

# Technological Ecologies & Sustainability

|                                   |   |
|-----------------------------------|---|
| <b>CHAPTER</b>                    | 3   |
| <b>TITLE</b>                      | Stifling Innovation: The Impact of Resource-poor Techno-ecologies on Student Technology Use   |
| <b>AUTHORS</b>                    | Anthony T. Atkins<br>Colleen A. Reilly  |
| <b>OVERVIEW</b>                   | <p>Our chapter reports on survey research we conducted to determine the effects that the resource-poor techno-ecology in which we work and teach has on student learning experiences and perceptions of themselves as users of computer technologies and designers of new media texts. Through a survey of 98 students in our professional writing courses, we gained insight into student access to and perceptions of their abilities to successfully use writing and communication technologies. We also learned about their awareness of the extraordinary measures that their teachers use to gain access to technologies for teaching and learning.</p> <p>Through this survey research, we discovered that students in our resource-poor techno-ecology do not perceive themselves as qualified for the most technologically intensive careers related to professional writing. Additionally, students reported a significant amount of apprehension when using technologies and fear of making irreversible errors. Scholars indicate that experience using technologies in classroom settings is key to fostering confidence and desire to learn in students, particularly female students. Because our techno-ecology is resource-poor, our students have uneven experiences using technologies for course projects; further, innovations are often unsustainable—that is, not easily transferred from section to section or faculty to faculty due to the extraordinary efforts often required to access technologies for classroom use. We present our methodology and results in part to provide a process potentially useful for other faculty in investigating their local techno-ecologies.</p> |
| <b>TAGS</b>                       | access*, administration, Anthony Atkins, barrier*, classroom, Colleen Reilly, communication, computer*, ecology, equipment, faculty, funding, grant*, hardware, innovation, integration, IT, lab, learning, pedagogy, professional writing, resource*, software, student, survey, sustain*, teacher, techno-ecology, technolog*, UNCW, unified theory of acceptance and use of technology, University of North Carolina at Wilmington, UTAUT  |
| <b>AUTHOR BIOGRAPHIES</b>         | <p>Anthony T. Atkins is an assistant professor at the University of North Carolina at Wilmington where he currently serves as the composition coordinator. He teaches courses and conducts research in professional communication, writing and technology, document design, video and composing, composition theory, and rhetorical theory. He serves on the editorial board for <i>Kairos: A Journal of Rhetoric, Technology, and Pedagogy</i> and serves on the executive board for the Carolina affiliate of Writing Program Administrators (WPA).</p> <p>Colleen Reilly is an associate professor of English at the University of North Carolina at Wilmington. Her teaching and research focus on professional writing theory and pedagogy; electronic composition and citation; computer gaming and literacy; and gender, sexuality, and technology. Her publications include several chapters in edited collections related to writing and technology and digital research practices and articles in <i>Computers and Composition</i> and <i>Innovate</i>.</p>   |
| <b>COPYRIGHT AND REPRODUCTION</b> | Copyright is held jointly by the Press and the author(s). Ebooks and projects can be displayed or reproduced (with the exception of limited reproduction by indexing and abstracting services) only with prior permission of both parties. Readers may view the   |

|                  |  |
|------------------|--|
|                  | <p>projects and download/print a copy of the ebooks found on this site for their personal use or link to this page. Readers may not reproduce this ebook or project or display it on another web site. According to U.S. Copyright law, scholars can use limited samples of the Work for the purpose of analysis, parody, etc. All such reproduction and use should be accompanied by appropriate attribution to both the Author and the Press.</p> <p>Requests for permission to use materials from this ebook or project in other publications will be handled by Utah State University Press on behalf of Computers and Composition Digital Press. For permission to use materials in this ebook or project, please contact Utah State University Press.</p> <p style="text-align: center;">Utah State University Press<br/>7800 Old Main Hill<br/>Logan, UT 84322-7800</p> |
| <b>PRESS URL</b> | <a href="http://ccdigitalpress.org">http://ccdigitalpress.org</a>  |
| <b>BOOK URL</b>  | <a href="http://ccdigitalpress.org/tes">http://ccdigitalpress.org/tes</a>  |



Computers and Composition **Digital Press**

---

AN IMPRINT OF UTAH STATE UNIVERSITY PRESS



## **Stifling Innovation: The Impact of Resource-poor Techno-ecologies on Student Technology Use**

**Anthony T. Atkins**  
**Colleen A. Reilly**

We begin with an all-too-familiar story in which our hero, attempting to teach multimedia writing in a professional writing senior seminar, must contend with his department's outdated digital video camera and lack of video-editing software and workstations. As he has each semester since instituting this project, he trots off to the grocery store to pick up dark chocolates, toaster pastries, cookies, and other treats to keep in his office and distribute to a variety of staff members in information technology departments, at the library circulation desk, and, of course, within the Technology Assistance Center (TAC)—all of whom control, in one way or another, the technology he and his students need. Prior to beginning a new multimedia assignment, he approaches the library circulation desk and requests a digital video camera—a hot item in the library—and finds it, inevitably, already checked out.

Understanding the situation, he leaves a bag of dark chocolates for the staff and thanks them profusely for checking for him. Returning to his office, he ponders where he will go next to find access to the digital video camera he needs to teach his classes. He arrives at his office to find a message from the library stating that someone has returned the digital video camera and that he may come and pick it up. This time, through his personal charm and gastronomically enhanced people skills, he is saved, yet he still feels tired because he knows that he will have to use this and other unorthodox strategies to gain access to a number of technological teaching tools throughout the semester. Furthermore, while he is our current hero, he is not the only faculty member in the department or on the campus who uses such strategies to gain access to digital technologies. Other faculty members who teach advanced professional writing courses, for instance, could and do share similar experiences and use similar strategies for coping with a resource-poor techno-ecology.

The extraordinary measures taken by faculty who want to assign technology-rich projects and attempt innovative digital pedagogies may be largely invisible to students. However, although students in our writing courses are often not aware of the roadblocks imposed by university infrastructures and institutional politics to developing sustainable new media composition initiatives, they are certainly cognizant of the personal consequences of these impediments: inadequate resources, inconvenient or irregular technological access, and inconsistencies in educational experiences across the same degree program. We cannot help but believe that the difficulties and sometimes outright obstacles that students experience accessing certain technologies to complete work for their courses communicates to them that the university—or, even worse, our department or program—does not consider developing technological expertise to be important for their work as students or for their future plans and goals. Thus, we view the environmental and resource impediments to our technological initiatives as having potentially negative effects on the learning experiences, attitudes, and motivations of students. Furthermore, the lack of sustainability of our initiatives hampers the integration of technologies into our professional writing courses and calls into question the availability of any progress we make with subsequent students and to subsequent classes.

To explore these issues, we employed survey research through which we sought to determine the impact of our resource-poor techno-ecology on student learning experiences and perceptions of themselves as users of technologies and designers of new media texts. We also explored student awareness of the measures faculty take to integrate digital technologies into classroom assignments. In the discussion that follows, we first consider how resource-



poor techno-ecologies, like ours, hamper innovation and sustainability of all but the most basic technological initiatives. We then describe in detail the techno-ecology of the professional writing track in the English major at our institution and describe the technological environments in which students must function both in our department and in the institution at large. Finally, we discuss the results and ramifications of our survey and the data we collected. In part, we collected this data about the effects of limited student access to technologies in order to demonstrate the detrimental impact of a techno-poor environment for student learning to administrators, who have the power to help us enrich our environments and to make our important technological innovations truly sustainable.

### **SUSTAINABILITY AND RESOURCE-POOR TECHNO-ECOLOGIES**

Sustainability constitutes a requirement for the integration of technological innovations into a program, department, and/or institution (Weston, 2005). Shelley Billig, Lorraine Sherry, and Bruce Havelok (2005) defined sustainability of technological innovation as involving the “maintenance or scaling up of the innovation by building constituencies and/or champions; creating strong, enduring partnerships; generating and leveraging resources; and identifying and securing funding sources” (p. 988). Cooperation and collaboration among community or institutional constituencies—such as teachers, technological specialists, and administrative and budgetary personnel—proves to be essential in fostering sustainability (Billig et al., 2005; Bridgland & Whitehead, 2005; Cropper, 1996; Lawrenz, Keiser, & Lavoie, 2003), as such cooperation and collaboration provide both a broad base of support for technological initiatives and pedagogical reform. These initiatives and reforms span discrete units (Fishman, Marx, Blumenfeld, Krajcik, & Soloway, 2004), and evidence an institutional commitment to flexibility and positive change (Weston, 2005).

Resource-poor techno-ecologies, however, lack many or all of the elements that facilitate the sustainability and integration of technological innovations; in their place are institutional barriers, turf-wars, and competition for resources, all of which hinder sustainability and discourage lasting technological innovation (Weston, 2005). As Timothy Weston explained, many of the barriers to technological innovation are external to faculty motivation and personal barriers (such as motivation or expertise); the impediments result from institutional limitations, including insufficient financial and technological resources (Warschauer, 2004), and a culture or climate not open to change or receptive to collaboration (Lawrenz et al., 2003). Without an institution-wide commitment to technological innovation, initiatives in some areas (especially those excluded from regular access to resources) are necessarily individual and disconnected from larger institutional concerns. These individual initiatives further hamper sustainability in the institution at large because support personnel, such as library information technology specialists or other IT specialists, have to grapple with unpredictable and idiosyncratic requests of individual faculty, which may distract them from supporting the institutional programs in place (Bridgland & Whitehead, 2004). Given that many of these institutional barriers are systemic, ingrained parts of the structure of the university, faculty who want to alter the environment or subvert these strictures must expend significant energy to navigate the complex “matrix of local and global policies, standards, and practices” (DeVoss, Cushman, & Grabill, 2005, p. 16) that have shaped the institutional context, leaving them with less energy and diminished motivation to develop future innovative digital, multimedia writing projects. Thus, innovation becomes untenable without a sustained effort, for as Richard Selfe (2005) explained,

we want locally sustainable technologies because we can't afford to invest time and money in instructional systems that will change over night; because successful teachers explore technology-rich pedagogy over a long period of



time; and because these efforts should be tied intimately to changes in our understandings of literacy and learning, neither of which are stable. (p. 153)

Although some research has documented the barriers to faculty and student technological innovation posed by a lack of available resources and other institutional barriers (Billig et al., 2005; Bridgland & Whitehead, 2005; DeVoss et al., 2005), less work has been done exploring the effects of poor resources on students' perceived proficiency and students' motivation and desire to use technology in innovative ways. Current research supports the notion that exposure to and instruction in technology in classroom settings provide a foundation for successful use of technologies in post-university environments. From a positive perspective, studies indicate that experience using technologies within supportive educational environments results in a rise in female student self-confidence regarding their technological abilities (Barron, 2004; a finding very important for us as the majority of our students are female). Well-supported experiences provide an important motivation for students, especially females, to develop technological fluency (Barron, Martin, & Roberts, 2007). Classroom instruction in advanced technological skills is essential for all students to function proficiently in other technologically rich environments (Brown & Warschauer, 2006).

## CHARACTERISTICS OF ONE TECHNO-ECOLOGY

### Investigating Techno-ecologies

An ecological perspective emphasizes the organic interrelatedness of elements in physical and virtual spaces, in which learning occurs, and where resources are found and used. Ecological discussions of learning have expanded from material descriptions of organizations as learning environments (Levitt & March, 1988) to encompass virtual, Web-based environments that facilitate and support learning (Barron, 2004; Brown, 2000; Looi, 1999). Using ecological metaphors to describe institutional contexts highlights the systemic nature of these contexts, in which all units both affect and are affected by connections with other elements in the context. For example, Bonnie Nardi and Vicki O'Day (1999) emphasized the importance of interpersonal relationships in structuring technological use and access in their definition of information ecologies as a "system of people, practices, values, and technologies in a particular local environment" (p. 49). Furthermore, Brigid Barron (2004) demonstrated the importance of expanding the notion of the learning ecology to include all elements of individuals' environments—such as home and workplace relationships and support networks, leisure activities, and classroom experiences—when considering how they attempt to acquire technological proficiency. Barron's conception of learning ecologies centrally locates individuals, which is useful in foregrounding human agency within such systems:

For the current research, I define a *learning ecology* as the accessed set of contexts, comprised of configurations of activities, material resources and relationships, found in co-located physical or virtual spaces that provide opportunities for learning. This use of the term ecology has the person as the organizing central node in the system, and thus differs from more traditional uses of the term, which usually refer to a single physical environment. (p. 6; see, also, Bateson, 1972; Levitt & March, 1988)

Ecological perspectives, therefore, facilitate rich description of relevant contexts and encourage scholars to investigate the unlikely or unanticipated elements that impinge on learning and, in our case, technology access and use.

Investigating a techno-ecology, similarly, involves the study of the technological elements in a particular context using perspectives analogous to the study of biological or environmental systems. Such an approach not only highlights the interconnectedness common to the other



ecological perspectives referenced above, but also questions of resources, economies, and infrastructure that are so closely related to and shape technological ecosystems. The English department at our university—the University of North Carolina Wilmington—which houses our relatively large undergraduate track in professional writing, constitutes one example of a resource-poor techno-ecology. This techno-ecology is characterized by the lack of resources in our local environment and the limited access to university resources afforded to those students who claim our portion of the university ecosystem as home. We currently have 96 majors in the professional writing track (according to February 2007 data). Overall, the university—a public comprehensive university in the southeast—enrolled 11,848 students as of fall 2006. Our students are largely white, middle to upper-middle class, and are mainly from North Carolina, although a significant number of students come from neighboring Virginia, Maryland, New Jersey, and New York.

Our department has one computer classroom equipped with 20 student computers and one instructor computer. We have a projector, DVD/VHS player, and a scanner. The room also has a laser printer, although printing is only permitted from the instructor's computer because the university recently adopted an iPrint pay system for student printing and did not designate our classroom as the site of an iPrint release station (laser printers deployed across campus to which students can print at the cost of 8 cents per page). In terms of software, all computers in the classroom have the standard university Information Technology Systems Division (ITSD)-provided software, which includes a Windows operating system, Microsoft Office 2003, Adobe Acrobat Reader, several multimedia players, and a CD creator program. Additionally, all 21 computers in our classroom have Adobe InDesign, Macromedia Studio MX (Dreamweaver, Flash, Freehand, Fireworks), and TechSmith Camtasia; 11 computers also have Macromedia Director MX. Our department purchased all of this additional software in 2004 with funds from the department's operating budget.<sup>1</sup> Our computer classroom is scheduled with classes from 8:00 am to 9:30 pm, Monday through Thursday. During the spring 2007 semester, students could use the classroom and its resources during 11 staffed, open hours spread over Fridays, Saturdays, and Sundays.<sup>2</sup>

Professional writing faculty and students also have access to one computer classroom in an adjacent building in which we hold our "overflow" courses—those that will not fit into the computer classroom we own. Currently, our courses occupy most of the instructional time slots in this secondary classroom, which has an undesirable layout—the computers are arranged in four long rows with little room in between, making instructor access to students difficult and complicating face-to-face collaborative activities. The computers in this room have the standard ITSD-provided software listed above. Additionally, our department paid half the cost of purchasing 21 licenses for Adobe InDesign for this classroom to support several of our writing courses, such as ENG 310: Theories and Practice of Editing. We cannot secure permission to provide students with access to this secondary classroom outside of class time as the room does not belong to the English department.

---

<sup>1</sup> The departmental investment for software in this classroom has been significant; for example, in 2004 our department purchased five licenses for Macromedia Director for \$1800, 26 licenses for Macromedia MX for \$4082, 31 licenses for Adobe InDesign for \$2255, and 21 upgrade licenses for TechSmith Camtasia Studio for \$595.

<sup>2</sup> The days and times of open hours in our computer classroom change each semester. Reliably staffing the computer classroom presents another sustainability problem because trustworthy student workers are difficult to find and the full-time lecturer whose job it is to find and oversee student workers in the computer classroom is predictably overworked.



Our present level of technological integration as a track in the major is barely sustainable with the resources outlined above. As the program grows and more courses are added, we struggle to locate computer classrooms in which to schedule courses that, from a pedagogical standpoint, must be taught in such environments. Additionally, although the department can occasionally spare funds to purchase some useful software, upgrading existing programs is never assured.<sup>3</sup> Finally, the replacement of faulty hardware is not guaranteed; for example, in 2004, when our data projector failed, the university's media department refused to replace it until we agreed to cover the cost of the replacement through a combination of department funds and supplemental monies from the dean's office. We recognize that taking on much more in terms of software or equipment in either classroom may make it impossible for us to support the maintenance and upkeep of our existing resources, a reality which certainly dampens enthusiasm for engaging in pedagogical innovation. Furthermore, our ITSD has a predictably negative view of open-source software; persuading them to install such applications on the machines they control is nearly impossible, requiring lengthy conversations and significant expenditures of social capital. Although we are responsible for the purchase of additional software as a department, ITSD retains control of the machines in our classrooms as the price for providing technical support and including our computers in the university's technology lifecycle program. The installation of additional software is restricted by the ITSD-installed application that secures each workstation's imprint, and policy restrictions prevent ITSD from sharing the administrative password for our computer classroom's computers with faculty. As a result, using open-source alternatives is not generally a viable option to replace high-priced, proprietary applications because we cannot install the software ourselves and requests for ITSD to install it are often denied.<sup>4</sup>

Students in our professional writing track also have access to some technologies in the larger university ecosystem, but because their home department is resource-poor, their access across campus is limited.<sup>5</sup> The university maintains only two general-access computer labs; one lab is located in the library and has 47 computers, one scanner, and two iPrint release stations. The second lab is in a classroom building and has 25 computers and one iPrint release station. During spring 2007, the library lab was open 7 days per week, from 8:00 am to midnight on Mondays through Thursdays; 8:00 am to 6:00 pm on Fridays; noon to 8:00 pm on Saturdays; and 1:00 pm to midnight on Sundays. The lab located in the classroom building is open on Mondays through Fridays from 8:00 am to 5:00 pm. Students are also able to check out laptops from three campus locations: 29 laptops are available in the library, ten in the student center, and six in the campus Technology Support Center, and each of these

---

<sup>3</sup> For example, we are still using the Macromedia MX Suite and Camtasia Studio 3 from 2004 instead of the new Adobe CS4 and Camtasia Studio 6. Even if we could afford to upgrade this software, the hardware in our computer classroom could not efficiently run the upgraded applications, as it is at the end of its lifecycle. Computers in computer classrooms are lifecycled roughly every 5 years, as the budget permits.

<sup>4</sup> Many faculty inform students about where to find open-source software alternatives for their personal computers and try to support students in using these applications.

<sup>5</sup> Student access to software at reduced prices is also hampered by their attendance at UNCW as opposed to other universities in the North Carolina system. Students at UNCW can purchase Microsoft Office 2007 from ITSD's recommended off-campus vendors for between \$80 and \$120 and Adobe CS3 Web for \$400. In contrast, students at North Carolina State University can purchase Microsoft Office for \$60 and Adobe CS3 Web for \$220. Our ITSD staff explained that the disparity in student software pricing can be attributed to the amount paid by the university to off-set student prices and to follow the licensing agreements agreed upon between institutions and corporate vendors.



locations also has one iPrint release station. Thus, our campus of almost 12,000 students provides only 117 computers for general student use. Additionally, all of the general access computers offer only the basic ITSD-provided software mentioned above, which is generally inadequate for more complex multimedia authoring tasks.

There are, however, many more computer classrooms and other sorts of technologically enhanced learning spaces on campus, housed in other departments in newer, well-equipped buildings. For example, the film studies program provides their students with exclusive access to two classrooms with video equipment, video-editing stations, and the latest film-related software. Additionally, the School of Education Building has a large, well-staffed computer lab with open hours 6 days per week in addition to several other computer classrooms open only to education students. Students in the School of Business have access to two additional open computer labs, one with open hours all day, 7 days per week. These labs are not available to students in other schools and departments; access is restricted through card swipe systems. Thus, although English students pay the same technology fee as students from other departments, their level of technological access both in and outside of class is relatively poor, and they are barred from other access points as a result of belonging to the resource-poor techno-ecology of the English department.

### **Attempts by Faculty to Understand and Enrich Our Techno-ecology**

Access to advanced writing and communication technologies is most important for students in the professional writing track of our English major. This track was initiated in 2001 and at the time this research was completed there were no tenured faculty members whose teaching and research areas were in professional writing or computers and writing teaching the upper-division writing courses that incorporate multimedia authoring. As a result, faculty most in need of the resources to promote innovative writing pedagogies were those with the least power from an institutional perspective; the least amount of experience negotiating the university's complex systems of funding and resource management; and the least amount of extra time to spend advocating for needed resources and seeking alternate ways of obtaining them.

Despite our positions as untenured professional writing faculty, all of us made efforts to understand the flow of resources within and enrich our techno-ecology early on in our arrivals at the university, with varying levels of success. We successfully sought support from our department chair for the department to purchase some of the applications needed to teach multimedia composition. However, our overtures to other higher-level administrators were less successful, despite our attempts to demonstrate how our use of multimedia writing technologies contributed to our department's participation in the College of Arts and Sciences (CAS) sponsored learning initiatives, including the use of student-authored Web-based portfolios for outcomes assessment and the integration of service learning projects in which students created Web sites and other texts for local non-profit organizations.

Professional writing faculty have also attempted to apply for grants through established programs funded by the university and outside agencies to obtain money for some of the technological resources we needed. For example, in spring 2003, Reilly applied for an ITSD Innovation Grant for staff support and hardware to configure and house an open source, electronic portfolio application, and Atkins applied for the same grant in spring 2006 for equipment to produce digital videos for use in classroom exercises; neither application resulted in funding. Reilly and Atkins were successful in their application to an outside organization, Friends of UNCW, to obtain funding for a digital video camera for the department in May of 2007 (we received notice of our award after our survey data was already collected). Notably, the Friends indicated that our inclusion of a DVD of student video projects created





using cameras borrowed from Randall Library proved to be the most persuasive portion of our application. Finally, in spring 2008, Atkins and Reilly both applied for and received internal grants to develop distance learning versions of writing courses using Blackboard Vista. Although this grant will not directly assist us in obtaining resources for our classrooms, our work with distance learning—an important university and state-wide mandated growth area—will potentially aid us in developing strong reputations with university administrators and ITSD staff as exemplary adopters of technologies for teaching. Cultivating such relationships may conceivably result in access to resources in the future.

In fall 2007, we achieved some success by meeting with our campus administrator involved in the management of infrastructure.<sup>6</sup> In a meeting with all three professional writing faculty, Diana Ashe, Atkins, and Reilly, this administrator agreed to help us gain access to a second overflow classroom in a neighboring building and agreed to help push for a second computer classroom in our building that would come online in fall 2008. However, the second overflow classroom is not optimal for our upper-division professional writing courses, as the computers in that room have only the standard ITSD provided software and the workstations lack speakers and microphones. Not surprisingly, the construction of a second computer classroom in our building has been indefinitely delayed due to budget and resource constraints.<sup>7</sup>

A recent meeting with this same administrator to demystify the funding processes for adding and upgrading technologies in traditional and computer classrooms confirmed for us that there is no written policy outlining technological funding priorities or procedures and no set mechanism for formally requesting upgrades, making it difficult for the processes to be predictable and transparent to faculty. ITSD maintains a Classroom Technology Assistance Program (CTAP), in which educational spaces are divided into tiers. Environments at Tier 1 get full support and participate in the campus technology lifecycle program, meaning that their equipment is upgraded at regular 4 to 5 year intervals. Spaces designated Tier 2 are equipped with some digital technologies, usually provided and paid for by the campus unit, but because the technologies do not meet ITSD standards, ITSD declines to support them. Spaces labeled Tier 3 have no digital technologies at all. When the administrator with whom we spoke took over about 3 years ago, very few campus spaces were ever upgraded from Tier 3 to Tier 2, or Tier 2 to Tier 1, thus forcing campus units struggling to purchase and maintain their meager amount of technology to continue to do so without any support. Additionally, no clear listing of priorities or criteria existed then or now to determine which spaces were next in line to be upgraded. These decisions were—and, to a great extent—continue to be made on the basis of the perception by ITSD administrators that campus units already technologically advanced most needed further infusions of equipment and support. ITSD has not been troubled by the

---

<sup>6</sup> We decline to identify this administrator further as we do not wish to implicate any individual in what are long-term, systemic problems. This individual has provided all the assistance and information possible given the limits of their budget and position.

<sup>7</sup> During our recent meeting with the administrator in charge of infrastructure, we were reminded of the ways in which the inequitable distribution of limited campus resources most negatively impacts the most resource-poor areas of the techno-ecology. In spring 2008, a unit on campus received a new fully equipped video-editing laboratory containing workstations that cost considerably more than the baseline funding point of \$1000 per workstation, because they have greater memory and superior video cards. These computers are part of the campus technology lifecycle program, so in 5 years, the administrator in charge of infrastructure, whose budget remains the same from year to year, will have to replace these computers at a higher cost, leaving less money to upgrade spaces with inadequate technologies in other portions of the college.



disparity of resources across campus and has been content to leave particular campus units resource-poor.<sup>8</sup>

Although we have experienced difficulties obtaining university funding, our situation in the Department of English is not significantly different from that of other humanities departments in the college. Humanities faculty and departments at our university are historically on the low-resource end in our techno-ecology and are not routinely included in administrative conversations about technological needs and resource distribution. In part, the humanities may be overlooked due to misunderstandings on the part of administrators about how technologies are used in humanities disciplines, resulting from a lack of communication. The 2007–2008 *UNCW Information Technology Systems Division Annual Report (2008)* described the reorganization of ITSD and the creation of three new advisory committees: the Committee for IT Strategic Planning, the Committee for Academic Research Technologies, and the IT Student Advisory Council. In the inaugural year of each of these committees—comprised of administrators, faculty, and students—no humanities faculty were included as members. Of the ten student members on the IT Student Advisory Council, only one is from the humanities, while three are from Business Administration and three from Computer Science. Significantly, only three of the ten students on the IT Student Advisory Council are women, despite a campus population that is 58% female.

Now that the recently published ITSD annual report has informed us of the existence of these new committees, we can endeavor to join them or make our needs known to their membership. In terms of committee membership, we have achieved some measure of success elsewhere, as Reilly was appointed to the Faculty Senate IT Committee in fall 2007 after a number of years requesting this assignment. The lack of representation of humanities faculty on these IT-related committees is emblematic of the invisibility of the humanities in relation to decisions about the distribution of technological resources on our campus. Although we can perhaps be faulted for not doing more to make our needs clear to our administration, we face obstacles in doing so. As noted at the start of this chapter, the extraordinary—and typically invisible, at the administrative level—means we must undertake to make our voices heard and have our resource needs met are currently unsustainable personally, programmatically, and departmentally. We operate in starts and stops, depending on our teaching commitments, administrative responsibilities, scholarly demands, and the need to perform other work that actually counts toward annual review, tenure, and promotion. As we are a minority program within a literature-dominated (in terms of numbers of faculty) English department, our efforts to increase the technological access of our students is largely invisible.

### **A SURVEY STUDY: EFFECTS OF THE TECHNO-ECOLOGY ON STUDENT EXPERIENCES**

To determine how our resource-poor techno-ecology affects student educational experiences and perceptions, we constructed a survey. The following sections describe the design and administration of our survey and our results.

---

<sup>8</sup> The administrator we spoke to has improved the situation, making the elevation of spaces from one tier to another a priority. This individual is not content with the technological marginalization of entire areas and campus units; however, as our conversation revealed, it is still the case that signature programs are receiving huge influxes of resources outside of the equitable distribution of funds to all units, making the maintenance of the resource-poor areas, like ours, even more challenging. The lack of transparency in terms of the distribution, prioritization, and application for resources makes requesting them a frustrating process.



## Survey Design

We collected data via a survey that included a battery of questions to discover student impressions, attitudes, opinions, and feelings about the access and quality of technological resources in the English Department and in other work spaces at the University of North Carolina Wilmington. The survey was also designed to reveal student processes for finding the technologies needed to complete required course work in our department and to determine how the lack of resources that we struggle with everyday affects student views of themselves as current and future users of technology. The survey engine we used to collect responses was SurveyMonkey, an online survey tool.

We divided our survey into four major sections: demographics, student experiences, professor experiences, and an adaptation of the questions from the Unified Theory of Acceptance and Use of Technology survey (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003; see Appendix for a complete list of the survey questions). The **demographic** section asked students about their majors, year in school, current courses, and gender. Because we surmised that student perceptions of technological access and proficiency would evolve as they moved through the program, we attempted to get a complete picture of respondents in terms of their educational experiences and progress through our program or their respective majors. Isolating gender was important for us, because our major is female-dominated and previous research indicates that supportive instruction in the use of technologies in class has a particularly strong impact on female student technology use self-perceptions (Barron, 2004).

In the **student experiences** section, we asked respondents eight questions about their access to particular computer technologies, both hardware and software; how they gained access on campus to technologies needed for their courses; and what sorts of professional writing careers they were both interested in and felt qualified to pursue based on their experiences. By asking these questions, we hoped to correlate access issues and lack of experience with student career goals and the degree to which they felt prepared to pursue them. The **professor experiences** section served a similar purpose. The questions about the student perceptions of professor access to various technologies in their classrooms were designed to identify what students noticed about instructor efforts in obtaining necessary technologies for and in their courses.

The final 23 questions were adapted from a standard survey, the **Unified Theory of Acceptance and Use of Technology** (UTAUT). This survey was developed by information technology researchers to investigate user responses to and willingness to adopt new technologies (Venkatesh et al., 2003), and has been statistically analyzed and applied by numerous other scholars in information technology and other fields (see Anderson & Schwager, 2004; Pappas & Volk, 2007; Ristola, Koivumaki, & Kesti, 2005). The questions in this survey use a Likert scale (1–7, 1 being “strongly disagree” and 7 being “strongly agree”) and ask respondents to report their attitudes toward adopting and using new technologies, and to assess the support and resources available to facilitate their use of these new technologies. We added this survey to our locally developed questions to give our instrument greater support and validity, as the use of this survey has been documented in numerous peer-reviewed publications in journals and conference proceedings. Additionally, as we discuss below, by cross-referencing the responses to the UTAUT questions with those we developed, our results have greater depth.

## Survey Distribution

To administer this online survey, we distributed the survey link to instructors teaching core professional writing courses taught in computer classrooms. We attempted to reach students



in the initial, middle, and final stages of completing coursework in professional writing. The survey was administered in 14 different courses, each of which was capped at 20 (though not all sections were full). Instructors asked students to complete the survey during the first 15 minutes of a class meeting during a 1-week period. Students were instructed to complete the survey only once, as many students were enrolled in more than one of the courses in which the survey was distributed; 98 students completed the survey. Our efforts to collect the maximum number of responses were hampered somewhat because we could not force students to participate in the survey nor could we force teachers to administer it, although most teachers appeared vigilant in their efforts to distribute the survey based on the numbers of responses we received. Additionally, we received reports that some students could not take the survey because the link did not work or, when they clicked on the link, it took them to a completed survey because the workstation they were using had not been restarted. We also learned that some teachers simply forgot to distribute the survey. While we cannot be absolutely certain that each and every response came from a different student, we felt it unlikely that students would voluntarily take such a lengthy survey more than once. We evaluated our responses for indications that the respondent came from our desired population sample; our number of responses (N=98) roughly correlated with the current number of majors in professional writing.

## SURVEY RESULTS

In discussing our results, we focus on three distinct areas related to sustainability. The first area we discuss is access. We believe that creating a sustainable techno-ecology depends not just on basic access, but rather on the types of access that students and teachers have to technological resources. Cynthia Selfe, Gail Hawisher, Dean Woodbeck, and Dennis Walikainen (2004) referred to “conditions of access” to expand access beyond the limited notion of physically obtaining something. Conditions of access include “timing, motivation, fit, safety, resources, and appropriateness of equipment” (Selfe et al., 2004, p. 84). We address conditions of access through survey questions related to the types of applications and tools students and professors use, and the contexts in which they locate and use them. We discuss what our results tell us about curriculum effectiveness—or how well, according to student experiences—our program prepares them for work both within and beyond the department and the university. Curriculum effectiveness is also reflected in student attitudes toward the hardware and software they use in the process of moving through our professional writing program and in the importance they place on gaining proficiency with these technologies. Lastly, we discuss how our results provide insight into students’ experiences and self-perceptions as users of the software and hardware presented to them in their courses. For us to develop a sustainable curriculum in which students acquire an increased proficiency in the use of sophisticated software and hardware crucial for writing and communication in contemporary organizational contexts, we must cultivate student desire for increasing levels of access and motivations to improve their skills. Without that, we are starting over in each course we teach, and we lack student support in our continued efforts to provide increased access and improved instruction.

Through our discussion and analysis of our results, we create a snapshot of our program, which we think will resonate with others teaching in or administering similar programs. Additionally, we illustrate how using such a survey might be productive for other programs in assessing the successful integration of technologies. Finally, we propose that collecting this sort of data can be persuasive to administrators and used to support initiatives that increase access and the likelihood of the sustainability of innovative technology-rich pedagogies.



### Conditions of Access

When creating a sustainable techno-ecology, programs and departments must consider issues related to access. Students need access not just to the technologies themselves, but also to resources necessary to help them complete tasks and projects. Furthermore, access should be obtained with a minimum of effort and inconvenience, as barriers to access may discourage students in multiple ways. Considering the conditions of access causes us to examine, as we attempted to do through our survey questions, how and where access is obtained and to measure the degree to which obtaining access places an additional burden on students and their professors. For example, students may have access to a piece of software inside the classroom, but lack sufficient access when completing a project or task on their own outside of class.

Over half (52%) the respondents reported finding access when needed, though many of them explained (and complained) that they were sometimes unable to get access to the software and/or hardware they needed when they needed it or without considerable extra effort. Furthermore, in light of student responses regarding what sorts of software they need to use to complete course projects, it is not surprising that the majority of students were able to obtain the necessary applications. As demonstrated in Table 1, only a small percentage of students are being asked to use more complex applications that encourage multimedia composition (such as Adobe Photoshop, Macromedia Dreamweaver, Macromedia Fireworks, and Camtasia Studio) to complete course projects, a disappointing but not unexpected finding.

**Table 1.** Software respondents reported using regularly to complete course assignments (N=98; response to question 6).

| <b>SOFTWARE</b>                                    | <b>RESPONSE<br/>% (n)</b> |
|--|---------------------------|
| Microsoft Office (Word, PowerPoint, Excel, Access) | 100.0 (98)                |
| Microsoft FrontPage                                | 38.8 (38)                 |
| Microsoft Publisher                                | 43.9 (43)                 |
| Adobe Photoshop                                    | 16.3 (16)                 |
| Adobe InDesign                                     | 29.6 (29)                 |
| Adobe Acrobat Professional                         | 33.7 (33)                 |
| Macromedia Dreamweaver                             | 11.2 (11)                 |
| Macromedia Fireworks                               | 6.1 (6)                   |
| Macromedia Director or Flash                       | 9.2 (9)                   |
| TechSmith Camtasia                                 | 11.2 (11)                 |
| Open-source software (e.g., OpenOffice)            | 4.1 (4)                   |
| Other  | 12.2 (12)                 |

Nearly half (49%) the respondents have personal access to the necessary tools to complete course assignments. The remaining 51% of students reported using multiple means to locate and use the tools they need. Open-ended question 9 prompted students who indicated in question 8 that they “sometimes” or “never” were able to get access to the technologies needed to complete course assignments to explain any extraordinary means they used to



accommodate their needs; 43 students (44% of total respondents) provided discursive answers to this question. As one student noted:

Computer labs are regularly filled during midterm exams and especially during the last three weeks of a semester. Also, there is significant walking distance when trying to find an open computer lab. The computer lab in S&B [Social and Biological Sciences] is only open sometimes--the hours seem to be dependent upon when the lab monitor needs to leave, whether it's at 5pm or at 2 in the afternoon. Students never know whether the computer lab in S&B is going to be open unless they physically walk to S&B and see if the computer lab door is open or closed. There do not seem to be enough open computer labs on campus. The computer lab in Morton Hall is small and rarely open; the computer lab in Bear Hall is small and rarely open. And these are problems. Also, software needs can be a problem. If the university is going to assign projects where certain computer programs or certain hardware needs to be used, then the university should supply those things.

This response is indicative of the narrative responses we received. Other students said:

Not all of the computer labs have all of the same programs, and many times it takes more than one program to complete a project. This can be frustrating. Also, when a lab only has software on every other computer, this makes completing a project difficult as well.

I was required to create webpages, but Dreamweaver is not on the regular computers in the Library or Underclassmen lab, and I do not have it at home. I was also required to use Adobe Indesign [sic] to create documents, and it is also not available to me in Library or Underclassmen lab and I also do not have it on my home computer. I was also required to use screen recording software Camtasia which also not available to me in Library or Underclassmen lab and I also do not have it on my home computer. Also the lab times that the computers that do have this software are available [sic], I have to be at work, or am taking other classes.

When we cross-tabulated responses, we noted that the same 51 (52%) respondents who indicated that they had access "All the time" also reported using less convenient means to gain that access at least some of the time: 9 reported using their professor's computer, 20 reported going to a friend's house to use software/hardware, and 23 reported using a publically accessible computer.

Our data pertaining to professor experiences reflects that students perceive that faculty sometimes need to take extraordinary measures to obtain needed technologies. Fifty-two of the 95 students described witnessing teachers struggling to find resources for classroom activities and course assignments. As one respondent noted:

We had only three microphones in a class of 20 students, whereby a microphone was needed per every four students. So we were two microphones short every class, and this directly impacted learning because eight students had to wait around for the other 12 students to finish with their three microphones so that we could use them. Luckily, our instructor had an extra microphone at the computer in his office, so one group of four was permitted to leave the classroom and use our instructor's computer. Then we were only one microphone short.



The scenario above is quite typical of situations we encounter during a typical semester. Other students noted similar difficulties:

In eng 204 my professor wanted to do some other projects that would further enhance our learning in the course. He could not, however, deliver the soft/hardware for us to complete the project.

We needed to reserve time and travel out of class to work on video editing projects for Eng 496

WE NEED MORE COMPUTERS!!! I hope the future generations of students at UNCW have better/more access to more computers and more software. Having only 11 copies of Macromedia Director in the Morton english [sic] lab is NOT appropriate. Half of the speakers and other materials do not even work.

In a journalism class I took only half of the computers in the classroom had InDesign and the professor could not get it installed on the other computers.

These excerpts from student observations reflect awareness of the lack of access and the problems posed by inadequate equipment. Like students, faculty are faced with searching for access to tools and resources (e.g., microphones, video cameras, video-editing software, and players for multimedia compositions) to complete instructional tasks and course assignments. In fact, 50 students (52.6%) reported observing their instructors borrowing space, time, or equipment from colleagues or other departments to obtain software/hardware needed for course projects. This kind of disjointed, hodgepodge access to digital technologies pollutes the very techno-ecology we seek to create by putting students and teachers in the detrimental and unsustainable position of struggling to develop and complete activities and assignments that have excellent potential, but are compromised pedagogically because both the student and teacher become preoccupied with accessing the needed tools.

This kind of digital resource scavenging attunes students to the university's priorities in relation to the distribution of resources. For example, in question 14, students were informed that they pay \$195.38 each semester as a standard technology fee included in their tuition; 59% indicated that the fee did not seem "fair" based on the efforts they had to put forth to access the technologies they needed to complete course projects. This becomes more important when one considers the conditions of access in other departments. All students pay the same technology fee, yet not all students have the same access to technology. Interestingly, however, when students were asked UTUAT question 25 about the support they were getting from the university as it pertains to the use of communication software and hardware, the majority of them (81%) responded positively. The mostly positive response may stem from students' abilities to find the software or hardware when needed or from the fact that the majority of their courses do not require the use of more difficult-to-obtain applications such as Web-authoring applications or video-editing software. Perhaps for many, the ITSD basic software imprint seems sufficient. Additionally, as illustrated by the student comment above, perhaps students are more likely to blame instructors for creating assignments that require the use of difficult-to-access technologies, rather than blame the university for not providing better access in the first place.

### **Curricular Effectiveness and Student Self-perceptions and Confidence as Users of Technologies**

In addition to gauging student perceptions of their access to technologies, the survey was also designed to determine student perceptions of the effectiveness of our curriculum, particularly



in relation to how well it prepared them to be successful and confident users of writing and communication technologies. The effectiveness of our techno-ecology is not only based on access, but also on developing a curriculum for students in professional writing that reflects current organizational and workplace trends and that challenges students to write in a variety of contexts, using multiple media and writing spaces, both physical and digital. Hiring individuals with cutting-edge pedagogical rigor and scaffolding the sequences of courses in an environment that nurtures the professional and creative ideas of students are two imperatives when designing a cohesive and consistent techno-ecology that adequately prepares students for the challenges they face outside of the university setting.

We expect faculty to incorporate innovative uses of technologies into their classes, because helping students use a wide range of tools is one of our programmatic goals. Our focus is not to make or mold students into expert users of particular hardware or software applications, but to cultivate in them the skills necessary to learn how to use unfamiliar tools. Focusing on the learning process rather than on the technical mastery of particular tools helps students learn the transferable skills of problem-solving, critical thinking, and contextual analysis that will serve them well in a multitude of contexts (DeVoss & Selfe, 2002; Gee, 2003). However, as reflected in their responses, a majority of the student respondents lack regular experience using applications beyond the ubiquitous Microsoft Office software. About a third of the surveyed students regularly use Adobe InDesign and Acrobat Professional, but a much smaller percentage use the more complex graphic-design, Web-authoring, and video/animation applications, including Adobe Photoshop, Macromedia Dreamweaver, Macromedia Fireworks, Macromedia Director, and TechSmith Camtasia (see Table 1).

Exposure to a wide range of applications also teaches students to make choices about the appropriate tools to accomplish certain goals. As Anne Wysocki (2004) argued:

digitality ought to encourage us to consider not only the potentialities of material choices for digital texts but for *any* text we make, and that we ought to use the range of choices digital technologies seem to give us to consider the range of choices that the printing-press technologies haven't. (p. 10)

Without exposure to multiple applications that perform similar functions, students are not provided opportunities to choose between them and understand the ramifications of those choices. For example, if students only use Microsoft FrontPage as their Web-authoring tool, they may not gain an understanding of the situations in which Macromedia Dreamweaver might be a more appropriate or powerful application, nor would they acquire the comparative knowledge needed to be critical of FrontPage's limitations.

Beyond teaching necessary problem-solving and analytical skills, classroom experiences shape student perceptions of professional writing as an occupation, as prior to taking courses many students have little understanding of this broad and diverse field, which encompasses occupations from technical writer to documentation specialist to multimedia content developer. Therefore, we predicted that the types of assignments and projects students complete and the types of software they are required to use have a direct impact on how they conceptualize the field. Using the Society for Technical Communication (STC; <http://www.stc.org>) Web site to generate our list, in question 11, we asked students to select the job titles related to professional writing that they found appealing.

In question 12, we presented students with the same list of job titles, but asked them to check the positions for which they felt qualified to apply. As Table 2 illustrates, in general, the number of students who felt qualified for each sort of position decreased from the number of students who expressed interest in those positions. More significantly, fewer students felt qualified to apply for positions requiring a greater degree of technological expertise. For example, while 35 students surveyed expressed interest in the position of Graphic





Artist/Designer, only 12 felt qualified to apply for such a position. Similarly, 26 students expressed interest in the position of Web Designer, but only 13 reported confidence in their qualifications as potential Web designers.

**Table 2.** Positions respondents indicated interest in and reported feeling qualified for (comparative responses to questions 11 and 12; N=98).

| POSITION                                    | INTERESTED IN<br>% (#) | FELT QUALIFIED FOR<br>% (#) |
|---|------------------------|-----------------------------|
| Advertising                                 | 60.2 (59)              | 39.8 (39)                   |
| Book / Magazine Editor                      | 57.1 (56)              | 35.7 (35)                   |
| Graphic Artist / Designer                   | 35.7 (35)              | 12.2 (12)                   |
| Marketing Assistant in Publishing           | 36.7 (36)              | 17.3 (17)                   |
| Print Journalist                            | 40.8 (40)              | 37.8 (7)                    |
| Interactive Journalist                      | 35.7 (35)              | 24.5 (24)                   |
| Technical Writer / Documentation Specialist | 35.7 (35)              | 38.8 (38)                   |
| Online Marketing Specialist                 | 29.6 (29)              | 7.1 (7)                     |
| Online Training Developer                   | 13.3 (13)              | 4.1 (4)                     |
| Proposal / Grant Writer                     | 5.1 (5)                | 18.4 (18)                   |
| Usability Research Consultant               | 8.2 (8)                | 8.2 (8)                     |
| Web Content Manager                         | 16.3 (16)              | 13.3 (13)                   |
| Web Designer                                | 26.5 (26)              | 13.3 (13)                   |
| Other                                       | 13.3 (13)              | 12.2 (12)                   |

When responses to question 12 are cross-tabulated with the demographic question 3 that asked students their year in school, we gain even more insightful results. For example, Print Journalist is one of the choices students could select as an appealing occupation, and relatively equal numbers of sophomores, juniors, and seniors expressed interest in this sort of position. However, as noted above, for positions that require intensive technological proficiency and use (e.g., Interactive Journalist, Web Designer), not only do fewer students feel qualified to apply for positions than are interested in those positions, senior students reported feeling less qualified than their junior counterparts. When we cross-tabulated question 3 with questions 11 and 12, we saw that 14 juniors and 9 seniors were interested in the position of Interactive Journalist while 10 juniors and 5 seniors felt qualified to apply for this type of position. A similar result is observed related to the position of Web Designer, with 13 juniors and 9 seniors expressing interest and 8 juniors and 3 seniors feeling qualified. This data is particularly troubling, as it may indicate that as students progress through our program, they become less confident in their qualifications for positions involving a significant use of communication and information technologies. Although we cannot know precisely why students responded as they did, such results give us pause and indicate the need for further investigation and possible curricular revision.

Intriguingly, when students were asked in question 27 whether they believed they had the knowledge necessary to use communication hardware and software, their responses were mostly positive, with 80% of respondents selecting 5, 6, or 7 on the Likert scale. This seems to contradict the results regarding the questions listing particular positions and asking respondents how well they felt qualified for them. We attribute this disparity to the way respondents approach different sorts of questions. That is, a question (such as question 12)



presenting a particular scenario may yield a more concrete response in contrast to the request for respondents to rate general skills (such as question 27), possibly, in part, due to the possibly more open-ended interpretation of writing and communication software/hardware by individual students when reading the general question.

Although many students expressed confidence in possessing the necessary knowledge, when asked about levels of apprehension and fear of making mistakes, responses were mixed. For example, in response to question 34, almost 20% of students reported some level of apprehension in using communication software and hardware by selecting 5, 6, or 7 on the Likert scale, while another 24% were undecided, selecting 4. When the responses to question 34 are cross-tabulated with question 5 identifying students' gender, we find that a higher percentage of female students report apprehension than do their male counterparts: on a scale of 1–7, with 1 indicating “strongly disagree,” and 7 indicating “strongly agree,” 15 (25%) females selected undecided and 13 (21%) agreed with this statement, in contrast to their male counterparts, 7 (23%) of whom were undecided and 5 (17%) of whom were in agreement. Furthermore, a higher percentage of males (30%) strongly disagreed with this statement, compared to only (16%) of females.

Students were asked to report whether or not they were scared to lose data when using writing and communication software/hardware by hitting the wrong key. When responses to this question were cross-tabulated with question 5, we found that 48% (29) females versus 43% (13) of males expressed some level of agreement with this statement. Additionally, another 22% (14) of females were undecided or neutral, selecting 4, with only 30% (18) of them expressing disagreement, as opposed to 47% (14) of males.

Reports of apprehension and the fear of making a mistake, of hitting the wrong key and losing data, are significant in that they might stifle innovation by causing students to be reticent to experiment with new tools, especially through play or by trial and error. That female students appear less confident and more fearful is very significant for future instructional efforts, as they make up the majority of the students in our program.

Our results reflect that we are currently unsuccessful in creating a techno-ecology that: fosters confidence, especially among female students; provides significant instruction in a range of hardware and applications; and demonstrates to students their preparedness for high-tech occupations related to professional writing. Addressing these issues will require increasing access by making more effective arguments to department and administrative decision-makers and by demonstrating to our faculty the need for depth and breadth when incorporating technologies into our courses.

## CONCLUSIONS

In *Opening Spaces: Writing Technologies and Critical Research Practices*, Patricia Sullivan and James Porter (1997) urged those of us in rhetoric and composition, computers and writing, and professional writing to “appreciate each other” (p. 185)—to consider more carefully the research across disciplines so that we can address knowledge gaps in each of these related but at times discrete fields. Our survey research addresses issues relevant to all fields of writing instruction at a moment of technological acceleration and in a time in which the disparities between programs and institutions rich and poor in technological access and support have never been greater.

Sustainable techno-ecologies are important for contemporary teachers of writing in part because of the new ways teachers and students are beginning to compose new media texts (see, for example, Selfe, 2007; Westbrook, 2006; Wysocki, Johnson-Eilola, Selfe, & Sirc, 2004). To allow students to play with textual and graphic materials and to develop confidence



in their composing abilities in a compelling medium requires a supportive and sustainable techno-ecology in which they can work. Teachers need space, equipment, and support to create a classroom environment in which students interact, design, compose, and collaborate using the most appropriate equipment for the assignment they are completing.

Based on our survey results, and despite the self-reported tenacity of many of our students, we discovered that students do not always have an appropriate place to work or access to equipment needed to complete assigned projects central to our program. Likewise, teachers, as resourceful as they are, do not always have access to equipment needed to initiate innovative, technology-rich pedagogies. We can also infer from our data that the lack of access and range of complicated experiences that using digital technologies appears to have detrimental effects on some students' perceptions of their fitness for specific high-tech careers in our field and on their comfort levels and confidence as technology users. In some cases, this is particularly true of female students, which is alarming in light of continuing income disparities among male and female workers and the unequal representation of women in occupations related to science and technology.

The troubling results we see in this data provide the impetus for curricular change and for additional research to monitor and assess techno-ecological conditions on our campus. Our goals for the future will be to find appropriate technological equipment, space, time, and support that will be sustainable each semester, each year, and across time, so that teachers and students know what to expect when entering our classrooms. Importantly, we want to eliminate as much as possible the idea that faculty must expend extraordinary energies to obtain and use digital technologies. To that end, we intend to continue to seek positions on committees related to technological resources on campus; participate in technological initiatives central to the university's goals and mission so as to build capital with relevant administrators and others controlling resources; apply for relevant internal and external grants to garner our own resources; and, using the recently achieved tenure status of two of our faculty, more forcefully argue for our share of resources. Finally, by achieving tenure, we are in a better position to seek the external funding necessary to enrich our techno-ecology, although we still view this challenge as somewhat daunting.

Placing teachers and students in instructional environments where digital technologies are available increases the chances that they will be successful when interacting with those tools within and beyond their programs of study. As a result, we must facilitate partnerships and relationships with our university community to foster sustainability; there is much to do that we cannot do alone as a department or a small program. We plan to use the results of our survey to support petitions to upper administration for additional computer classroom space and technological resources. Through this study, we highlight the need to integrate student experiences and perceptions into our research and our planning when attempting to create sustainable techno-ecologies. We invite others to adapt and administer our survey, to change it, critique it, and alter it to suit their specific institutional needs, and we are happy to consult with other researchers also navigating the institutional intricacies that invariably impact the ways we work, teach, and do research. We plan to build on our study and continue to develop and grow our techno-ecologies with student experiences and learning outcomes fueling the direction our efforts will take.



## REFERENCES

- Anderson, John E., & Schwager, Paul H. (2004). SME adoption of wireless LAN technology: Applying the UTAUT model. *Proceedings of the 7<sup>th</sup> Annual Conference of the Southern Association for Information Systems*. Retrieved July 19, 2007, from <http://sais.aisnet.org/2004/2004proceedings.pdf>
- Barron, Brigid. (2004). Learning ecologies for technological fluency: Gender and experience differences. *Journal of Educational Computing Research*, 31 (1), 1–36.
- Barron, Brigid; Martin, Caitlin Kennedy; & Roberts, Eric. (2007). Sparking self-sustained learning: Report on a design experiment to build technological fluency and bridge divides. *International Journal of Technology and Design Education*, 17 (1), 75–105.
- Bateson, Gregory. (1972). *Steps to an ecology of mind*. New York: Ballantine Books.
- Billig, Shelley H.; Sherry, Lorraine; & Havelok, Bruce. (2005). Challenge 98: Sustaining the work of a regional technology initiative. *British Journal of Educational Technology*, 36 (6), 987–1003.
- Bridgland, Angela, & Whitehead, Martha. (2005). Information literacy in the “E” environment: An approach for sustainability. *The Journal of Academic Librarianship*, 31 (1), 54–59.
- Brown, Dina, & Warschauer, Mark. (2006). From the university to the elementary classroom: Students’ experiences in learning to integrate technology in instruction. *Journal of Technology and Teacher Education*, 14 (3), 599–621.
- Brown, John Seely. (2000, March/April). Growing up digital: How the Web changes work, education, and the way people learn. *Change*, 32 (2), 10–20.
- Cropper, Steve. (1996). Collaborative working and the issue of sustainability. In Chris Huxham (Ed.), *Creating collaborative advantage* (pp. 80–100). London: Sage.
- DeVoss, Danielle Nicole; Cushman, Ellen; & Grabill, Jeffrey. (2005). Infrastructure and composing: The *when* of new-media writing. *College Composition and Communication*, 57 (1), 14–44.
- DeVoss, Danielle Nicole, & Selfe, Dickie. (2002). Encouraging and supporting electronic communication across the curriculum through a university and K–12 partnership. *Computers and Composition*, 19, 435–451.
- Fishman, Barry; Marx, Ronald W.; Blumenfeld, Phyllis; Krajcik, Joseph; & Soloway, Elliot. (2004). Creating a framework for research on systemic technology innovations. *The Journal of the Learning Sciences*, 13 (1), 43–76.
- Gee, James Paul. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave MacMillan.
- Information Technology Systems Division Annual Report*. (2008). Information Technology Systems Division, University of North Carolina Wilmington. Retrieved August 13, 2008, from <http://www.uncw.edu/itsd/>
- Lawrenz, Frances; Keiser, Nanette; & Lavoie, Bethann. (2003). Sustaining innovation in technological education. *Community College Review*, 30 (4), 47–64.



- Levitt, Barbara, & March, James G. (1988). Organizational learning. *Annual Review of Sociology*, 14, 319–340.
- Looi, Chee-Kit. (1999). A learning ecology perspective for the Internet. *Educational Technology*, 40 (3), 56–60.
- Nardi, Bonnie A., & O'Day, Vicki. (1999). *Information ecologies: Using technology with heart*. Cambridge, MA: MIT Press.
- Pappas, Frank C., & Volk, Fred. (2007). Audience counts and reporting system: Establishing a cyber-infrastructure for museum educators. *Journal of Computer-Mediated Communication*, 12, 752–768.
- Ristola, Annu; Koivumaki, Timo; & Kesti, Manne. (2005). The effect on familiar mobile device and usage time on creating perceptions towards mobile services. *Proceedings of the International Conference on Mobile Business (ICMB '05)*. Retrieved July 19, 2007, from <http://doi.ieeecomputersociety.org/10.1109/ICMB.2005.101>
- Selfe, Cynthia. (2007). *Multimodal composition: Resources for teachers*. Cresskill, NJ: Hampton Press.
- Selfe, Cynthia; Hawisher, Gail; Woodbeck, Dean; & Walikainen, Dennis. (2004). Complicating access: Gateways to the literacies of technology. In Cynthia L. Selfe & Gail Hawisher (Eds.), *Literate lives in the information age: Narratives of literacy from the United States* (pp. 83–108). Mahwah, NJ: Lawrence Erlbaum Associates.
- Selfe, Richard. (2005). *Sustainable computer environments: Cultures of support in English Studies and Language Arts*. Cresskill, NJ: Hampton Press.
- Sullivan, Patricia, & Porter, James E. (1997). *Opening spaces: Writing technologies and critical research practices*. Westport, CT: Ablex.
- Venkatesh, Viswanath; Morris, Michael G.; Davis, Gordon B.; & Davis, Fred D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27 (3), 425–478.
- Warschauer, Mark. (2004). Reconceptualizing the digital divide. *First Monday*, 7 (7). Retrieved July 19, 2007, from <http://www.digitaldivide.net/comm/docs/view.php?DocID=57>
- Weston, Timothy J. (2005). Why faculty did—and did not—integrate instructional software in their undergraduate classrooms. *Innovative Higher Education*, 30 (2), 99–115.
- Westbrook, Steve. (2006). Visual rhetoric in a culture of fear: Impediments to multimedia production. *College English*, 68 (5), 457–480.
- Wysocki, Anne F. (2004). Opening new media to writing: Openings and justifications. In Anne Frances Wysocki, Johndan Johnson-Eiola, Cynthia L. Selfe, & Geoffrey Sirc (Eds.), *Writing new media: Theory and applications for expanding the teaching of composition* (pp. 1–40). Logan: Utah State University Press.
- Wysocki, Anne F.; Johnson-Eiola, Johndan; Selfe, Cynthia L.; & Sirc, Geoffrey. (Eds.). (2004). *Writing new media: Theory and applications for expanding the teaching of composition*. Logan: Utah State University Press.



**Appendix.** Survey questions.

Download survey as Word document: [03\\_Atkins\\_Reilly\\_Word.doc](#)

Download survey as rich-text format document: [03\\_Atkins\\_Reilly\\_RTF.rtf](#)

**Demographics**

This survey is designed for you to express your feelings, attitudes, and opinions about your experiences with technology on campus at UNCW. When you answer the questions below, please consider only your on-campus experiences with and access to hardware/software unless the question specifies otherwise. For example, some questions may ask you to indicate that you have access to required software/hardware at your home. An asterisk beside the question number means that a response is required before being allowed to move to the next question.

**1. What is your major?**

- English (professional writing)
- English (literature)
- English (Teacher Licensure)
- Creative Writing
- Communication Studies
- Business (any major in Cameron)
- Other (please specify)

**2. What is your minor?**

- English (professional writing-certificate)
- English (literature)
- Journalism
- Communication Studies
- Business
- Other (please specify)

**3. What is your academic Status?**

- First-Year
- Sophomore
- Junior
- Senior

**4. What English Course are you currently taking? (if more than one--check all that apply)**

- English 204
- English 310
- English 312
- English 313
- English 314
- English 496

**5. What is your gender?**

- Male
- Female



**Student**

**6. What sorts of software do you regularly use on campus to complete course assignments? Check all that apply. (Use the textbox below to list types of software not on the list)**

- Microsoft Office (Word, Powerpoint, Excel, Access)
- Microsoft Front Page
- Microsoft Publisher
- Adobe Photoshop CS
- Adobe InDesign
- Adobe Acrobat Professional (pdf reader/converter)
- Macromedia (Dreamweaver)
- Macromedia (Fireworks)
- Macromedia (Director/Flash)
- Camtasia
- Open Source Software (OpenOffice, for example)
- Other (please specify)

**7. What sorts of hardware do you regularly use on campus to complete course assignments? Check all that apply. (Use the textbox below to list types of hardware not on the list)**

- Digital Video Camera
- Desktop Computer System
- Laptop
- DVD Burner
- CD Burner
- Digital Audio Recorder
- Digital Scanner
- Digital Still Camera
- Other (please specify)

**8. How often are you able to gain access to digital technologies (software and hardware) on campus required to complete course assignments?**

- All the time
- Sometimes
- Never

**9. If you answered: Sometimes, Never, describe a situation in which you were unable to accommodate your technological needs for a course assignment.**

**10. What other locations, on or off campus, have you visited to gain access to software/hardware to complete course assignments? Check all that apply.**

- Used your professor's computer
- Went to a friend's house to use software/hardware
- Used a publicly accessible computer (such as one at a public library)
- I have personal access to all necessary software/hardware for my course assignments
- Other (please specify)



**11. People with degrees in professional writing hold a wide variety of positions. Which of the following positions appeal to you? Check all that apply.**

- Advertising
- Book/Magazine Editor
- Graphic Artist/Designer
- Marketing Assistant in Publishing
- Print Journalist
- Interactive Journalist
- Technical Writer/Documentation Specialist
- Online Marketing Specialist
- Online Training Developer
- Proposal/Grant Writer
- Usability Research Consultant
- Web Content Manager
- Web Designer
- Other (please specify)

**12. Of the positions listed below which one/s do you feel qualified to apply for? Check all that apply.**

- Advertising
- Book/Magazine Editor
- Graphic Artist/Designer
- Marketing Assistant in Publishing
- Print Journalist
- Interactive Journalist
- Technical Writer/Documentation Specialist
- Online Marketing Specialist
- Online Training Developer
- Proposal/Grant Writer
- Usability Research Consultant
- Web Content Manager
- Web Designer
- Other (please specify)

### Professors

**13. Undergraduate tuition and fees at UNCW includes a technology fee. What do you think the amount of that fee is for a student enrolled in 12 credit hours or more?**

- \$49.95
- \$97.69
- \$146.54
- \$195.38

**14. Most universities require a technology fee. Is UNCW's technology fee of \$195.38 (for students enrolled in 12+ credit hours) fair, based on your level of on campus access to software/hardware?**

- Yes
- No
- Don't Know



**15. Does the computer classroom in which your classes are held contain the necessary software/hardware needed to complete course assignments?**

- Always
- Sometimes
- Never

**16. Please offer an example of an instance whereby your professor/s may or may not have been able to acquire necessary software/hardware for use in the classroom to complete course projects.**

**17. Which of the following methods have you observed professors use to obtain software/hardware needed for course projects. Check all that apply.**

- Borrowed space, time, equipment from colleagues or other departments
- Purchased or provided use of their personal equipment
- Used software/hardware from other campus locations
- None
- Other (please specify)

## Section II

In this portion of the survey when we use the phrase “writing and communication software/hardware” we are referring to the technologies that you commonly use to complete coursework and assignments. Such technologies include everything from email to Web-authoring software to video editing and production software.

**18. Using writing and communication software/hardware is a good idea.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**19. Writing and communication software/hardware makes work more interesting.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**20. Working with writing and communication software/hardware system is fun.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**21. I like working with writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**22. People who influence my behavior think that I should use writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**23. People who are important to me think that I should use writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**24. Professors have been helpful in my use of writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**25. In general, the university has supported my use of writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**26. I have the resources necessary to use writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**27. I have the knowledge necessary to use writing and communication software/hardware.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

**28. Writing and communication software/hardware that I use at school is not compatible with writing and communication software/hardware I use at home.**

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|



29. A specific person (or group) is available for assistance with writing and communication software/hardware difficulties.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

30. I could complete a job or task using writing and communication software/hardware if there were no one around to tell me what to do as I go.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

31. I could complete a job or task using writing and communication software/hardware if I could call someone for help if I got stuck.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

32. I could complete a job or task using writing and communication software/hardware if I had a lot of time to complete the assignment for which the software/hardware was provided.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

33. I could complete a job or task using writing and communication software/hardware if I had just the built-in help-feature available for assistance.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

34. I feel apprehensive about using writing and communication software/hardware.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|



35. It scares me to think that I could lose a lot of information using writing and communication software/hardware by hitting the wrong key.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

36. I hesitate to use writing and communication software/hardware for fear of making mistakes I cannot correct.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

37. Writing and communication software/hardware is somewhat intimidating to me.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

38. I intend to use writing and communication software/hardware in the next 6 months.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

39. I predict I will use writing and communication software/hardware in the next 6 months.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|

40. I plan to use writing and communication software/hardware in the next 6 months.

|                   |   |   |   |   |   |                |
|-------------------|---|---|---|---|---|----------------|
| strongly disagree | 2 | 3 | 4 | 5 | 6 | strongly agree |
|-------------------|---|---|---|---|---|----------------|