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Cover Illustration by Dave Cutler for peerReview.
The term “Net generation”—which refers to those born from (about) 1980 to 1994, after the influx of personal computers—was coined by author Don Tapscott in his book Growing Up Digital: The Rise of the Net Generation. This generation is composed of what some have called “digital natives”—the majority of those in the Net generation have always been surrounded by and are comfortable with technology. The Net generation’s natural facility with technology is often in striking opposition to the challenges faced by those of previous generations, who metaphorically immigrated to the land of technology. These opposing experiences with technology have lead to pedagogical challenges for many members of the academy—most of whom are members of the baby boom generation—as they search for the means to teach Net generation students in a manner that capitalizes on the group’s technology-driven lifestyle and fosters quality liberal learning.

The Internet plays a major role in the lives of the Net generation. The Pew Internet and American Life Project’s 2002 report The Internet Goes to College found that 86 percent of college students are frequent Internet users. The report states, “Internet use is a staple of college students’ educational experience. They use the Internet to communicate with professors and classmates, to do research, and access library material.” The report further finds that “nearly three quarters (73 percent) of college students say that they use the Internet more than the library . . . for information searching.” These findings illustrate the Net generation’s comfort with the Internet, but what does research say about their information literacy?

Kate Manuel addressed this topic in a paper published by the Association of College and Research Librarians, “What Do First-year Students Know about Information Research? And What Can We Teach Them?” Manuel reported on a 2005 study conducted at New Mexico State University in which 2,877 first-year students studied a library instruction module on information research. These students took pre- and post-tests that assessed the students’ knowledge of information sources, search strategies, and differences between the library and the Web. The key findings were mixed: “(1) Students can articulate savvy explanations for searching and evaluating strategies and (2) Misinformation about the use of information sources persists even after instruction.” Manuel concludes, “The relationship between searching styles and student learning would be a productive area of future research.” This study suggests that while students clearly come to college with technological confidence, there is still work to be done to improve student competency in information literacy.

This challenge and many others were addressed by nearly three hundred educators who participated in the Learning and Technology conference held by the Association of American Colleges and Universities’ Network for Academic Renewal in April 2006 in Seattle, Washington. The conference sessions were organized around four themes: how people learn with technology, educational and policy implications of technology, supporting faculty work in and across the disciplines in a technological age, and social and cultural implications of education and technology. Many participants also attended pre-conference workshops on topics such as blended learning, electronic portfolios, and innovative designs for learning with technology. One of the many engaging and inspiring featured conference speakers, Brian M. O’Connell of Central Connecticut State University and the Institute of Electrical and Electronics Engineers Society on Social Implications of Technology, spoke on computer ethics, critical thinking, and the pervasive nature of technology. He told the audience that “like the Ancient Mariner, when we deal with technology … we’re surrounded by it. In many ways, we’re not only situated in it, we’re saturated by it.”

This edition of Peer Review further examines many of the topics and themes introduced at the Learning and Technology conference. The issue features a range of articles from IT professionals, administrators, and faculty members on programs that use new technologies to further liberal education goals for students across disciplines. As these articles show, students’ grounding in the richness of liberal education, combined with their sophisticated technological skills, can foster the confidence and competence that students will need to navigate the complex challenges of the twenty-first century.

—SHELLEY JOHNSON CAREY

To hear the podcasts from the 2006 Learning and Technology meeting go to www.aacu.org/Podcast/LT06_podcasts.cfm.
Technology and Integrative Learning: Enabling Serendipitous Connectivity across Courses

By David E. Shi, president, Furman University

Many colleges and universities are already promoting and assessing engaged learning in distinctive ways. But can we do more? In fact, can we enhance liberal learning in more fundamental ways? Can we go beyond the now widespread emphases on greater engagement and commit ourselves to the more difficult task of promoting integrative learning? With that ambiguous proposition lingering in the air, let me provide some context to buttress its premises.

A paradox confronts residential liberal arts colleges. On the one hand, the world around us is being transformed by the increasing fragmentation of knowledge; the ferocious specialization of disciplines; the tidal wave of digitally refined and delivered information; the fragmenting energies of pluralism; and the increasing scale, complexity, and fluidity of global events and threats. In short, life is more dynamic and chaotic than ever before, demanding different competencies and perspectives from college graduates.

Yet too many campuses and too many of our colleagues in the academy continue to operate largely within traditional organizational structures and routine learning environments. Inertia prevails. However, change is in the air. In recent years, a small but growing number of colleges and organizations have committed themselves to creative efforts to reinvigorate the traditional ideal of integrative learning that initially constituted the core of liberal education.

Nexia—Fostering Integrated and Connected Learning

The Association of American Colleges and Universities (AAC&U) and the Carnegie Foundation for the Advancement of Teaching have made a concerted effort over the past three years to promote more integrated and connected learning. Integrative learning as promoted by AAC&U and the Carnegie Foundation is intended to help students intentionally connect ideas and insights from various disciplines and experiences. AAC&U and the Carnegie Foundation have applauded colleges for implementing first-year seminars, thematically connected learning communities, interdisciplinary opportunities, capstone experiences in the major, digital student portfolios, and student self-assessment instruments such as journals and blogs.

But these examples highlight one of our sternest challenges: to promote integrative learning comprehensively, over the entire span of a college experience, spatially and temporally. Rather than being satisfied with individual initiatives such as first-year learning communities and senior capstone courses, colleges need to help students make connections across learning experiences and over time. Integrative learning must be not an isolated event or exceptional curricular experience but a regular part of intellectual life—and its access portals must be readily accessible, day and night. Yet pedagogy on many campuses has not kept pace with technology. To be sure, new learning technologies have become commonplace, and the distribution of information and knowledge, as well as
the speed and frequency of communication, have increased dramatically. Dazzling new electronic resources, however, have been used primarily as “add-ons” to conventional ways of teaching and learning. Few institutions have fully embraced the strategic significance and transforming potential of new learning technologies. Even fewer have tried to yoke new learning technologies and innovative learning communities to the integrative premises of liberal education.

At Furman, we have been wrestling with such elusive possibilities. Our efforts have recently coalesced around an ambitious program we call Nexia that was stimulated by a planning grant from the Mellon Foundation. The term “nexia” embodies the plural of nexus—a link or connection. In this context, nexia denote the distributed nature of thinking within a truly integrative learning environment in which the centralizing focus of the major is deliberately complemented by links and threads of broader concern.

The Nexia concept comprises two related approaches to facilitating integrative learning within a residential liberal arts setting. The first approach is explicitly curricular and focuses on building and enhancing connectivity across courses. Like similar programs at Wheaton College in Massachusetts, Carleton College, and the University of North Carolina–Asheville, Nexia will support faculty in designing multidisciplinary team-taught courses and forging fertile connections between separate courses that may be explored throughout the duration of an academic term.

The Nexia program is distinctive, however, in recognizing the limitations of such “designed connectivity” for nurturing the responsive, inventive nature of thinking within a fluid world that demands more nimble notions of learning and more immediate conduits of connectivity. Accordingly, Nexia’s intent is not only to support prepackaged interdisciplinary courses, but also to enable serendipitous connectivity across courses. Such ad hoc connections may be prompted by current events, a spontaneous conversation in the faculty lounge, or a late-night residence hall conversation in which two students discover an intriguing point of convergence between discussions or readings in their respective classes.

Connectivity Conduits across the Curriculum and the Campus

As Gerald Graff of the University of Illinois at Chicago has noted, “The classes being taught at any moment on a campus represent rich potential conversations between scholars and across disciplines. But since these conversations are experienced only as a series of monologues, the possible links are apparent only to the minority of students who can connect disparate ideas on their own” (1992, 105–106).

Our Nexia concept aims to convert such conventional monologues into dialogues as well as group conversations by providing a conceptual development process and an administrative or implementation structure, both of which are necessary to enable these covert conversations to emerge within the institution. As Graff notes, discerning “the possible links” between scholarly monologues has been,
and continues to be, the missing link in higher education. How can we be more intentional in our efforts to facilitate serendipitous interactions?

The Nexia initiative fosters integrative learning through the development of a dynamic software program that mimics the functions of an air-traffic controller by assisting faculty and students in identifying and facilitating connections across the curriculum and the campus. Building on recent developments in semantic search technologies (notably from the National Institute for Technology in Liberal Education [NITLE] Semantic Engine), the Nexia tool initially generates potential connections from a database of teaching- and research-related materials submitted by faculty, staff, and students. Conceptual connections are identified not on the basis of simple word-to-word matching, but through algorithms of semantic proximity, thus generating results that are more conceptually nuanced and more intellectually stimulating than those produced by simple keyword or other metadata-driven searches.

A significant benefit of the Nexia tool stems from its dynamic, three-dimensional graphical interface, which allows users to visualize connections through an array of filters, including faculty names, departments, courses, and specific keyword terms. The tool’s potential utility extends from its immediately intended use of stimulating faculty-identified, teachable connections among courses to building dynamic, interactive learning communities among students, documenting integrative learning within digital portfolios or blogs, identifying possible sources of outside funding, and developing a more flexible and responsive model of curriculum development.

For example, professors who are interested in taking part in these “metacurricular” threads could use collaboration tools to create asynchronous discussion venues shared by all the classes involved in the thread, thus allowing students to participate in a richer convergence of perspectives and discourses than is possible within a single classroom. In this way, a complex issue such as intellectual property, which currently has no obvious “home” in the disciplines, could be simultaneously engaged by classes in computer science, philosophy, economics, bioinformatics, music, literature, sociology, and so on. The resulting dialogue about the issue would both highlight the unique contributions of the different disciplinary voices and enable students and faculty to transcend the limitations of the traditional disciplinary structure. This sort of multidisciplinary discussion is intended to create a discursive campus environment that is much closer to the so-called real world, in which the expertise of various specialists is commingled and shared to meet the challenges of complex problems that transcend single disciplines or offices.

Institutions tend to value what can be seen, shared, and remembered. Education in general, and higher education in particular, has increasingly come to value content over context, facts over meaning, and knowledge over conversation and connectivity.

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A Campus Culture of Creativity and Innovation

Such a radical shift from a content and disciplinary focus toward a more integrated, interdisciplinary emphasis and context requires shifting campus cultures, rethinking disciplinary boundaries, and reconceiving teaching and learning. Such ambitious efforts are potentially radical in their implications—and expensive. Promoting integrative learning through the use of sophisticated software requires first and foremost a campus culture of creativity and innovation. It also requires

- staffing and resources to support a more active learning community of faculty and students that transcends traditional course times and boundaries (e.g. online presence and conversations);
- staffing and resources to assist faculty with developing new cross-campus connections and instructional materials;
- faculty development programs to introduce the concept of cross-curricular connectivity;
- centralized administrative technical support and software for identifying and facilitating collaborations;
- programs to formalize and promote an institutional culture of academic engagement and collaboration (for example, essay and multimedia contests, symposia, speakers, campus-wide online discussion venues focused on various topics, an e-journal of collaboration, and so on);
- cutting-edge search and knowledge mapping technologies, resources for digitizing and archiving teaching and research materials, and staff and resources to develop appropriate assessment tools for integrative learning.

To the extent such resources become available, the residential liberal arts colleges have the potential to move beyond being exemplars of various forms of student engagement and become beacons of integrative learning. Furman has already taken a step in this direction with the establishment of a Center for Teaching and Engaged Learning (CTEL) which is designed to increase the quality and frequency of cross-disciplinary and pedagogical dialogue within the academic community. The creation of CTEL coincides with a reorganization of the general education curriculum around perspectives or “ways of knowing”; a transition from a term-based to a semester calendar, and the establishment of a two-semester first-year seminar for incoming students designed to facilitate integrative thinking. Each of these steps alone challenges professors to reconsider their teaching strategies and redesign their courses. Together, they may prompt cultural change across the campus and promote even greater creativity and innovation.

In this regard we view Nexia as simply one of several critical tools in our efforts to encourage dynamic dialogue and cultural change. CTEL is also positioned to promote integrative learning by supporting faculty and the academic community as they rethink their courses in coming years. As potentially powerful as Nexia may be as a connective tool, its success will depend upon the quality and extent of the conversations surrounding it. CTEL will facilitate such dialogue by providing a lively crossroads for faculty and students to engage issues and explore technologies directly related to integrative learning.

In pursuing such innovations, we will ironically resurrect one of the animating premises of classical liberal learning in its modern guise. We invite the higher education community to join us in these conversations. Rarely has the need been so compelling and the means been so available for rethinking and renewing the processes of liberal learning.

Academics promoting integrative learning often quote the phrase “only connect” from E. M. Forster’s novel Howard’s End. Yet the usually overlooked context for the quotation serves as a more fitting coda for these reflections: “Only connect! That was the whole of her sermon. Only connect the prose and the passion, and both will be exalted, and human love will be seen at its height. Live in fragments no longer. Only connect, and the beast and the monk, robbed of the isolation that is life to either, will die.”

Reference

Like many other universities that are managing change in the information age, Weber State University is constantly assessing whether conventional, off-the-shelf information technology (IT) products will meet its needs or whether it needs to invest energy in customized solutions that suit its particular institutional culture. Often the dilemma is cast in terms of the question “build or buy, insource or outsource?” The question, however, is more profound than that. What Weber State University’s IT staff really are trying to determine is whether our university should adopt and practice received wisdom (as embodied in existing IT solutions) or call this wisdom into question and forge our own way through a combination of IT innovation and IT research.

I argue that if universities want to strike a wise balance between these poles, IT cannot be treated merely as a commodity but instead should be regarded as a set of communities and social practices with pervasive effects on the way people collaborate, think, and learn. Because of these effects, good IT strategy and IT acquisitions depend on fostering a culture of innovation and a culture of reflection in which the political, social, and cognitive implications of IT choices can be considered. We need to muster the full powers of social science and computer science to understand the place of the university in the information age. We need, in short, to recognize that IT matters—enough so that we must be creators and scholars of IT, not just consumers.

Arguments against Investing Heavily in Innovation and Research
At our school the answer to the question of how much energy we want to invest in researching the relationship between IT and university life is informed in part by the type of Carnegie Classification we embody—which is very high undergraduate and primarily nonresidential. The lack of a research culture might suggest that our IT initiatives should follow the cues of our academic departments; many of our faculty are making important research contributions to their disciplines, but our undergraduate orientation encourages faculty to focus their energies on being stewards of existing knowledge and learning rather than discovering new knowledge. If our IT culture were to follow suit, it would invest in technology that was stable, tried, and true rather than cutting edge. Moreover, it would focus the majority of its energies on refining existing business processes rather than fostering or creating a culture of innovation. In concise terms, the argument suggests that if our departments do not focus on research, then neither should campus IT.

IT Doesn’t Matter (Very Much): “I Just Want the Technology to Work”
These arguments gain additional resonance when faculty members claim that they “just want the technology to work,” and when administrators tout the value of service and stability or suggest that...
software produced through open-source collaboration with other universities simply doesn’t have the same level of support as that which is available when a product is purchased from a vendor. To some extent our school has been persuaded by these arguments. We have convinced ourselves that tools for facilitating campus learning and campus administration have become so ubiquitous and so refined that they are now “commodified.” Since quality products can be bought off the shelf, there is little or no return on investment when we create or customize these products inhouse.

The justification for such a position is reinforced by Nicholas G. Carr’s well-circulated article “IT Doesn’t Matter.” While dismissed by many, Carr’s argument has some validity: investment in IT has fewer marginal returns than in the past and, as a result, corporations should treat IT like electricity, water, or other utilities. In Carr’s view, companies need IT in order to compete, but they do not need to be provided with a commodity that is fancier or better designed than their competitors’ because the base “plain vanilla” product is more than good enough. Although Carr’s article was directed primarily at the business world, its appeal and luster are not completely lost on academic culture, especially when academics are known to say that they “just want it to work.” The implicit message here, as stated by a significant portion of end users, is that they do not need bells and whistles or cutting-edge features. In order to do their jobs as teachers, they just need the existing technology to function as advertised.

**Arguments for Investment in Research and Innovation**

While these are sensible positions to adopt in a corporate setting, we need to be careful how we choose to deal with them in academia. We also need to consider whether the logic that may apply in the corporate world can be applied wholesale in academia. There are some good reasons why an idea that makes sense in the world of business may not be applicable in academia; they revolve around the fact that IT is not just a commodity that can be bought and sold and traded.

**Reflecting on IT**

Because IT is more than a commodity, we need to think about creating organizational arrangements that more effectively integrate the methodologies of academic disciplines into IT management. The reason this is necessary is that IT is not just a tool, but something that has transformative effects on the university, has reflexive properties, and is intimately implicated in the evolution of local and trans-local learning communities. The import of IT is so broad and so profound that the process of tooling or retooling the university is not something that can be left up to some folks in IT partnering with ad hoc committees of faculty and administrators. Instead, the university needs a formal set of offices that have the intellectual and technical authority, along with the fiscal resources, to sponsor ongoing colloquia on IT and the university. These offices can help the university develop more reflexive strategies that are informed not only by tactical, fiscal, and pragmatic interests but also by the broader and intractable challenges that face universities in the information age.

If there is not an office that is formally tasked with researching the broader social
undercurrents of IT and how the university is swept up in these currents, the social and political implications of IT decision making are left relatively unexamined. The tactical and pragmatic focus of administrative IT means that these questions do not get the reflection they deserve in day-to-day decision making. And while academics have the tools and dispositions to reflect on these issues, their departmental responsibilities and their lack of involvement in IT problems (e.g., their lack of daily proximity to the machine) mean that in practice, they seldom give as much attention to IT as they do to their own disciplinary interests. This lack of reflection might be acceptable in an institution that does not hallow deep thinking. But in a university, this situation is unacceptable, and if it exists, it is best remedied by forming an academic office that can address IT problems on a continual, rather than ad hoc, basis.

The Pedagogical and Cognitive Impact of IT

One of the major reasons we cannot relegate IT decision making strictly to offices that treat it as a consumer good that can be assessed on a fiscal balance sheet is that IT has transformative effects on the university and on the way instructors teach. Technology has not just allowed us to pursue existing pedagogical goals (and larger university ends) with greater facility; it has also, in subtle and sometimes not so subtle ways, changed or redefined the ends we are pursuing.

Instructors spend a lot more time fiddling with IT than they did in the past, and this is a source of frustration for some, since it suggests, as Thoreau put it, that we’ve become “tools of our tools.” But others have embraced the change without complaints about wasted time because they are adjusting to and pursuing new forms of technical and communicative literacy that are beginning to be valued as much as the more orthodox textual literacies that universities have hallowed. In its most curious manifestation, and in ways that extend from communication into cognition, we see educators touting the new “multitasking” capacities of the Net generation and the ostensible need to transform traditional pedagogies, which often quiet, cloistered reflection, into pedagogies that cater to the Net generation’s increased tolerance (and actual embrace) of discontinuity and interruption that has, ironically enough, been fostered by IT itself.

Combating the Threat of Technological Determinism

While these new pedagogical ends may be worth pursuing, the salient point is that new technologies are transforming university learning without anyone’s explicit consent. We may want or even embrace this change in ends, but we should not do so without reflecting on technology’s implications. And to the extent that we value reflexivity, if we do embrace these technologies, we should make a conscious choice about embracing them. If we do not consciously embrace them, we run the risk of letting pragmatic technical decisions and acquisitions determine university ends. We run the risk of letting the technological tail wag the university dog. We run the risk of sleepwalking while technicians determine the topology and character of learning. We run the risk of allowing technology to determine its own ends, or (in more academic language) allowing technological determinism to jeopardize the happy prospect of the university determining its own fate.

To combat somnambulism we need to recruit academics from a variety of disciplines to study IT on an ongoing basis as it manifests itself in the university. As Rosalind Williams (2002, 25) observes in Retooling: A Historian Confronts Technological Change, the very technology that universities produce has a habit of “boomeranging”:

The new fact of history on a social level is that we keep running into ourselves . . . as we build our values and social order into the world. . . . We live in a world of echoes, a “boomerang” world where everything that goes out comes back . . . where technology changes the very institutions producing it . . . the process keeps getting more intensely reflexive. . . . A leading product of information technology is more information technology.

If computer scientists and social scientists want to study the information age, a good place to start would be in their own backyard. But in my experience, this usually doesn’t happen. Generally, when I try to engage academics in the political and social problems that IT presents, eyes begin to roll. The sleepiness is palpable. It is as if academics did not believe
that there were any interesting political or social problems in their midst. The irony is especially poignant because, in general, these are the same academics who know on the one hand that technology is reshaping university life but on the other hand mutter that “they just want it to work.”

**Participating in the Commons: The Virtues of Collaborative Innovation**

When apathy runs this thick, people need to be reminded of the obvious. The educational commons (that is, the shared set of learning practices and associated tools that faculty use) is no longer solely shaped by the fiat of a provost, a president, or the decision of a (largely technologically uninterested) faculty senate. The character of the modern university, and the way it is experienced by a student, is increasingly decided by technology acquisitions, the vendors who control the evolution of these technology acquisitions, and the discretionary policy decisions of a few well-placed technology administrators. In recent years, universities have begun to feel the brunt of this technological determinism, which is most painfully manifest when a broad constituency of users is happy with the way things are but change and migration to a new system is mandated because the original vendor is no longer supporting the product.

In order to counter the power and influence of these technologies, and the vendors that direct their fate, universities have increasingly been turning to community-source software solutions (such as Sakai, Kuali, and Moodle). By collaboratively creating software with other learning institutions, universities that join these communities aim to gain more fiscal and technological control over their IT futures—futures that at the moment have been ceded, in large part, to outside vendors.

When universities take the time to embody their own learning goals and theory in software they’ve built in collaboration with other universities, the opportunities to reflect on the relationship between learning, community, and technology are increased. The idea is to create an ecology where members are not just consumers of knowledge and technology but active participants in its production. And in emphasizing collaborative production over consumption, in encouraging participants to defend their design choices to other members in the community, homegrown or community-source software catalyzes reflection.

**Fostering Innovation and Research**

If IT matters to universities (and is not really just a commodity that can be reified) and if universities need to continue to invest in it by fostering a culture of innovation, universities also need to foster a culture of reflection. The import and effects of IT on university life are so great that if we want to avoid sleepwalking in the information age, we need to do more than merely envision ourselves as inventors and creators (rather than mere consumers) of technology. We also need to think of ourselves as philosophers who are willing to spend time reflecting on the broader sociological movements and communities that we partner with (and condone) when the university makes particular software acquisitions. Given that IT is much more than a commodity, we need to create the cultures—and the offices—in university life that will encourage us to innovate, to reflect, and ultimately to keep the prospect of technological somnambulism (and its corollary, technological determinism) at bay.

**Reference**

Harnessing Technology to Improve Liberal Learning

An interview with Steven Sachs, vice president of instructional and information technology at Northern Virginia Community College (NOVA), by Noreen O’Connor, associate director of Web communications for the Association of American Colleges and Universities. Sachs discussed how new instructional technologies are advancing important liberal education outcomes, as well as how NOVA is using technology on its six campuses.

From your experience at NOVA, how do advances in technology support the goals of liberal learning for all U.S. colleges and universities?

Innovative technologies have the potential to make learning at the college so much richer for students. It is important to realize, though, that there is no one right way to teach or to use technology. The real key is the actual design of the instruction. These technology tools simply offer a wider array of options to faculty.

Technology can play an important role in fostering a climate of liberal learning in a number of important ways. Technologies engage more of students’ senses outside of class, exposing them to a richer environment than they would get just reading about things in a textbook or on a Web page. They can see it, hear it, and go places they might never experience otherwise.

We would never think about trying to do justice to Dr. Martin Luther King’s “I Have a Dream” speech without letting students hear him deliver it and showing the crowd listening to him in Washington. Geography classes have always used media to take students to distant lands to show them different cultures, lifestyles, and basic life challenges.

With modern technology, though, students are not limited by traditional classroom time. Today, people learn from many sources, whether they are in school or not. People learn about politics and national policy from radio and cable talk shows. People learn about medicine and far-away places and history from the Discovery Channel, the History Channel, the Biography Channel, the Travel Channel, and a variety of shows on other cable channels. In fact, they can now download television programs to their cell phones. If we are serious about liberal learning, we need to both harness these powerful resources and provide students with direction and tools for evaluating them.

How do new educational technologies influence a student’s learning experience?

Technology helps to improve liberal learning by making students more active learners. In a traditional class discussion, relatively few students really participate. Even those who do may not be listening and thinking about what others are saying. Instead, they are worried about being recognized and formulating what they will say. Others in the class are worried about lots of things other than the topic at hand. With modern technology, all students can be expected to participate in online discussions. They can all be exposed to different ideas and they all have to actually be engaged with the subject matter.

Using technology in educational settings does more than just increase the opportunities for student interaction. It helps students develop the skills they need to learn to be truly educated for a modern world. They
need to learn technology etiquette. They need to learn to communicate in a digital world. They need to learn that meanings are not in the medium they use—but that the medium can have an impact. They need to learn to collaborate and to use a variety of tools to do it.

A liberal education has always been about more than just remembering facts. In the twenty-first century, students face more options and more information than ever before and not just when they are on campus or in a metropolitan center. The challenge will be for them to learn to sort through the mass of information faster, more skillfully, and with more finesse than ever before.

How do new technologies fit into the goals already in place at NOVA for a quality education? Do they significantly change the kind of education offered to students?

Technology does not really change our goals. We have had technology in one form or another from the beginning. Our challenge has always been to find ways to use the tools we had to help students achieve success and to provide them with access to an education. Great teachers have always found ways to reach their students—regardless of the technologies at their disposal. Modern technologies just offer them more options and are more adaptable.

Educational quality is really about the quality of instructional design, not the tools we use. It is about capturing a student’s imagination and getting the student to think things he or she never thought before. It is about teaching that student to be a lifelong learner. It is about teaching that student to be a savvy consumer of information. It is about teaching that student to be able to communicate and function effectively in the world. It is about helping that student be able to make a difference.

The technologies we have today in our classrooms, our homes, even in our pockets, are more robust, more nimble, more scalable, and more powerful than at any time in history. Nonetheless, this is of no consequence unless we design and create the right messages. This is what faculty do every day. It is what makes going to college mean more than just what you would get from reading a book or listening to a radio talk show or looking up facts on a Web site.

How can faculty and administrators help ensure that students get a high-quality education through distance learning?

Everything ultimately comes back to the instructional design. We now know a great deal about the science of instruction and the characteristics of effective instruction. These characteristics are student motivation, content organization, student engagement, and useful feedback. While there is no single right way to teach, all really good instruction accounts for those characteristics in some way. The design has to be appropriate to the content, students, location, time available, and tools.

Just capturing a bad instructor on tape and delivering his or her presentation to students over the Web may be distance learning, but it is hardly going to provide a high-quality education. However, neither is sitting in that same instructor’s classroom. Some people wrongly equate distance learning with little more than a book and a test.

In fact, the lines between distance learning and on-campus instruction are blurring. At NOVA, we have more traditional classes that use Blackboard (our learning management system) outside of class time than we have distance learning classes using Blackboard. We have more faculty in traditional classes using various Web tools to create online materials than we do in distance learning.

We have also seen a huge growth in hybrid classes where there are half the number of class meetings—with technology being used to make up the difference in “class time.” It is not a straight one-for-one exchange though. The issue is to cover the content and class objectives outside of class. In distance learning, we have to design the course in such a way that students are not only exposed to the full range of content, but also have appropriate interaction with that content, receive feedback from their instructor, and have a chance to interact with others about the content, ask questions, and demonstrate their mastery of the course objectives. There are lots of ways to do this, and sitting in a classroom is only one of them.

How are faculty using hybrid courses on the NOVA campuses?

There are several different approaches that our faculty are using in these hybrid classes. In one approach, faculty meet with their class on campus once a week instead
of the more traditional twice a week. Instead of the second weekly class meeting, the faculty member uses techniques and tools more associated with distance learning to cover content. When well planned, that same classroom can be used for a second hybrid class on the days now not being used for the first hybrid class—effectively doubling the capacity of the classroom.

In another approach, the instructor meets with the class on campus for several meetings at the beginning of the semester and then at regular intervals during the rest of the semester. Once again, distance learning approaches are used between the class meetings.

The hybrid approach is very good for students not quite ready for the independence of distance learning or for classes where some of the content or learning objectives would be very difficult to convert to a purely distance learning format.

Though not as flexible as distance learning, this approach does offer students more flexibility than traditional classes. Other faculty use the hybrid approach to free some class periods to meet individually or in focused groups with students to target their specific needs without giving up any of the traditional content covered in the course.

Do faculty express concern that technology is ultimately going to replace classroom teachers? Technology is great for delivering content, carrying messages, storing information, speeding things up or slowing them down, making things bigger or smaller, etc. But technology itself does not think independent thoughts, select, create, and organize content on its own (without a question or theme), answer a novel question, or mentor or evaluate students.

How can faculty use technology more effectively? Faculty have always used forms of technology—whether it was an overhead transparency, a set of slides, a film, or even a chalkboard. They did not create all their teaching tools in a day then, and are not likely to now. The difference is that there are far more high-quality instructional materials available for faculty to choose from without having to spend any time in production. They need to put their time into designing appropriate learning activities, selecting content, and providing student feedback.

One of the most significant things that faculty have had to master with new technologies is how to take technology into account when designing courses and setting course expectations. Faculty frequently complain about how much time it takes to work with students now that they have e-mail, but nothing says they have to be available 24/7 just because students can e-mail at all hours.

Faculty can set rules and expectations for communication—electronic and otherwise—that ensure the new technologies can actually save them time.

Technology itself does not think independent thoughts, select, create, and organize content on its own (without a question or theme), answer a novel question, or mentor or evaluate students.
For example, when a question is answered for one student, faculty can post it for everyone to see and make sure students know to look for an answer online before sending an e-mail. Faculty can also post examples of assignments so students do not always have to ask for guidance.

In the classroom, faculty have developed communication strategies and have learned to anticipate questions. It is the same in the digital world. Just because we can communicate more quickly and more often does not mean we should.

What are the most important emerging trends for learning technologies and how are they being used to advance learning goals?
The emerging trend is the increase in ways faculty can use technology with students outside of the classroom. Textbook publishers are making a much richer array of materials available, and the tools have gotten easier to use. Faculty at NOVA now use a number of software packages, including Dreamweaver and Flash from Adobe for Web site design; Microsoft Producer and Impatica for adding PowerPoint to the Web; Microsoft Photo Story #3 for putting Web-based slide shows with sound online; Audacity and Horizon Winma for capturing and editing audio for Web sites; Tegrity and Apresso Classroom from Anystream for easily capturing live classroom sessions for the Web; and Saba Centra #7, Elluminate, and Adobe Breeze for real-time meetings over the Web. These materials are now in formats that are readily available to students on the Web, through Blackboard or other learning management systems, and soon will be available on iPods and other digital media players. Faculty can assign materials to students as homework rather than having to take classroom time to show them.

These new technologies have three big payoffs for faculty. First, faculty can use class time for more than just a one-way delivery of content. Second, students can be held responsible for the content—even if they miss class. Third, the new technologies allow for innovative approaches to scheduling. For example, they allow creation of hybrid classes that meet face-to-face less often since more of the content—and even interaction—is online in some way.

What are the most widely used classroom technologies at NOVA campuses?
All of our classrooms now have networked computers and LCD projectors, and many have more than just that basic equipment. They have special speakers, DVD players, overhead cameras for displaying 3-D materials, and touchpad control units that make it easy for faculty to manage the equipment in the room. Over the next several years we will be upgrading more rooms with additional equipment so faculty do not have to request it in advance.

We are also equipping more classrooms with electronic whiteboards that allow faculty to capture everything they write on the board in class, then post these notes to the Web or to Blackboard for student reference outside of class. The electronic whiteboards also function as interactive screens that allow faculty members to display and point out information on a Web page without having to go back to the computer.

Another of the newer technologies we expect to start putting into classrooms is the tablet PC. The tablet PC is a big improvement in the classroom over a standard desktop PC because it allows faculty to actually write on the screen and project it as they did with the old overhead projectors. We expect that this will add a whole new dimension to PowerPoint presentations or materials developed in advance. This will make those materials much more interactive and dynamic.

What is the biggest challenge you face and what are you doing about it?
The biggest challenge is finding enough staff to champion the new technologies, help faculty feel comfortable using them, and make sure we have the right support systems in place. This takes much more than traditional technology training. We recruit and pay some of our more innovative teaching faculty to mentor other faculty, hire instructional designers and instructional technologists who combine technical skills with the ability to relate to faculty, and design lots of online tools and training specifically targeted to faculty. It is still not enough to keep up, though. Our most innovative faculty are still moving so fast that it is hard to keep up with them.
Recent surveys document the growth of service learning on American campuses, whether through college-wide initiatives that encourage or require student involvement in community projects or through faculty-initiated, course-based academic structures. But there is little data on the number of academic majors that include service learning as a graduation requirement. The information technology leadership (ITL) major at Washington and Jefferson College (W&J), created in spring 2002, incorporates service learning in its required capstone course, ITL 400. Requiring service as part of our major enhances the benefits to the department and the community that usually accompany service courses.

Building Community Relationships through Information Technology

The service-learning foundation of ITL 400 creates continuity for the community organizations we work with and for the students in our program. The community organizations can think strategically about how to integrate the service of ITL students for both immediate and long-term projects, and our students can see themselves building upon the work of previous graduates of the program. For both groups, the horizon of the relationship between community and college becomes expansive, built upon shared goals and long-term commitments.

For the ITL department, these long-term relationships, and the variety of service projects they produce, help communicate to students, the community, and even our academic and administrative colleagues the liberal arts philosophy behind our program. When we created the ITL major, we sought to define the emerging field of information technology as a liberal arts discipline. Seeking to distinguish ourselves from traditional computer science programs, we emphasize the inherently interdisciplinary nature of information technologies. While we do require courses in programming and databases, we also require more interdisciplinary courses that draw upon traditional liberal arts disciplines such as psychology (in our human-computer interaction course), history (in our IT and society course), and art (in several of our new media courses). Moreover, the three emphases available to our majors—information systems, data discovery, and new media technologies—naturally connect to the different divisions of the college and provide attractive courses for students in other departments who wish to minor or double-major in ITL. The project-based service-learning capstone helps us communicate the interdisciplinary nature of our program, and our contribution to fulfilling the liberal arts mission of our college, to multiple audiences.

ITL 400 students have worked with the Washington Community Arts and Cultural Center (Wash Arts) for each of the past three years. Wash Arts was established in 2001 to bring cultural programming and arts instruction to southwestern Pennsylvania children at low cost—free for children on free or reduced lunch programs. In the
first year of our relationship with the center, one of our students facilitated the center’s first offering of a digital music class. The class met once a week in W&J’s technology center, and the student’s duties included installing and maintaining the class’s specialized software on the lab’s computers; meeting with students before and after the class to provide tutorial assistance; and helping other students create CDs of electronic music they created in the class. In our second year working with Wash Arts, two ITL students taught Wash Arts’ first class in digital art. Meeting at the arts center two nights per week, the students planned the entire curriculum for the course, and even brought department laptops and digital cameras to the class when necessary. Most recently, two ITL students made a twenty-minute documentary film about a neighborhood arts program run by Wash Arts, assuming all responsibility for filming, editing, and writing the narration for the film. These progressively more complex projects reflect the growing trust between the center and the college. Most importantly, they demonstrate the variety of skills—in oral and written communication and in project management as well as in information technologies—that we want to see in liberally educated ITL students.

Community-Based Projects
In many cases our service projects benefit from existing intersections between community organizations; sometimes we create new ones. For example, one student in the digital art class was also a member of an after-school Youth Engaged with Technology (YET) club at the local Washington High School. YET is funded through a five-year grant from the federal government’s Children, Youth, and Families at Risk program. Students in this club learn a technology-rich curriculum and interact with the community through such activities as workshops for senior citizens and technology consultations. Students enrolled in ITL 400 have been working with the YET club for the past three years on increasingly complex projects.

In the first year, three ITL students attended the twice-weekly meetings and assisted in teaching the robotics, Web development, and Geographic Information Systems (GIS) elements of the YET curriculum. For the GIS segment, they organized a treasure hunt in which YET students used global positioning systems to find a variety of items. In the second year, two other ITL students supplied similar instructional assistance during club meetings and arranged a visit to the Washington County, Pennsylvania, 911/Emergency Response office, where YET students learned about how the county was incorporating GIS technologies to improve emergency response. In the most recent year, ITL students provided instruction in LEGO robotics to YET club members interested in serving as robotics camp counselors over the subsequent summer.

Through these community-based projects, our students learn how they can help improve the quality of life in communities surrounding the college. In the past three years a palpable synergy has developed between Wash Arts’ digital art classes and the YET club’s high school students, who have developed increasingly sophisticated technology-related skills. In the first year of their collaborations, YET students developed the Web site for Wash Arts; most recently, they worked together to open the Inspiration Store, where Wash Arts artists sell their work and YET club members operate a Web development and computer assistance office. These kinds of community collaborations take years to develop; the annual involvement of ITL 400 students has allowed them to become partners in the community and to witness firsthand the benefits of long-term community involvement.

One final example will demonstrate the ways in which the service of ITL students reinforces and sometimes creates collaborations between community organizations. Two years ago, an ITL student worked with Science Matters, a partnership between W&J and local schools and businesses, to integrate the LEGO robotics curriculum into local schools. The student handled software and hardware issues, facilitated

AAC&U Work on Service Learning
The Center for Liberal Education and Civic Engagement brings together the resources of the Association of American Colleges and Universities and Campus Compact. Campus Compact is a national coalition dedicated to promoting community service, civic engagement, and service-learning in higher education. This partnership enhances the powerful possibilities of campus work on civic engagement and illuminates how higher education’s societal obligations can be integrated into the academy’s core educational mission. For information about the center, see www.aacu.org/issues/civicengagement.
communication between Science Matters and local schools, and organized a training camp for interested science teachers. In the following year, two other ITL students organized a robotics competition for students in these schools who had become involved in the robotics curriculum; they also helped plan the robotics summer camp and trained counselors from the YET club to assist during the camp. At the same time, several of the YET club students were assisting with the Wash Arts neighborhood arts program that ITL students were filming. Because of the interconnections between all of these projects, ITL students found themselves working with some of the same area children, who independently have become active in various Wash Arts, YET, and Science Matters projects.

Other ITL 400 students have worked with the local county information technology office to implement the Health Insurance Portability and Accountability Act (HIPPA) requirements, with the local hospital to research and recommend an e-mail encryption program, with a local health partnership to create a client database and to upgrade its internal network and information management system, and with the county’s literacy council to create a new Web site. None of these projects was strictly technical; rather, students combined their technical skills with their ability to research and collaboratively implement solutions to information-related problems. In doing so they came to understand the obligation to community that is inherent in liberal education.

Service Learning, Leadership, and Liberal Education

In addition to their service commitment, which typically requires six to eight hours of work each week, ITL 400 students meet weekly as a class to discuss their service work and the weekly reading assignments. The earliest of these readings are in the field of project management; students learn principles of project management, and write a first essay about how they intend to apply these principles to their projects. They also learn to use Microsoft Project to map out a preliminary plan for their work. At the same time, students are assigned readings on the topic of service learning itself; we find that instructing students in the goals and purposes of service learning helps us convey the philosophy of the department and of liberal education in general. These readings segue well into others from the field of servant leadership, the academic domain that informs the “leadership” portion of the information technology leadership curriculum. Perhaps more important than any of these assigned readings is the requirement that the students identify a text that supplements their service work and write a second essay about the connection between the text and their experience. In some cases these connections are direct: the two ITL students who shot the documentary about the neighborhood program run by Wash Arts selected books on the art of documentary filmmaking. But in other cases the connection is more tangential and, in some ways, more rewarding: many students use this assignment as an opportunity to explore such issues as community engagement, educational theory, and the management of nonprofit organizations.

Students in ITL 400 receive grades based on their essays, weekly participation in class, final presentation, and reflection in the
course blog—not on the success or failure of their projects. In fact, while the students’ work on these projects has always been excellent, the experience has helped us understand why 70 percent of IT projects fail. This failure rate is less the result of inadequate technology or poor work than of changing requirements and uncontrollable external factors. The digital music and art classes, for instance, rarely attracted the same students two weeks in a row, so it was difficult for the instructors to follow planned curricula. One week before the announcement of the robotics competition, a similar competition for the same weekend was announced by Carnegie Mellon University, which affected our level of participation. Additionally, most of the Web development projects have to be modified midstream due to our clients’ inability to deliver content according to the planned schedule. Unsurprisingly, our Microsoft Project planning charts are rarely followed past midterm.

The long-term relationships with community organizations established by our requirement of service learning in the ITL capstone reinforces this sense of obligation in our students and helps us communicate to them, and to our campus colleagues, the program’s grounding in the liberal arts. This has proven a surprisingly difficult effort, largely because of the common assumption that technology-related majors are necessarily preprofessional. Our department seeks to define information technology as a liberal arts discipline by stressing the interdisciplinary uses of information technologies as well as their social and historical contexts. Rather than preparing students for the IT profession specifically, we (like other liberal arts faculty) counsel students to pursue their passions in life; we hope they will consider ITL as a major that will prepare them to address needs related to information, whether they are directing an art museum, serving in the Peace Corps, or working in some other occupation that brings meaning to their lives.

As a result, our graduates pursue the same mix of professional and graduate school opportunities as other liberal arts majors. They do so prepared to address the challenges of information in an increasingly diverse and interconnected global environment. We hope that their experience with service learning also empowers them with a lifelong habit of giving back to their communities.

Reference

Notes
1 The best source for these statistics is the Campus Compact annual membership survey.

2 According to the 2005 Campus Compact survey, 29 percent of courses that contain a service component “require” it, while 58 percent “could be described as having a combination of both optional and required service components.” Throughout the survey, however, questions are asked about “service, service-learning, and/or civic engagement activities and programs,” making it difficult to draw conclusions about academic majors requiring a specific course that incorporates service-learning pedagogy.
Sorting out what is truly useful among the tremendous technological advances of the last decade is essential for higher education. Critics worry that the use of advanced technology in liberal arts classes will erode faculty–student interaction and diminish intellectual rigor. A study we conducted recently, however, made us wonder if both the hazards and benefits of educational technology may look quite different from what most of us have imagined.

Expanding the Scope and Curriculum of Classics Education

For three years, we analyzed the workings of Sunoikisis, a program that is changing the way classics is taught in over a dozen liberal arts colleges. Sunoikisis, a virtual classics department, was designed by the Mellon Foundation and members of an educational consortium, the Associated Colleges of the South (ACS), in hopes of expanding the scope and curriculum of classics education across these institutions. Sunoikisis courses blend online lectures and discussion with face-to-face tutorials on each student’s home campus. Through this program, students have the opportunity to study more advanced and diverse subjects than their own departments can offer. In the words of one student, the variety of lecturers provides “a much wider perspective than the bubble or mindset” that can characterize small departments, especially.

In this virtual liberal arts classroom, students also reported feeling more responsible for their own learning. “It can be tempting to learn to write for one professor,” one student said about traditional classes. In Sunoikisis, though, he realized that students have to “integrate lectures, rather than regurgitate information.” Faculty members also expanded their intellectual horizons through their work with colleagues on other campuses. Many described forming lasting relationships with colleagues through designing courses together and continued, regular interaction in the virtual classrooms. By allowing professors to teach in their areas of specialty while opening up the curriculum for undergraduates, the program supports the traditional aspirations of liberal arts education. Sunoikisis seems to show that technology, creatively employed, can enhance a liberal arts curriculum, perhaps even more effectively than media less embedded in twenty-first-century culture and traditions. The range of ways technology influences teaching here also deserves a closer look.

Over three years of interviews, research, and data collection on Sunoikisis, we concluded that the most powerful influence on teaching is not the technology. Rather, it is the venue for interaction and collaboration that the technology makes possible. Because of the collaborative design of Sunoikisis
courses, instructors always speak not only to students but to colleagues as well. One faculty member observed that team teaching led to more publishable papers by “raising the bar in preparation, presentation, and thought.” Whether faculty participants contribute a single lecture, coordinate a whole course, or tutor Sunoikisis students on their own campus, their activities are thoroughly collaborative. Team teaching has even spun off into collaborative research projects for some faculty members.

Technologically Assisted Collaboration

Perhaps collaboration in Sunoikisis is so highly valued—the classics faculty rated it as the program’s greatest strength—because it is relatively rare in their typical academic environments. Classicists in small liberal arts colleges usually have little chance to engage in academic exchange because of the very small size of their departments, intense teaching loads, and a strong disciplinary tradition of individual scholarship. In overcoming those challenges to fruitful collaboration, these faculty members resemble the “next intellectuals” who David Damrosch (1995) describes in We Scholars as essential to a much-needed shift in academic culture. For Sunoikisis faculty, a face-to-face summer seminar proved critical in laying the groundwork for continuing, technologically assisted collaboration. This summer seminar brought faculty together to review and select course materials, design the course, and share teaching techniques. Each year, participants spoke warmly of this experience for fostering personalities, teamwork, and professional development. The collegial atmosphere of the summer seminar also spilled over into the courses, sometimes blurring the boundary between teachers and learners. Both faculty and students realize that collaboration infused the course with a particular energy. The faculty members’ excitement about teaching in their specialty and exploring other aspects of their discipline tends to sweep students into the scholarly process.

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To some, the appeal of this kind of venture is its efficiency in organizing the intellectual labor of faculty to allow students access to wider course offerings. Sharing the workload of class preparation can mask, however, another aspect of collaboration’s significance. As one participant noted, “You actually spend more time on the lecture you deliver. You have a bunch of bright colleagues out there...you can’t fall down on the job.” Other professors said that the presence of their peers affected their interactions with students. “You teach less from an authoritative model when there is live interaction among all faculty,” one said. “It’s a model of communal struggle, communal endeavor.”

The fact that this community is far-flung, furthermore, offers some surprising benefits. Classicists are collegial but often proprietary about their courses. One participant remarked that the fact that his colleagues in Sunoikisis were “not right down the hall” made collaboration easier in some ways. Too often professors only enter other professors’ classrooms to evaluate teaching effectiveness for tenure or promotion. Freed from that context, many reported a sense of academic exploration they had not experienced since graduate school. While this shared purpose may be the real key to the program’s success, it would be impossible without the technological infrastructure that bridges the campuses.

Collaboration across Disciplines and Perspectives

A technology center supported by the consortium and the foundation at one of the colleges helps Sunoikisis run smoothly. The value of expert technological guidance to
this kind of endeavor cannot be overstated. Center staff help faculty develop Web skills and find specific software solutions to teaching challenges. As Sunoikisis has evolved, routine technical problems have diminished. Course Web pages, archived notes, audio lectures, and visuals now are fairly easy to use. What became clear to us, though, is that the technological problems that did pop up are only partially technical; cultural issues in the use of technology raise questions for professors and students.

Faculty report they still feel the need to defend their use of the electronic medium to peers who believe technology has no place in the liberal arts. Students experience discomfort of a different sort. Some students told us that they are uneasy not so much with their own anonymity in an online setting as with the anonymity of their peers and off-campus faculty. In a typical class, teachers and peers are known, or at least generally visible, and the parameters and expectations for interaction are well established. For juniors and seniors, like the students in Sunoikisis, such a framework is a “given.” The virtual context for these new courses, by contrast, seems to have left students more uncertain of the ground rules for interaction and perhaps feeling more vulnerable to unpredictable relationships and experiences.

The rules and conventions of online communication are still evolving everywhere it flourishes—from listservs to interactive Web sites and blogs. Though these students were studying the ancients, the medium that fosters that study is socially young. Despite the growing pains that go along with the new contexts for communication, some students quickly saw the usefulness of the experience. One recent graduate told us “we use the same approaches every day in our company on Wall Street. Because of the program [working over conference calls and with many forms of media] is very familiar to me.”

While the kinship between the uses of this advanced technology in the workplace and the uses of advanced technology in the classroom is easy to spot, a more subtle parallel also became clear to us—one between content and form. We were struck by a somewhat ironic similarity between the content of this humanistic program and technologically supported forms that support learning there. By their very nature, humanistic approaches to learning require the learner to deal with a lot of complexity. Sunoikisis gives students a contextualized, multidimensional view of the texts they study, fostering a “thickness” of teaching materials that reflects the complexity of learning in the humanities. In other words, taking information in though many different forms mirrors the multidimensional nature of humanistic inquiry.

A liberal arts education has always helped students develop the disciplined yet vibrant habits of mind that allow them to respond usefully to what is new in our culture. The new (and widespread) condition of the spatial separation of partners in dialogue exists in tension with another reality—the increasing necessity of collaboration in solving problems. Fewer people now live and work in close proximity to their professional colleagues, and many routinely travel far from them. At the same time, more people view collaboration across disciplines, perspectives, and party lines as essential to problem solving.

The case of Sunoikisis suggests that the relationship between technology and learning can be shaped by the deepest strengths of traditional humanistic inquiry. Liberal arts education has a long history of tackling such complex challenges, making sense of cultural change, and transforming seeming chaos into meaning. Since advanced technology and the revolution in the dissemination of information it has spawned are here to stay, where better than a liberal arts institution to help students acquire the intellectual habits that the new realities require? ■

Reference

Catalyst, a unit of the Office of Learning Technologies at the University of Washington (UW), supports the use of technology in teaching and learning. Catalyst staff members promote innovative uses of technologies that support education and provide centrally supported learning technology resources that help faculty, researchers, and students attain their pedagogical and research goals. We accomplish these goals by collaborating with clients and partners, emphasizing the use of technology as a means to enable them to achieve their goals rather than as an end in itself. To accomplish this, Catalyst supports three areas of service—Web tools, knowledge services, and learning spaces. This article discusses the University of Washington’s experience with the development, operations, and implementation of new technology learning spaces.

Creating New Spaces for Learning

The Catalyst unit supports several well-established campus learning spaces, including the Odegaard Learning Commons, which is equipped with 350 workstations that provide access to technology in the heart of the undergraduate library. The computing help desk and reference services, located in the Odegaard Learning Commons, provide students with a convenient, single point of service. Catalyst also maintains five computing classrooms—wired classrooms especially designed for computer-based instruction, experimental education, and student collaboration. All Catalyst classrooms are equipped with LCD projectors connected to the instructor workstation.

Catalyst's expansive campus learning spaces include a computing resource center, departmental computing labs, library workstations, and most recently a suite of technology studios. We design these facilities for more than just e-mail and word processing—they are information commons that provide students and faculty with a rich set of resources that enhance teaching and learning.

Creation of new learning spaces involves many considerations. We begin by listening to our clients, both faculty and students. Through surveys, focus groups, and general feedback, we stay in touch with their needs and interests. By attending conferences and visiting other institutions, we learn from the experiences of our peers. We consider the input of faculty and students as well as the experiences of peer institutions before we draft a proposal, identifying goals and benefits, and proposing a timeline for design and a comprehensive budget. Once a proposal is accepted, we select an appropriate location, seek budget approval, and begin the process of construction.

When a facility opens, we seek to meet our clients’ needs for a particular space through a process involving three “operational phases.”

Phase One: Experiment—During this period, we explore how students and instructors use a learning space. We conduct research to learn how well we achieve the goals outlined in the proposal and gain new insights into how faculty and students utilize the space. As a facility completes phase one, we need to make decisions. Have we achieved our goals? Were we able to set new goals? Answers to these questions will help us determine if we should close the facility or move into phases two and three.

Designs for Learning with New Technologies

By Karalee Woody, director, Catalyst Client Services, University of Washington Seattle
If we decide to close a facility it does not necessarily mean the project failed; often we have simply learned from the experience and there is no direction in which to proceed.

**Phase Two: Expand**—When a project advances to phase two, we are fully ready to scale up our operations. We may open additional facilities or enhance the functionality of the original facility. During phase one, we listened to our clients— instructors and students—and in the second stage, it is time to collaborate with our partners. Collaboration may include adding new facilities, helping another unit construct a similar facility, or approaching partnering units to find space so we can expand and operate within their space.

Enhancing our original facility also involves collaboration as we incorporate new technologies and services into the current facility. Regardless of the direction we take in this phase, assessment remains a key component as we advance to phase three.

**Phase Three: Establish**—At this point, we are satisfied with the completion of the previous two phases. During this final phase, maintenance and support of the facility activities fall within our regular operations. Assessment will continue on a regular basis as we introduce new features and as our clients needs change. In time, a facility may become obsolete.

**Developing and Implementing the Catalyst Technology Studios**

The design and implementation of Catalyst Technology Studios illustrate the process of creating new learning spaces. We recently opened three new technology studios and are about to open a fourth. Each of these studios is in a different phase of implementation.

**The Digital Audio Workstation (DAW)**—The DAW is a professional digital-audio studio that utilizes industry standard computer hardware, recording and mixing hardware, sound-processing hardware, and audio software to produce high-quality audio recording and professional audio editing. The DAW enables students to record electrified instruments or analog sounds, such as vocals or acoustic guitars, to the computer and to import previously recorded audio.

The DAW provides students with several audio-editing options, including a professional hardware processing and editing system and a software-only system. With these editing tools, clients are able to adjust track speed, length, and pitch, apply special effects, crop and cut tracks, combine multiple tracks, import tracks from varied media, and export completed works to either digital audio tape or compact disc.

Through survey responses, comment forms, and e-mail requests, many students indicated their desire for a studio that would be accessible to non-music majors who were interested in creating audio recordings of their music. Collaborating with the UW libraries, we selected a room conveniently located in the Odegaard Learning Commons. This request was initiated by students, so our Student Technology Fee Committee readily funded the proposal.

When the DAW opened, the UW student newspaper, *The Daily*, ran an article on the front page. By 10 a.m. that morning, the DAW had been reserved twenty-four hours a day for the next three months. Initially, students used the digital audio workstation to create and edit musical recordings. Soon students came forward with academic projects. One rather creative use involved a graduate student in Persian studies. In an effort to capture the Persian culture and language, she created audio recordings of folk stories. Since then we have seen many students in communications and business use the DAW to create radio spots, advertisements, and audition tapes. The Digital Audio Workstation is now in phase three. Our student consultants provide first-tier maintenance and support and offer free workshops.

**Collaboration Studio**—Our Collaboration Studios facilitate in-person, interactive, small-group projects. The facilities feature a fifty-two-inch plasma display as a shared desktop, a Microsoft Windows server running Tidebreak’s TeamSpot software, a full lab software image, and furniture that accommodates eight students with laptops. Two of the Collaboration Studios can be reserved using the UW libraries’ scheduling system, and the third is a drop-in location in the main library. In the Collaboration Studios, students

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- share files and Web links with one another;
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- control the common work (plasma) area from their laptops;
- share files and Web links with one another;
- edit documents in real time and across separate computing devices;
- collect, organize, and record information that individuals share in a team session;
- mark up the content on public displays using digital ink.

UW students were quick to comprehend the preliminary concepts of the space and eager
to endorse our proposal to the Student Technology Fee Committee. Again, the UW Libraries agreed to provide space for these collaboration studios. While we are only in phase one, student use of the Collaboration Studios has exceeded our expectations. In summer 2006, Catalyst initiated an assessment process by observing and surveying student groups using the facilities. In fall 2006, we began working with faculty, who are incorporating use of the collaboration studios into their courses. These facilities have generated much interest across campus, and currently Catalyst is helping departmental units build their own studios.

**Digital Presentation Studio**

(DPS)—In the DPS, clients have privacy to rehearse presentations. The facility simulates a classroom environment and includes a laptop computer connected to a plasma display and a small audience seating area. What makes this facility special is the mounted camera and microphone system, which enable clients to create digital recordings of their presentations. To initiate a session, the presenter logs in with his or her university network ID. When the recording session is complete, the presenter instantly receives an e-mail with a link to the streaming video file. The presenter is able to review the video online or from a mobile video player, so he or she can assess presentation skills, make changes to the presentation, etc.

We were inspired to bring DPS to UW after attending a session presented at a conference about Georgia Tech’s presentation studio. We introduced the idea to UW students and faculty and received an enthusiastic response to our proposal to build a similar studio here. Our gracious library partners donated a group study room and the Student Technology Fee Committee stepped up with funding on yet another project.

The DPS is now in phase two. We will begin assessment this autumn and have plans to work with individual students as well as a few selected courses and their respective faculty. Based on client feedback, we are considering enhancements to the room, including a second camera with a wider angle and a conference-style table for additional participants.

**Video Conferencing Studio**—Still under construction, the Odegaard Video Conferencing Studio will feature stadium-style seating that can comfortably accommodate sixteen people. The tables in the studio will include live microphones, power, and data for each participant. It will also feature dual automated cameras that alternate between narrow shots of individual speakers and a wide shot of the entire group. Once complete, there will be three plasma displays to view far-end participants, as well as a smaller display reflecting the local participants. The studio will allow geographically separated groups to meet and collaborate using various types of video conferencing technologies. Initially, the studio will be for researchers and administrative groups who need to meet with their colleagues remotely. In the long term, we expect either to enhance this studio to accommodate seminar classes, or to build a separate facility dedicated to academic courses. We will have a video conferencing consultant to assist clients with the entire process, from coordinating the video conference with the far-end site to preparing materials and operating the equipment on the day of the conference.

**Assessing Program Effectiveness**

Assessment is an integral part of Catalyst and mirrors the collaborative and evolving nature of our work. We use a formative assessment approach to support the development and ongoing improvement of our offerings. In collaboration with the UW Office of Educational Assessment, we set the direction for our evaluation efforts and meet with coordinators of program components to clarify program goals and ways to assess program effectiveness. Catalyst strives to continue improving services to our clients. Future efforts will involve deeper integration in academic activities and the campus environment, better collaborative tools, wider interaction with other institutions, expanded presence of technology-rich classrooms and informal learning spaces, and greater use of technology to enhance teaching, learning, and research.

**Resources**

For additional information on the technology studios, please see depts.washington.edu/sacg/facilities/advtech

Product information for the Collaboration Studios software is available at: www.tidebreak.com

To view the initial proposals, please see techfee.washington.edu/proposals/departments/eplb/2002-403

techfee.washington.edu/proposals/2005-039-1

techfee.washington.edu/proposals/2005-078-1
With more than 73 percent of adults in the United States using the Internet (Pew Internet and American Life Project 2006), universities are turning to Web-based instruction to better serve the needs of their students. As an endeavor by educators to maximize learning opportunities for the Net generation—students with lifestyles that involve frequent use of personal, mobile, and digital technologies (Oblinger and Oblinger 2005)—online lesson delivery also responds to higher education’s role in the emerging world economy (Friedman 2005). Current statistics show that more than 2.3 million students took an online course in fall 2004 and that this educational mode is growing more than 18 percent a year (Allen and Seaman 2005). These data underscore the important role that online resources play in the lives of undergraduate students, 78 percent of whom indicate they used the Internet for homework prior to entering college and 80 percent of whom have a computer by their freshman year (Educause Center for Applied Research 2003).

As a result of these developments, the past decade has seen online teaching and learning evolve from an experimental intervention to a legitimate component of contemporary higher education. In the present postsecondary environment, it is difficult to find a college or university that does not offer some form of distance or distributed learning. Today’s college students have grown up expecting everything to be available online and, indeed, universities have responded to these expectations by offering a variety of online options for them. Many are developing fully online programs designed to meet both student demand and strategic institutional goals. The question is no longer whether online education is as good as face-to-face instruction, but rather how to prepare and support faculty in the online environment and ensure that students achieve important learning outcomes whether they study in online or face-to-face settings or both.

The abundance of Internet resources creates such easy access to information that the majority of students now rely on the World Wide Web as their primary portal to knowledge, opinion, social networking, and entertainment (Jones 2002). Social networks create a sense of community among students when learning is a collaborative and distributed process. News packages on the Web link to corresponding blogs so that news acquisition becomes interactive and cooperative. Podcasting enables a truly mobile learning environment, and sources such as Google and Wikipedia seem to make virtually anything available online. Classes are not constrained physically or temporally, proving that continuous engagement for students is not only a possibility but, in many instances, a functional reality. Many
faculty members energize and redefine themselves through online teaching, and students have access to learning resources that were not available a decade ago. In fact, it seems reasonable to conclude that very few genuine face-to-face classes, as we have historically defined them, persist in higher education because even if an instructor does not use online technologies, his or her students most certainly do.

As the online environment expands, however, it presents formidable challenges to higher education. Universities must confront the demand for new pedagogies, enhanced support for both faculty and students, organizational redefinition, authentic and contextual assessment techniques, and new policies and practices. Unfortunately, these transitions have not necessarily been seamless. Some question whether online learning adds value for student learning outcomes, claiming it leads to lower success rates and higher rates of withdrawal (Noble 2001).

### Adaptation to Growth: A Case Study of Online Learning Milestones

The University of Central Florida (UCF) is a major metropolitan research university whose stated mission is to “offer high-quality undergraduate and graduate education . . . and contribute to the global community.” To accomplish this mission, the university has implemented a combination of online learning strategies to accommodate diverse regional educational needs, with considerable resources allocated to Web-based degree programs, certificates, and course offerings.

A significant factor in the success of UCF’s program is that it resonates with the university’s strategic plan and, as such, is supported by UCF’s policy initiatives. In a key speech offered to the academic community, University of Central Florida President John C. Hitt noted that UCF has achieved success at the undergraduate and graduate levels by using Web-based technology to facilitate delivery of curricular content to both on-campus and off-campus target markets, augmenting the instructional program with a combination of fully online, partially online, and Web-enhanced face-to-face courses (Educause Center for Applied Research 2003). This transformation to a distributed learning environment is achieved through Online@UCF, a component of the university’s Center for Distributed Learning (online.ucf.edu/cdl).

### From Modest Beginnings to Unprecedented Growth—The Market Mix

The University of Central Florida launched its first Web-based course initiative to increase access opportunities for a diverse group of students who were geographically dispersed across the state. This modest beginning evolved into UCF’s extensive distributed learning initiative, which currently offers five fully online bachelor’s degree completion programs, seven online master’s degree programs, and ten online graduate certificate programs (see details in table 1).

### Online@UCF Trends

Overall Web-based course offerings have increased across all of UCF’s colleges, with that growth reflecting student-driven demand for increased access. In 1996–97, two colleges (Arts and Sciences and Education) provided thirty-four Web-based courses, whereas in 2005–6 six colleges (Arts and Sciences, Health and Public Affairs, Education, Business Administration, Engineering and Computer Science, and Hospitality Management) provided more than 1,400 fully online and partially online courses (online.ucf.edu). Table 2 presents the growth in fully online course sections...
and student enrollments since the initiative began in 1996.

Table 2. Fully online sections and enrollment at UCF

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Number of Sections</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–1997</td>
<td>34</td>
<td>645</td>
</tr>
<tr>
<td>1997–1998</td>
<td>75</td>
<td>1,538</td>
</tr>
<tr>
<td>1998–1999</td>
<td>116</td>
<td>3,096</td>
</tr>
<tr>
<td>1999–2000</td>
<td>155</td>
<td>5,668</td>
</tr>
<tr>
<td>2000–2001</td>
<td>195</td>
<td>8,710</td>
</tr>
<tr>
<td>2001–2002</td>
<td>268</td>
<td>12,778</td>
</tr>
<tr>
<td>2002–2003</td>
<td>426</td>
<td>15,828</td>
</tr>
<tr>
<td>2003–2004</td>
<td>549</td>
<td>21,950</td>
</tr>
<tr>
<td>2004–2005</td>
<td>729</td>
<td>29,111</td>
</tr>
<tr>
<td>2005–2006</td>
<td>857</td>
<td>38,148</td>
</tr>
</tbody>
</table>

Success and Withdrawal in Web Courses

When educators talk about innovation, whether it is a new mode of instruction or a new technology, the first question is typically “Is it as good as face-to-face learning?” In an effort to maintain quality, this is a good question; however, in the case of Web-based instruction, it is the wrong question to ask. As online instruction has grown across our campus, we have found it increasingly difficult to find pure face-to-face courses. Many course sections may be offered only fully online or in blended form, and many of those that are classified as face-to-face in fact utilize Web components for posting assignments, online quizzes, and course discussion groups. From a research design perspective, it has become virtually impossible at UCF to locate course sections that are not making significant use of online resources for comparison purposes. In fact, the instruction that occurs in Web courses is as varied as the instruction that occurs in what would have been considered a typical face-to-face environment.

When assessing success across modes, grades become the only measure that is available and common across all departments and colleges. However, grades and grading practices vary widely across disciplines and among faculty—a natural reflection of pedagogical and assessment philosophy differences rather than instructional modality consequences. In lieu of comparing specific grade distributions, we declassify them by defining success as receiving a grade of A, B, or C. This tactic provides a more reliable, albeit less specific, measure of student performance. As seen in a typical data set presented in table 3, success rates for fully online courses remain fairly stable across semesters. Overall success rates in these courses vary slightly each semester due to the variability in course offerings, but range from 84 percent to 85 percent. Note that non-success includes withdrawal, grades of D and F, and other special categories such as “incomplete.” Examining attrition, we find student withdrawals ranging from 5 percent to 8 percent. Much of this variability is due to specific course content across semesters and has little to do with instructional mode.

Online Learning Yields Student Satisfaction

Student satisfaction with online learning is consistently high. Eighty-three percent of students who took online courses exclusively indicated they were satisfied with their academic program. When asked the reason for their satisfaction, students overwhelmingly indicate convenience and flexibility as being the motivating factors for their choosing online courses. Student comments indicate that replacing at least a portion of classroom time with online instruction provides them with the ability to accommodate their family, work, and academic lives. In fact, 80 percent of those who had taken a fully online course indicated that Web-based education enabled them to complete their degree program.

Online teaching and learning is changing the face of higher education in America as well as the rest of the world. In many respects, it is a natural consequence of burgeoning educational technology, the manner in which the current generation
approaches learning, and global economic perspectives. Students have instant access to information, assemble their individual personal learning spaces (Oblinger 2006), and feel the competition for a place in the workforce. If Friedman (2005) is correct in his assertion that the global economic advantage of the United States is diminishing, then by extension the higher education world is flattening as well. Learning is moving from a “command and control” structure to a “connect and collaborate” environment where the roles of students and teachers are changing dramatically.

Online education represents an innovative and proactive initiative that extends access to higher education, assuring students that they have a local university (Mayadas 2006) be they on, near, or far from campus. Obviously, this plays out differently depending on the context of the institution, but one elemental question remains constant. Can we increase access through online technologies while maintaining or improving educational quality? This is a complex question encompassing many components, three of which we have addressed in this article: growth, success and withdrawal, and student satisfaction. The answer appears to be that with proper support mechanisms, online learning will grow at significant rates. Success and withdrawal rates will be more than acceptable and student satisfaction will be high. In many respects, we are experiencing what Jared Diamond (2005) refers to as “landscape amnesia,” where, with the ubiquitous presence of media and technology on our campuses, it becomes more and more difficult to remember the academy prior to these resources. Colleges and universities have always been media-rich environments for our students. The thought of not having remote access to information is a dim memory, even for the most aged members of the faculty.

Online learning is expanding the boundaries of higher education. For instance, recent development in the area of information fluency (Gibson 2005; Breivik and Gee 2006) suggests the need for considerable work to help students develop an understanding of the components of information fluency—information literacy, technology literacy, and critical thinking mediated by effective communication skills—with the objective of molding comprehensive strategies for gathering, evaluating, and using information properly. This has resulted in the University of Central Florida creating its Southern Association of Colleges and Schools reaffirmation quality enhancement plan in the area of information fluency (for more information, see www.if.ucf.edu).

Online learning is a contributing factor in a number of innovations in higher education. Students will continue to integrate their personal technologies into their educational and social lives, and creative faculty members will respond in innovative ways to keep our current generation actively engaged in learning. Institutional support is the key to maintaining the quality of these efforts. Students will learn online through course managements systems, mobile devices, and remote access. In addition, they will use their devices for forming social networks and entertaining themselves. The challenge for higher educators and administrators is to stay ahead of the curve, recognizing that educational technology expands more rapidly than anything else that we have encountered and can morph into educational forms that we have not anticipated. Although online learning has been a part of the educational landscape for only a few years, the evidence to date suggests that it is rapidly becoming a major component of higher education.

References
When I was a new assistant professor, I gave much time, thought, and energy to my courses. I worked late the nights before on classroom presentations and rose early the mornings of my classes. I read and reread and underlined and took notes on the key books and chapters as well as the current articles on the topics that I was teaching. I continued to reorganize and revise my lecture notes (most of my teaching has been with large classes) until just before I walked to the classroom, adding additional material and making certain that I was prepared for any questions the students might raise. Looking back, I can see that I was making a simple error: I was mistaking my own learning for the students’ learning. I thought that if I had learned the material well, my extra preparation would magically increase my students’ learning.

Until recently, I was making a similar mistake, still working late into the nights and rising early the mornings before my classes. I continued to search the Web for information to add to my lecture slides and links to add to the course Web site. I continued to construct additional slides for my lectures as well as fuss with the content and formatting for previous slides. Until just before I walked to the classroom, I continued to search Google for more and better images to show during lecture, as well as rehearse the sequence and timing for the audio and video clips I had woven into my lectures. Looking back, I realize that this time I was mistaking my use of technology for the students’ learning. I thought that if I was competent with classroom technology and my lectures were entertaining, my students would magically learn the material better.

I’ve learned from talking with students that some see the place and value of technology in their courses as follows: First, they like professors’ lectures to highlight the main points in the assigned reading (so they don’t have to do the reading, think, evaluate, underline, and take notes). Students like lectures presented with slides, so they can see what to copy into their notes (as opposed to having to listen, think, and select what is worth noting as well as assess whether they are understanding the material and, if not, form questions). And students like lectures illustrated with images (these make the class entertaining) and video clips (a welcome break from copying from slides). Next, they like professors’ lectures to not go beyond the reading and they like the lecture notes to be posted on a course Web site (so that the students don’t have to attend class). Last, before the exams they like professors to post review handouts and sample questions on the course Web site (so they don’t have to read the lecture notes posted previously or review, organize, and think about the material prior to the exam). These students like the exams to be multiple-choice and computer-scored, rather than fill-in-the-blank, short answer, or—worse—essay exams (so they can rely on recognizing the correct answer rather than having to work to recall it or—worse—having to think and write).

If my use of technology merely encourages and supports student attitudes and behaviors such as these, then I have lost sight of my primary goal and responsibility as a professor, which is to facilitate student learning. Instead of expanding and fine-tuning my use of classroom technology, I should be putting my time, effort, and creativity into promoting the active engagement, thinking, questioning, and learning of my students. Once we move beyond a transmission model of teaching and learning, in which students are passive, to a constructivist model of liberal education, in which students are actively engaged, curious, reflective, and thinking critically, the best learning technology becomes the posing of a problem, issue, or question for the students (and this is real, not magic). Yes, I continue to use a variety of technologies in my teaching, but less so than a few years ago, for often the students can best be stimulated by sharing a good story with a twist or sketching a simple table or diagram with chalk. The criterion for bringing technology into my courses should always be: will this enable me to pose questions that better engage my students, spark their curiosity, and push them to think critically and, ultimately, to learn?
The Real Test
Liberal Education and Democracy’s Big Questions
January 17-20, 2007
New Orleans, Louisiana

Winter /Spring 2007 Working Conferences
AAC&U’s Network for Academic Renewal

General Education and Assessment
Engaging Critical Questions, Fostering Critical Learning
March 1–3, 2007 | Miami, Florida

The Student as Scholar:
Undergraduate Research and Creative Practice
April 19–21, 2007 | Long Beach, California
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