities need to provide to prepare students for the Knowledge Age?

• Who will establish standards for the appropriate processing and integration of knowledge from different sources, domains, and non-text media? What should such standards actually look like and how might they be established and promoted?

• Why do so few students and faculty make use of multimedia techniques that are crucial for clear expression in many types of investigations?

4) *How Can We Advance the Campus Culture Through Academic Publishing?*

Faculty and administrators need to work with one another and with software developers and publishers to investigate the effects of ETD initiatives on research methodologies, collaboration, mentoring, the academic reward system, and publishing practices. Some faculty—particularly those who dislike and distrust technology—may discourage their students from authoring new-media scholarship or from publishing their work on the Web. Others may embrace collaborative and multimedia authoring spaces, or may willingly serve on distance ETD committees. Related research questions are as follows:

• Will the increased access to graduate research created by digital libraries of ETDs result in more attention being paid to students' needs as writers?

• How will digital libraries of ETDs affect how university dissertation committees are formed or how "defenses" are held?

• Will hiring committees and tenure committees value ETDs that are widely cited or downloaded?

• How can we work with colleagues and software developers to create worthwhile collaboration, multimedia, and authoring tools?

• What are the effects of ETDs on traditional publishing practices?

Conclusion

Until recently, few graduate theses or dissertations circulated past local libraries. Although the United States invests billions of dollars each year to support graduate research, most of the results of this research are communicated poorly. Over half of the students who begin doctoral work fail to complete the dissertation; and few studies benefit from the effective use of multimedia tools.

Yet we live in exciting times, revolutionary times. New authoring spaces created by the Internet, the NDLTD, and multimedia software are challenging our traditional conceptions of research and scholarship. Like Victor Hugo's priest in *Notre Dame de Paris*, we know that dramatic changes are ahead. Thanks to information technology, faculty and graduate students can work collaboratively across geographical boundaries. Graduate students can use technology to defend proposals and dissertations, collaborate with each other and with faculty on group projects, incorporate interactive elements into their theses, and complete their dissertations without printing a word. Students can incorporate video samples of their research into larger documents or presentations. They can create poly-vocal case studies and ethnographies—that is, studies with alternative voices and interpretations.

Similarly, in the quantitative realm, students can incorporate pivot tables that allow readers to see the effects of different sample sizes or alternative ways of viewing and interpreting data. Across disciplines, students can include links in their work that explain the significance of their research results to lay audiences. As interdisciplinary research becomes more common, graduate students throughout the world can co-author collaborative studies, using their respective disciplinary expertise to contribute appropriate components. Faculty, finally, might frequently serve on dissertation committees at universities distant from their home campuses.

These new ways of making meaning and collaborating in graduate work are evolving daily. In response, we need to re-articulate our programs, ensuring that we provide the training and resources students need to write well and to incorporate new-media scholarship. Unless we want to be overtaken by corporations and online universities, we cannot shut our eyes to the inevitable transformations created by information technology. We cannot be complacent with the past ways of shaping theses and dissertations. Instead, we must engage in serious reflection and must actively investigate the ways information technologies can influence research, composition, collaboration, and mentoring. And, using the results of such research, we must work to re-articulate our definitions of literacy and our roles as teachers, scholars, and researchers.