Challenges and Satisfaction

Most survey respondents, IT administrators, and wireless users report overall satisfaction with their wireless networks. Many track satisfaction qualitatively through user feedback, though some institutions do incorporate quantitative tools as well.

Jack McCredie, CIO and associate vice chancellor, information systems and technology, University of California, Berkeley, stated, “We track the wireless network quantitatively by the number of access points deployed (and requested) and the number of users of them, and [we check] qualitatively by feedback via the campus-wide task force.”

Mark Cain, executive director, information services and support, College of Mount St. Joseph, explained, “We track it qualitatively, primarily. We do student surveys to find dead spots and satisfaction. However, by using the wireless network administration tools, we get quantitative readouts of performance, which help us spot problem areas.”

Richard Parker, CIO and director of computing and information services, Harvey Mudd College, stated, “The number of happy users is the best gauge. Since we require registration for some wireless access, we can watch the increase in total number of users. We also monitor traffic and watch its increase.”

Challenges and Disadvantages

As Figure 8-1 illustrates, almost 70 percent of survey respondents identified security issues as a key challenge. Unsurprisingly, Carnegie classification and FTE size affect the response. Security issues gain importance as institution size and complexity grow. Ninety percent of 20,000-plus FTE institutions and 88 percent of doctoral institutions identified security as a concern, but only half of associate’s institutions and 60 percent of 1–4,999 FTE institutions did so.

Many IT administrators cited cost management as a disadvantage because, as David G. Brown, vice president and dean of the International Center for Computer Enhanced Learning, Wake Forrest University, succinctly explained, “Cost is a problem because it’s a double system.” John E. Bucher, director of computing services, Oberlin College, elaborated: “It adds costs to network infrastructure.” Larry Conrad, assistant vice president and CIO, Florida State University–Tallahassee, further explained, “It is duplicative of existing wired plant investment,
adding management and support load.”

Users cited class distraction as a potential challenge. Dr. Brian D. Voss, associate vice president for telecommunications, Indiana University, explained, “Anecdotally, there have been some faculty that are resistant to the idea of having connected machines in conference rooms and classrooms. Students have yet another thing to distract them; [they worry] that these devices are taking away from the students the ability to concentrate.”

From a technology perspective, users listed the laptops’ limited battery power and the network’s limited bandwidth as disadvantages. An instructor at Middle Tennessee State University elaborated: “There is a bandwidth issue. When the number of users increases during the day—when people read their e-mail in the a.m. or look at the Web at lunch—there is a slowdown in network performance. And I have noticed slowdowns during windy weather. And when the nearby tree blossoms, the leaves affect transmission. I suggested putting the antenna on a pole on top of the trailer so it’s higher than the tree.”

**Unforeseen Problems**

Dan Shapiro, director of information services and CIO, School of Dental Medicine, University of Pennsylvania, stated, “At first the wireless network was unstable. For about four or five months, it was up and down all the time, and people did not want to use it because it was so unstable. Eventually, the network operations group from Penn’s Central IT Department was able to adjust the access points to resolve the problem. Since that time, the wireless connectivity has been much more reliable.”

Pam Nelson, instructor in geology, Maricopa Community College, encountered a problem during her night class, when there was limited support to assist her. “Once, the electrical power to the building spiked, crashing the access point. It was hard to locate someone who knew the access point’s location. And then we had to go up into the ceiling and reset it.”

David Dunne, adjunct professor of marketing, Joseph L. Rotman School of Management, University of Toronto, worries about online testing: “If a professor holds an open book exam, then students access...
their laptops for their notes. What prevents the students from communicating their notes to each other during the exam? If the students have laptops with external cards, professors can instruct the students to pull out the cards and place them on their desks. Now more laptops have internally installed cards, so what can we do now to prevent this?

Dr. Elizabeth Bookser Barkley, professor, Humanities Department, College of Mount St. Joseph, wondered about equipment disparity among students: “Students who are not full-time traditional students are not required to buy laptops as part of course requirements. This means wireless could exclude evening and weekend students. This category of student introduces complexities as to how to equip them with laptops (such as loaners).”

Lessons Learned

Both IT administrators and users offer lessons in several areas. Some emphasize the importance of planning and the need to concentrate on good, basic service initially.

Ira Winston, computer and information, University of Pennsylvania School of Engineering, advised, “We spent a lot of time making sure we had really good coverage, mapping out the area. You should just really do a selected deployment at first. Focus on the places or space where it was difficult to do computing (network access) before.”

Barry Walsh, director, Indiana University, agreed. “Focusing on security and policy and standards first has been a benefit of our approach. I think any institution needs to address these issues before launching a wireless network.”

KC Hundere, director of network services, Glendale Community College, said, “Don’t do anything exotic. We are using it the way it was designed. We don’t use technology just for the wow factor. Faculty and staff sometimes want a technology just because they’ve read about it or someone else has it. Make sure the application makes sense, otherwise it could get really expensive real fast.”

Finding a good outside partner is important if institutions lack in-house expertise.

Mark Cain, College of Mount St. Joseph, outlined several activities. “One: Work very hard to find a good business partner, someone who has solid experience in doing this. We have already had to redo our residence hall once. Use a vendor, unless you have considerable in-house expertise in wireless networking (unlikely). This is still more of an art than a science, so you should make certain the vendor has experience, especially with wireless networks in higher education environments. Two: Get your vendor to create a careful, written plan. (Visio drawings are good.) Three: Be prepared to ask lots of questions … try to poke holes in the plan. Questions should be like this: Will we have enough bandwidth in this classroom, that classroom? Won’t we get frequency interference this way? Wouldn’t this work better?”

And finally, institutions should strive for campus-wide access.

David G. Brown, Wake Forrest University, believes, “Wireless will not become the primary network until 100 percent of the campus is covered… until it can accommodate almost all network uses. The educational gains from wireless do not yet justify the added cost and the compromises that must be made in terms of speed and versatility.”

Larry Levine, director of computing, Dartmouth College, noted, “What worked well was to jump in, decide to spend the money, bring it up ASAP, not worry about security, subsidized cost of client cards. PR it a lot, etc., … get it going. People like it, find it worthwhile.”
Satisfaction and Benefits

Most online survey respondents expressed satisfaction with their wireless networks. (See Figure 8-2.) Wireless communication has met or exceeded the expectations of nearly 90 percent of the respondents who have implemented it.

Most IT administrators and users expressed satisfaction also.

Brian Voss, Indiana University, believes, “Benefits are really defined as user satisfaction and, as such, are nebulous. The benefit is to increase the way technology can affect teaching, learning, research, and service missions of the university. It’s not a question of metrics, it’s more a question of providing an environment.”

Mark Cain, College of Mount St. Joseph, stated, “The students love it, the faculty love it. It is already enabling/creating new forms of learning and collaboration.”

Richard Parker, Harvey Mudd College, explained, “It has exceeded our expectations. We found more uses than we had anticipated. And the requests for additional areas of coverage were rewards in themselves.”

Most institutions cited convenience as a benefit. Parker explained, “Sometimes the issue of convenience determines whether someone will try to incorporate technology into their teaching or not. Faculty’s being able to use their computer, configured how they want it, in a classroom is very appealing. Students’ being able to access the Web at any time from anywhere, without planning for it, is a big plus.”

Others believe wireless technology enhances productivity. Larry Levine of Dartmouth College listed several benefits: “Definitely productivity, lower cost, service, convenience, efficiency. We receive glowing reviews—it’s a robust technology and people use and like it.”

Some users believe wireless enhances the classroom experience.

Dr. Elizabeth Bookser Barkley, College of Mount St. Joseph, said, “Another benefit for the students who collaborate is that wire-

![Figure 8-2. Results vs. Expectations for Wireless Networks, by Carnegie Classification*](image-url)

* Base: Current/piloting wireless network operators (N = 299).
less creates a less formal environment for interaction. The mobility is also a major benefit of the wireless function, as is the ability to print out using networked printers in the area of the department.”

Gregg Humphrey, director of elementary education, Middlebury College, stated, “These students are working professionals and are able to get more done in the course of their seminar time. This is important because they are looking for practical, efficiency-enhancing results.”

Chris Jernstedt, professor of psychological and brain sciences, Dartmouth College, said, “Research shows that in traditional lecture environments, students are not actively engaged most of the time. Taking notes is not particularly active; it is passively receiving and storing information. This has almost none of the characteristics of active learning. Wireless is not making things get done faster, but better. It makes people [focus more] on thinking and less on the clerical and logistical, which are deemed less relevant to the overall mission of the enterprise.”

**Future Plans**

Most IT administrators plan to maintain both their wired and wireless networks in tandem. Richard Parker of Harvey Mudd College explained, “They are complementary. We use wireless as an additional way of accessing the network, broadly defined. We have not used wireless for building-to-building connectivity, except in very limited areas where bandwidth needs were not great.”

Many IT administrators also want to continue wireless network expansion throughout their institutions, using it as a means to provide ubiquitous computing. Bandwidth is another issue; institutions want to provide better service so that users can utilize the wireless network for data-intensive applications like video.

And unsurprisingly, many plan to monitor IEEE 802.11a and security developments for future implementation. Users plan to continue fostering wireless networking’s adoption in the classroom by promoting its capabilities to faculty members and students and by enhancing applications.

PDAs and handheld devices intrigue both IT administrators and users. (See Table 5-1.) Barry Walsh of Indiana University stated, “PDA usage seems to be a key item for future consideration. This is a two-edged challenge, dealing not only with access but also with processing of application screen images to fit the variety of PDA-sized screens.” Jeffrey Rehbach, special projects manager for library and information services, Middlebury College, expects that “wireless will mimic the wired network environment, potentially serving a mix of laptop and PDA equipment.”