Chapter Two and Three consider how information technologies can contribute to two well-defined higher-education missions (delivering and creating instruction) and, in so doing, can address some major challenges that higher education now faces. But the preceding chapter discussed how the Internet, in particular, might play a much broader role: fostering electronic-learning communities. Not surprisingly, the potential effects of such communities on specific educational problems are much tougher to gauge than are those of more well-defined technologies, such as distance learning. For one thing, these communities often emerge spontaneously, rather than as part of a deliberate plan aimed at specific educational goals. Moreover, since Web-based groups are so new, it will be some time before we see which key problems in higher education they might help solve, if any. And, if online communities do help improve educational outcomes, almost certainly they will do so not simply by reducing labor costs and increasing the productivity of traditional higher-education-delivery systems, but by transforming learning and teaching practices.

In spite of these uncertainties, electronic-learning communities are worthy of attention, because, if they realize even a fraction of the benefits BioMedNet or the World Lecture Hall seem to promise, they will indeed make a substantial mark on higher education.

If you scan the WWW for online educational communities, it quickly becomes apparent that, however formative they may be, they are also ubiquitous. We have reviewed communities that conduct and publish research and share curricula; but others are appearing
to fulfill almost every information-based function associated with higher-education institutions, both within and across traditional organizational boundaries. Within institutions, for example, governance and administration issues are being discussed not just through academic committee meetings but also using various network technologies, including e-mail, organized electronic discussion groups, real-time chat rooms, and Web pages. (See Figure 4.1.) Just as in other businesses, information technologies may cut out layers of academic middle management and give faculty more-direct input into institutional decisionmaking. This use of information technology to flatten organizational structure, which is hardly novel in business, is still rare in “cloistered” universities.

Internet applications such as these might help improve the flow of information within higher-education institutions and help accelerate internal decisionmaking. Perhaps the most interesting feature of most successful online communities, however, is that they often start small, with a single purpose (such as administration), then expand—not only attracting a larger collection of participants, but also adding functions. In this chapter, then, we briefly present a few such emerging communities, noting how they might address key challenges for higher education, but also keeping in mind how tentative these possibilities are, at least today. We first look at some of the vir-

The University of California, Davis is using Web pages to help create a new Information Technology Strategic Plan (see http://it.ucdavis.edu/). The root page includes links to current versions of parts of the strategic plan, service guides and reference materials, University technology reports, as well as links that route browsers to any of UCD’s current Information Technology Operating Units (e.g., The Center for Advanced Information Technology). All these links provide background material for faculty and Information Technology Strategic Planning Committee members, who can contribute to the ongoing planning and design process. Some of the planning was conducted in focus groups and face-to-face community meets. But later deliberations were conducted using online forums.

**Figure 4.1—Academic Technology-Planning Using Information Technologies**
tual communities that have been around the longest—those in academic publishing.

**BIOMEDNET: AN EXAMPLE OF ELECTRONIC COMMUNITIES**

BioMedNet (Figure 4.2) began its virtual life as a single electronic academic journal in 1991. Today, bolstered by the Web, which permits a richer collection of materials to be placed online (the early electronic journals relied mainly on text, and e-mail-like communication protocols), and an infusion of capital, BioMedNet has expanded its functionality to include an online library of publications, a shopping mall (which links to companies that sell products of interest to this community), a collection of collaboration tools, and even an electronic bulletin board of job opportunities. (See Figure 4.2.) Virtual discussion groups and online conferences are the most recent additions to this growing community.

BioMedNet and many of its contemporaries look at once familiar and novel. The individual services they provide all have analogs in traditional academic communities: Libraries permit faculty and students to take out books on loan, meeting rooms are available for conferences, administration offices can arrange purchases on individual or institutional accounts, and department bulletin boards post flyers that announce new academic positions. However, several features may make the online versions more powerful than their analogs.

One feature is that the pieces of and participants in these online communities can be seamlessly combined. BioMedNet offers higher-education faculty in biological and medical science almost “one-stop shopping” for professional needs: In a couple of hours, professors might be able to catch up on the latest journal publications, read critical reviews, discuss new research ideas with colleagues from other countries, examine new books in their field, check out job listings, and place orders for a variety of products. These examples certainly do not exhaust the online services these providers will soon offer (and which the growing communities will soon demand). One recent addition in BioMedNet, for instance, permits members to create their own virtual rooms within the community. These rooms can contain a profile (which helps BioMedNet
suggest products and people of interest), details of their credit-card accounts (to facilitate electronic purchases), monthly billing statements (with a complete record of past purchases), and a community e-mail account (for corresponding with BioMedNet members only, not the Internet at large).

If designed properly, some virtual parts of electronic communities may actually do much more than their paper counterparts do, not simply provide the same services more conveniently. For example, job listings do not need to be (and in some Web sites are not) limited to static announcements of required qualifications and pay ranges. Links can permit Web applicants to visit homepages of potential employers, or even to take online tests and interviews. They can
draw into a growing community a wide range of educational stakeholders who rarely talk to one another. As the environment sketched in Figure 4.3 suggests, information technologies already provide, for

This information environment was designed as part of a RAND transition-to-work study. One of the main goals of the research was to provide models for how network technologies could help increase the bandwidth and flexibility of communication among students, schools, and the workplace. Implemented as Web homepages, the prototype system connected a local vocational school, and its students, to nearby employers. As part of the work, the project also showed how several kinds of databases, describing schools, students, skills, and jobs, could be constructed to add substantial value to the network as a whole.

Figure 4.3—A Schematic of a Possible Information Environment to Support the Transition to Work
example, tools that help students learn about employment opportunities, let employers converse with candidate workers, and enable schools to keep up-to-date about the changing needs of the job market. And the more these networked communities extend to new participants and link them in different ways, the more new communication technologies appear to be redefining the educational communities, rather then just streamlining communities that already exist.

It is a good bet that more-expansive communities—communities that fulfill even more-innovative functions and encompass a broader collection of stakeholders than existing communities, such as BioMedNet—will appear shortly. At present, however, the best, or at least the most complete, of these electronic communities seem focused on research and academic publication rather than on other missions of higher education. This focus may be beginning to change, as some institutions start to take the idea of combining educational functions in electronic communities to its logical conclusion: the virtual university.

VIRTUAL UNIVERSITIES: OLD WINE IN NEW BOTTLES?

While the realization of an entire virtual university seems the inevitable end-state of a movement to digitize higher education, many institutions have been “virtualizing” themselves, in bits and pieces, for years. Recall that the Open University (Chapter Two), probably still the world’s largest “virtual campus” (however this loose term is defined), has been using telecommunications to offer distance learning for over three decades. In the past, OU and others relied mainly on TV, radio, and telephony; today, the Internet and WWW are the vehicles of choice as universities go online. According to the Institute for Learning Technologies at Columbia University (http://daemon.ilt.columbia.edu/ilt/), almost 500 universities in the United States already have some Web presence, which, in many cases, still means just a homepage providing a brief description of the institution, its mission, and addresses to contact if the Internet browser wants any real information about admissions, requirements, or courses. The next steps beyond basic public relations often include virtual campus tours using interactive maps, digital campus periodicals or newspapers, homepages for specific departments, university centers and faculty, and online application forms.
These sites provide prospective students with a wealth of information they can use in planning their college careers. As of winter 1996, however, only a few established public or private universities had “virtualized” core teaching and learning functions.\(^1\) And, of those that had, most still limit online offerings in several ways:

- **The University of British Columbia** provides online courses that are mainly about the Internet itself, rather than about other subjects.
- **UWired** (part of the University of Washington) also weights its offerings toward net courses, and also follows the strategy of overlaying networked courseware on existing courses—the online resources are essentially enrichment materials—rather than creating stand-alone virtual courses.
- **Arcadia University** boasts an attractive set of pages at its Web site, but it offers only continuing education classes at a distance (using video rather than the Internet).

Perhaps not surprisingly, the most complete virtual universities on the Internet are not extensions of existing institutions but institutions that have been created in cyberspace almost from scratch.

**Athena**

By no means rivaling their traditional counterparts in size of faculty or range of courses, online universities such as Athena (Figure 4.4) are beginning to put together digital versions of all the familiar pieces of a campus. Founded in 1995, Athena had, by April 1996, employed about 25 faculty (some full-time and others who teach at traditional universities) and offered courses in over a dozen subject areas. Like a typical university, Athena grants liberal arts degrees (although it is

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\(^1\)This statement demands further research. At a minimum, the following questions should be addressed: How many universities are doing more than public relations on the Web? What kinds of services are they providing online? Who are they and what are their strategies (existing institutions, virtualizing bit-by-bit, or new virtual campuses created from scratch)? Answering these questions definitively, though, is like hitting a moving target: The number of universities online changes daily. For instance, Peterson’s (1997) Distance Learning Programs, New York, Peterson’s Guides, Inc., counted 97 “cyberschools” in 1993; in 1997 this total was almost 800.
This is Athena’s course catalog, which provides links to specific course descriptions, as well as to admission requirements, registration information, degree requirements, and the core curriculum. In addition, users can quickly link to an online student guide and faculty directory. The student guide provides detailed instructions on how to use the online technology that makes up Athena’s infrastructure. The faculty directory lists all current staff and provides e-mail links to most, and homepages and vitae for many.

Athena is administered by Virtual Online University, Inc., a nonprofit corporation offering a novel approach to academic excellence, professional development, and life-long learning.


Figure 4.4—Athena University: A Familiar Organization in a New Medium?
still waiting to receive accreditation from a regional accreditation body), has a transfer-credit policy, and offers a detailed, and surprisingly traditional, core curriculum. Athena differs substantially from most higher-education institutions only in its admission policy (because finite resources such as classroom space are not an issue, enrollment is open and unlimited) and its teaching methods.

Like courses in the World Lecture Hall, all Athena courses rely heavily on the Web. However, Athena courses go beyond typical WWW homepages, which are often rich multimedia documents, but rarely documents that permit the kind of intensive interaction among students and teachers that are the hallmark of good learning environments. Following others who seek to develop high-quality learning environments for the Web (Figure 2.9), Athena’s idea is to mix the richness of Web documents with the dialogue of MOOs (multi-user, object-oriented environments), which introduce into the WWW world of graphics, audio, and text, a communication protocol that permits students and teachers to talk with one another across the network in real-time, and to share multimedia “objects” as they chat.

Athena is a conscious attempt to capture the best of a traditional university structure in a virtual version. If it acquires accreditation and can keep costs low while continuing to offer courses to all comers, Athena could succeed in this goal.

But Athena’s is not the only approach to developing a virtual university, nor is it necessarily the best one. A few groups are viewing cyberspace as an opportunity to rethink the structure of educational institutions from the foundations up, rather than as a new tool for an existing organization. The Globewide Network Academy (GNA) is an example of such a rethought institution.

**GNA**

The Globewide Network Academy (http://www.gnacademy.org) is one such experiment. (See Figure 4.5.) In a broad sense, GNA is a

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2As of winter 1996, however, a liberal arts degree from Athena did not come cheap at approximately $12,000 (120 credit hours at $100 per hour). Costs may drop in the future if Athena can attract more students while requiring relatively few added faculty. But, even now, Athena clearly undercuts higher-education institutions (where degrees usually cost over $25,000) and private schools (where $50,000 is rarely enough).
This is from an online letter by the president of GNA, July 1995:

What is the Globewide Network Academy?

The Globewide Network Academy is a federation of educational and research institutions. We exist in order to provide a central location at which students and teachers can find each other, and to provide administrative support services to aid teachers in teaching.

Much of the reason for the existence of GNA lies in the belief that the traditional departmental structure of universities is reaching the end of its usefulness and that new organizational structures are needed if universities are to provide education for the masses of the world with the diminishing resources which are available to them.

Universities today are both too large and too small. An average university is simply too large to have a coherent focus, and most universities today are indeed composed of many sub-groups many of whom have conflicting ideas of where the university should go. As a result, one has huge amounts of energy being wasted in academic politics when it becomes necessary for the university to set priorities.

At the same time universities are too small. If you go to five different universities, you generally find five different registrar departments, five different payroll departments, five different computational systems, etc. etc. This leads to tremendous and costly administrative duplication which serves absolutely no educational purpose.

At the same time, universities are facing increasing pressures from the outside. Tuitions are rising far beyond the ability of a middle class family to pay, and government grants for research and education are drying up as governments face budgetary pressures. At the same time, universities are victims of their own success as the doctoral students that they are producing are unable to find any job openings in traditional academia.

The purpose behind the federation model of GNA is to deal with both of the structural problems of the traditional university so that it can deal with the challenges that face it in the opening years of the 21st century. GNA consists of independent members, each of whom has their own internal finances and course and curriculum policies. The core organization is responsible for providing computational and administrative support as well as providing a central location for students to find the courses that they are looking for.


Figure 4.5—Globewide Network Academy: A New Organization in a New Medium?
Creating Connected Educational Communities

mix of Athena and the World Lecture Hall. Like Athena (and unlike the World Lecture Hall), GNA offers more than a collection of online courses; it also includes virtual lounges where teachers, students, administrative and support staff, and technical experts can engage in ongoing electronic discussions about the academy. The student lounge also contains a collection of links that make up an ad hoc digital library and another set of links to career resources.

Like the World Lecture Hall (and unlike Athena), GNA is not developing its own courses. Rather, it encourages institutions and individuals to list with GNA existing courses for online distance learning, then provides a collection of value-adding and brokering services to help students find the courseware they want and to put them in contact with the providing institutions. At the same time, GNA offers support services for teachers and contributing institutions, which, they hope, will improve the quantity and quality of the products GNA manages. Initial indications look promising: By 1996, GNA had already catalogued thousands of courses, contributed by almost 200 sponsoring members (mostly American public universities—including Athena).

REFLECTION: NETWORKED COMMUNITIES AND HIGHER-EDUCATION GOALS

Electronic communities now emerging on the Internet and WWW may address several key goals of and challenges for higher education. In the simplest cases, putting basic functions online will streamline existing communication processes, helping both to reduce costs and increase access. Enrolling through the Web, or e-mail, already saves paperwork and administrative time; students also avoid long lines and frustrating delays in finding courses with open spots that suit their needs. But, although valuable, these uses of information technology with the Internet are certainly not new.

New network communities are just beginning to take advantage of the unique characteristics of the Internet and Web to fulfill a wide range of educational functions. Within higher-education institutions, Web-based dialogues might help open up decision-making processes and flatten administrative structure. If lessons from the corporate use of information technologies hold here, universities might be encouraged to rethink more rapidly the products (courses)
they offer, thereby being more responsive to the needs of business. Such responsiveness might be enhanced further if the same networks that improve communication within higher education also provide direct links to the business community, giving students direct access to potential employers, enabling employers to query schools for lists of promising prospective workers, and permitting industry more of a say in academic course design.

As electronic communities continue to grow, they should help meet more of higher education’s pressing needs. But growth means more than expanding to include a larger number of students and faculty; it also means connecting a broader set of stakeholders and encompassing additional educational functions. Such growth seems to point to virtual universities as a kind of holy grail for higher education: a single cyber-institution that provides all the functions of the academy, digitized and knit tightly together through high-bandwidth network connections. Certainly, virtual universities look like the logical conclusion of all this digital construction in that it is hard to imagine a digital academy that is more inclusive in its functions. Athena and others are deliberately attempting to build cyber-institutions that include as many pieces as possible of existing universities, from student centers, to libraries, to classrooms and faculty lounges. Some even include images of virtual ivy-covered walls. That these visions are so all-encompassing and vivid is, perhaps, the main reason that the popular press seem to view virtual universities as the most cutting-edge and ambitious of all applications of information technology to higher education.

Ambitious? Yes. Cutting-edge? Not really. Certainly, building anything that has the scope of a fully virtual university is challenging to say the least. But although the technology is thoroughly modern, the institutions being constructed in Athena, and those planned by other developers, are actually about as traditional as can be. GNA, on the other hand, demonstrates that a virtual university might transform the structure of higher education rather than simply streamlining it or improving its productivity (in any simple sense). GNA is trying to do more than digitize the past: while it replicates some conventional functions (e.g., virtual student lounges), a few familiar functions are distributed or eliminated (e.g., databases collect courses from other higher-education institutions; GNA does not create them), and still
others seem quite new (e.g., GNA’s brokering services to connect providers with consumers).

None of this suggests that GNA is more likely to succeed as a virtual university than Athena. Both may succeed or fail. And, in any case, their fates may have little to do with their underlying structures.

The comparison is important in that it illuminates two broader points. First, network-based information technologies can be used to deliver educational services in many different ways. Athena and GNA are two options, but doubtless others soon will surface that are more radical than GNA in the way they reorganize traditional functions of higher education—partnering with more-global institutions for digital library services or offering education on a “per-concept” basis, rather than providing whole programs of study, for instance. With equal certainty, other virtual universities will appear on the Web that are as traditional as Athena. It is in the nature of a flexible new technology such as the Web that it can be as easily configured to mimic an existing institutional structure or medium (Figure 1.1) as it can be crafted into a novel structure. If anything, repeating the past with new technology is easier than devising new designs, which takes considerable creativity, and substantial hard testing and refining to prove.

This brings up the second point. Many public and private higher-education institutions have been reluctant to experiment with novel applications of information technology, not only because they are tougher to devise and more expensive to implement, but because digitizing old institutions may still seem like a perfectly serviceable, and much more certain, strategy. However, if current higher-education institutions are not interested in conducting high-risk experiments, new external providers of educational services are. If they succeed, they may make holding to the status quo less and less tenable.