Student Campus Technology Trends: 2001 Versus 2006

Five-year trends revealed by an annual residence hall survey help campus technology planning

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Since 1999, students who reside in campus housing at the University of South Carolina have completed an annual residence hall computer and technology survey. More than 2,800 students completed surveys during the fall 2001 semester, and approximately 1,800 completed the survey in 2006. In fall 2006, the survey used a Web-based format rather than asking students to complete a paper survey immediately upon moving into the residence halls. With the paper survey, students thought they had to complete it to obtain the keys to their rooms. This belief resulted in more students completing the paper survey than the Web-based survey.

The survey has changed over the years to include questions about home Internet access, cell phone use, and technologies students typically bring to campus, including types of computers, personal digital assistants (PDAs), and MP3 music players. The survey findings assist the student development services and university housing plans for the incorporation of technology into student housing, centralized computer laboratories, and the wireless university environment. This article compares results of the 2001 and 2006 surveys.

Literature Review

In fall 2003, colleges and universities, especially in the West and Southeast, faced record enrollments.[1] This trend continues at the University of South Carolina, a large, public, four-year university that has had a more than 10 percent increase in the undergraduate population from 2002 to 2006 (from 28,484 students to 31,378 students).[2] Universities provide student housing to establish collegial living environments, which are "essential in creating and enhancing a vibrant intellectual community" at the university level.[3]

Some colleges and universities are providing technology-based equipment or requiring such technology of incoming students. In 2004, for example, St. John's University in New York supplied approximately 3,000 IBM ThinkPad notebook computers to the incoming freshman class.[4] In 2001, Seton Hall University ensured that every freshman had a new laptop by leasing laptops to them.[5] The laptops, in conjunction with an increasing wireless capability, gave students the opportunity to use computer technology campus-wide.

According to the Campus Computing Project's survey, wireless networks reach 51.2 percent of college classrooms compared to 42.7 percent in 2005 and 31.1 percent in 2004.[6] The wireless community extends beyond college classrooms to campus-wide wireless networks. Wolff discussed the implementation of a University of Texas at Austin initiative in which "wireless coverage by spring 2005 included approximately 80 percent of common spaces and 40 percent of classrooms."[7] Wolff also noted that student ownership of laptops grew from 2002 to 2004 among graduate students (from 45 percent to 47 percent) and among undergraduate students (from 22 percent to 45 percent). Riley noted that at the University of Wisconsin–Madison, more than 12,000 students and approximately 6,000 faculty used laptop computers.[8]

To encourage creative uses of technology in education and campus life, many universities are implementing PDAs and other technology for student use. In 2001, the University of South Dakota required PDAs just as they required texts for students. One student admitted that he initially used the PDA only as an electronic calendar and a campus map. However, he now uses the PDA to download quizzes, take notes, and listen to lectures.[9]

Duke University provided iPods to approximately 1,700 incoming freshmen in fall 2004.[10] The university discovered, however, that students provided with iPods during the first year of the initiative did not use them as learning tools, but more for listening to music and audio books. During the second year of the iPod initiative, Duke provided devices only to students enrolled in classes using technology as a classroom tool and did not limit the devices to iPods.[11] Read found that during the third year of the Duke initiative, the majority of students already owned the devices,[12] so the university now loans devices as needed to students involved in courses using the technology. Graham also noted that several colleges and universities are analyzing Duke's decisions and choosing to provide or require iPods for students, including Drexel University in Philadelphia, Georgia College and State University, and Stillman College of Tuscaloosa, Alabama. Colleges and universities are using the devices for a variety of educational purposes, as well as offering them as incentives for students to complete financial aid and registration forms in a timely manner.[13]

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University life today provides an information-rich environment in which students can develop skills for success.[14] Providing technology or access to technology in student housing gives students an opportunity to conveniently develop necessary skills. Fees are often implemented to support such technology purchases and maintenance. For example, Northern Illinois University reported in its 2006 Information Technology Services (ITS) annual report that students are charged computing fees to help fund upgrades and replacement computers for laboratories.[15] The report notes that "ResTech" is an associate program of ITS staffed by employees to support labs with over 200 computers, both PC and Macintosh, along with an intranet, Web site, and other features.

These programs and departments are common on university campuses, and students living in student housing expect technology to be available. Indiana University reported that more than 96 percent of students come to campus "with at least one personal

computer (and possibly also a PDA, cell phone, and gaming system), and most expect to connect to the campus network within a few hours, if not minutes, of arrival."[16] Providing the necessary software, hardware, support, and technology management for students becomes an urgent issue. Consequently, it is important not only to investigate the type of technology the university will supply to students but also the type of technologies students bring with them to campus. This data gives administrators and staff who are responsible for policy, procedures, system setup, software installation, and maintenance the information necessary to adequately plan and to inform the departments and programs that make budgetary decisions about what students need while living in campus student housing.

Another factor in providing current and adequate technology to student housing is to retain those students as residents. As noted by Li, Sheely, and Whalen,[17] "residence hall occupancy is a concern to housing administrators because higher occupancy leads to financial stability." Their study showed that high-speed Internet access was a significant positive predictor of students returning to live in the residence hall the following year.

The information needed by student housing authorities goes beyond computer laboratories in the residence halls, however. For example, information about cell phones, PDAs, and music downloads is also important. If students use cell phones instead of residence halls' landlines, a university can save money by removing the landlines. Students might also be willing to pay an extra fee for legal downloading capabilities. Before making changes in its current system, a university should obtain student input and analyze trends.

A trend toward wireless computing is emerging as students bring more wireless laptops to campus. Residential students prefer a wired connection due to its reliability and bandwidth, while continuing to enjoy wireless connectivity when away from the residence halls. Centralized computer laboratories remain a necessary component of the infrastructure of student housing, but as students begin to bring more laptops to campus, there may be a continued decline in the number of such labs. Results from the annual computer and technology survey indicate that the need for centralized computer laboratories persists, but the usage differs. Students now use the computer labs for the laser printers, software programs not typically installed on laptop computers, and to check e-mail, not for the computers available there.

Purpose

The annual survey was designed to obtain data about computers and technology that students bring with them to university student housing at the University of South Carolina. The results of the survey were meant to help the university investigate the campus's changing student technology environment and to adjust policy, funding, and pedagogical approaches and strategies to meet student expectations. The results would also affect infrastructure plans and decisions regarding wireless and wired connectivity and computer laboratory investments. The purpose of the study reported in this article was to compare such technology brought to campus during the fall 2001 and fall 2006 semesters to guide effective policy decisions.

Methodology

The residence hall computer and technology survey was originally distributed during the move-in process in hardcopy format, including the fall 2001 survey. In the fall 2005 and 2006 semesters, the surveys were created in a Web-based format. The distribution of the fall 2006 survey was a collaborative effort between housing staff and faculty from the Technology Support and Training Management (TSTM) program. The TSTM faculty developed and administered the Web-based version of the survey for the first time in September 2005. The survey was expanded each year to include questions regarding up-to-date communication technology, downloading files, and file sharing.

In September 2006 students were e-mailed a Web link to complete the survey online. The small percentage of students without a computer could use an existing computer lab to complete the survey. An iPod giveaway served as an incentive in 2005 and 2006 to get a higher level of participation from the students.

The survey questions pertained to types of computers students brought to campus, home Internet access, cell phone use, PDAs, MP3 devices, and other technologies. The resulting data were provided to students through an e-community developed through Blackboard. The University of South Carolina's housing department uses Blackboard to send mass e-mail reports of power outages, room change deadlines, major water leaks, and so forth to students. As housing's in-house IT staff continue to support and expand the e-communities, the technically savvy students use Blackboard in the following ways as well:

- Online residence hall government elections
- Electronic bulletin board to sell books and find rides home during breaks
- Subgroup creation catering to specific learning communities such as premed and engineering

From 1999 through 2006, approximately 24,000 students completed surveys. The wealth of data provides the Housing Department, researchers, and the university with the opportunity to learn about students' use of computers and technology.

Findings

The demographic data for the surveys completed in 2001 and 2006 appear in Table 1. The students involved in this study were mainly freshmen and sophomores, with more female than male students, which is consistent with the resident count in university student housing.

Table 2 shows the data gathered. The fall 2001 survey asked simple computer and technology questions dealing with the following:

- Did students bring a computer to campus?

—If yes, what type of computer (Macintosh or IBM/compatible)?
—If yes, desktop or laptop?
—If yes, wireless ready?

- Did students bring a cell phone to campus?
- Did students bring a pager to campus?

As noted in Table 2, questions added to the 2006 survey covered a variety of computers and technologies. Some questions were the same for both surveys.

Approximately 17 percent more students (99 percent of the respondents) brought computers to campus in 2006 than in 2001. The number of Macintosh computers rose only slightly (by approximately 3 percent, or three students). This information aids administrators and staff responsible for purchasing and supporting computers for labs in student housing on campus. A trend toward laptop computers is evident: almost 84 percent of computers brought to campus were laptops and 16 percent desktops in 2006 compared to 26 percent and 75 percent respectively in 2001. (Historically, desktop computers brought to campus peaked in 2001.) Wireless-ready computers increased by nearly 50 percent from 2001 to 2006 (from 29.6 percent to 80.4 percent).

Students were also asked to supply information about other technologies brought to campus. The data gathered appear in Table 3. Because the 2001 data were limited, for comparison the table includes data from 2002, when the survey included Internet service at home, cell phone with mobile messaging, PDA/Palm device, and a printer.

The percentage of students bringing cell phones with text messaging increased by almost 40 percent from 2002 to 2006. This stands out as the top technology (other than computers) brought to campus by students. PDA and pager use are falling: PDA use fell more than 6 percent from 2002 to 2006, and pagers have steadily decreased since 2001, with a mere 0.4 percent of students bringing them to campus in 2006. Students with Internet service at home increased approximately 8 percent from 2002 to 2006.

In 2006, the survey also asked students what type of Internet service they had at home. This question might have been the most important one asked. The results indicated dial-up for 17.7 percent (306 students); broadband cable, 41.4 percent (713); and broadband DSL, 35.1 percent (605). Other types of connection were used by 1.2 percent (20 students), and 4.6 percent (80) were not sure of the service they used. Thus, more than 70 percent have broadband Internet connections at home. This information is important to faculty and housing because they provide much information via the Internet to students and student housing residents. It is also essential information for faculty teaching online courses.

Table 1

Demographic Data for Residence Hall Survey

Survey Year	*n**	Female	Male	Freshman	Sophomore	Junior	Senior
2001	2,794	61.6% (1,720)	38.4% (1,074)	54.7% (1,529)	25.1% (702)	13.9% (388)	6.3% (175)
2006	1,784	64.9% (1,141)	35.1% (618)	59.8% (1,063)	20.6% (366)	13.1% (232)	6.5% (115)

* Note that not all participants answered each question.

Table 2

Computer Technology Brought to Campus*

Brought a computer	Yes	No	
2001	82.4% (2,302)	17.6% (492)	
2006	98.6% (1,734)	1.4% (24)	
Computer Type	Macintosh	PC	
2001	7.4% (170)	85.7% (1,972)	
2006	10.0% (173)	90.0% (1,559)	
Computer Design**	Laptop	Desktop	Tablet
2001	25.6% (554)	75.4% (1,701)	
2006	83.7% (1,457)	15.9% (2,77)	0.3% (6)
Wireless Ready	Yes	No	No Response/Not Sure
2001	29.6% (681)	59.3% (1,364)	11.2% (257)
2006	80.4% (1,401)	13.0% (227)	6.6% (115)

* In 2001, $n = 2,794$; in 2006, $n = 1,784$. Not all participants answered each question.

** In 2001, 1.7% (47 students) brought both a laptop and a desktop to campus.

Table 3

Additional Technologies Brought to Campus*

Type of Technology	Yes	No
Cell phone without text messaging		
2001	66.0% (1,843)	34.0% (951)
2002	80.4% (2,721)	19.6% (663)
2006	26.5% (472)	73.5% (1,312)
Cell phone with text messaging		
2001	–	–
2002	31.1% (1,053)	68.9% (2,331)
2006	70.7% (1,262)	29.3 (522)
PDA/Palm device		
2001	–	–
2002	8.3% (280)	91.7% (3,104)
2006	2.2% (57)	97.8% (1,727)
Pager		
2001	4.2% (117)	95.8% (2,677)
2002	3.8% (128)	96.2% (3,256)
2006	0.4% (8)	99.6% (1,776)
Internet service at home		
2001	–	–
2002	88.7% (3,003)	9.0% (303)
2006	97.5% (1,720)	2.5% (44)

* In 2001 n = 2,794; in 2002 n = 3,384; in 2006 n = 1,784. Not all participants answered each question.

The information about cell phones is especially important when determining whether landlines are necessary in student housing. Housing provides a telephone jack but not a telephone for residents. In 2006 the question "Do you intend on bringing a landline phone with you?" was added to the survey. Housing staff believed this question would provide more information for decisions on landline installation in student housing. Of the 1,784 respondents, 823 (46.1 percent) noted that they would bring a landline phone with them to campus, and 961 (53.9 percent) indicated they would not.

In 2006 students were also asked to provide information about downloading files and file sharing. Table 4 provides the resulting data.

The survey questions dealing with downloading files and file sharing resulted in the acknowledgment that approximately 80 percent of students listen to music from files on the computer, while approximately 60 percent of students transfer music files to portable media. More than 75 percent of students noted they would be willing to pay a fee per semester for the ability to download music legally. Slightly under 40 percent would be willing to pay for educational downloads even though 74 percent believed educational music and video downloads would be useful.

Implications

As students continue to use technology in a variety of ways, instructors and administrators need to consider those uses in planning and making policy. Classroom technologies are only one part of the learning process, after all. Faculty and administrators must look outside the classroom, including more effectively utilizing the technologies students have in their possession. The survey data reported here affect university policy toward IT strategic planning and support the finding by Riley that "the growth of wireless computing has encouraged faculty to post course materials on the Web, enabling an 'any time, anywhere' collaborative learning environment."[18]

Survey results from the past several years show a strong increase in the use of personal computers by students arriving on campus and in ownership of laptop computers. Centralized open computer labs are fewer in number, while the university has increased its investment in wireless infrastructure to support mobile computing devices. The university is now considering options such as central technology lounges with wireless network access, recharging stations, and access to printers.

These changes also require the university to thoroughly examine existing security policies. Campus policies should be more inclusive and specific to laptops and other mobile technologies. Mobile technologies, for example, raise concern among security officers for their potentially damaging effects on university networks. As noted by the Campus Computing Survey, "campus IT officers continue to view network and data security as the single most important

Table 4

Downloading Files and File Sharing in 2006*

Question	Yes	No
Do you currently download music or video (motion pictures) from the Internet?	64.8% (1,151)	35.2% (624)
When downloading music do you: (check all that apply)		
Burn them to a CD	60.4% (1,077)	39.6% (707)
Transfer them to a portable device (i.e., MP3 player, PDA, or jump drive)	63.4% (1,131)	36.6% (653)
Listen to them from your computer	82.4% (1,470)	17.6% (314)
Do you ever purchase music from a service like Napster or iTunes?	49.2% (857)	50.8% (886)
If the university provided legal access to download music, would you download and pay for songs?	76.2% (1,345)	23.8% (419)
If you answered yes to the above questions, would you be willing to pay a fee of $10 to $20 per semester for this legal downloading service?	77.5% (1233)	22.5% (357)
What is more important to you, downloading music or video (motion picture)?		
Music	91.0% (1,588)	
Video	9.0% (158)	
If the university provided an educational use of video and music files in the classroom, do you think it would be useful?	74.3% (1,302)	25.7% (451)
If you answered yes to the above question, would you be willing to pay a fee of $10 to $20 per semester for this service?	39.5% (612)	60.5% (936)

* n = 1,784. Not all participants answered each question.

information technology issue confronting their institution over the next two to three years."[19] Laptops also require a more robust and comprehensive wireless network compared to the wired infrastructure already implemented on campus. Consequently, electrical requirements in university classrooms, housing, and common areas to recharge laptops will need upgrades.

Students using cell phones for local and long-distance services greatly reduce the income from such sources, making it difficult to justify the continued existence of phone services for a few individuals. The university is investigating stronger partnerships with cellular providers as a way to leverage investments in telecommunications.

One area easily overlooked is the limitation of 911 services with a cellular connection. Campuses might need to provide more widely distributed emergency phones for residence halls, classrooms, and outside areas to facilitate a quicker response to emergency situations. The University of South Carolina installed an outdoor public address system to alert students regarding emergencies and provides an extensive network of emergency telephones in key locations on campus.

The data provided through the annual residence hall computer and technology surveys prompted housing to terminate all landlines in residence halls, except those for live-in staff members, for fall 2007. By not installing these landlines, housing eliminated $1.4 million in expenses.

University faculty and technology support personnel need to be cognizant of the growth of digital music and how to leverage and use MP3 player technologies in the classroom. Legal ramifications grow with the increase in illegal downloads, and universities may need to become more proactive in providing technology orientations for students regarding legal matters related to technology. Providing legal alternatives for students at a reasonable price might be a viable solution for some institutions.

As universities collect larger technology fees, students will expect more personalized technology services in return. Universities must be ready to face this challenge and proactive in meeting the needs of the university as a whole, including the residential student body. Based on the survey results, the university issued a request for proposal for a music download service. The university has now partnered with Ruckus Network to provide free and legal downloading for students on all University of South Carolina campuses beginning in the fall 2007 semester. The system is in place, and students are being notified of its availability by e-mail. Over 4,000 students have signed up and downloaded music since the original notification. The university expects the numbers to grow even more following students' arrival on campus in August. In addition, the results prompted housing to evaluate the feasibility of offering premium cable channels and pay-per-view services to students in their rooms. Beginning in fall 2007, housing will add its first premium channel, HBO, to the cable television line-up.

The survey data also help faculty and administrators make decisions on classroom technologies to ensure compatibility with technologies students bring to campus. Many universities require laptops for incoming students; however, if the majority of students already bring laptops with them, is a mandate necessary? Or should universities simply suggest a particular type of laptop for students? The key is to keep current with technology and share data with students, faculty,

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and administrators to support effective decisions university-wide.

Conclusion

Several years of data from the residence hall computer and technology survey showed continuous growth in students bringing computers to campus. In only a five-year span, computer type shifted from largely desktops with a wired infrastructure to wireless laptops. Nearly every resident (99 percent) now brings a computer to campus.

Updated technology obviously drives part of this growth, but better use of technology in the classroom and in student housing and the advent of mobile applications probably also contribute. Consequently, both wireless networking and physical security of computers become important issues.

The changes identified between 2001 and 2006 indicated an increase in mobile technologies that in turn resulted in the university's quickly deploying a complete wireless cloud on campus. Instructional support personnel were reenergized in researching new ways of integrating laptops, tablets, and other devices in the classroom.

Landline telephone use, once a necessity in residence hall rooms, has dropped with the proliferation of cell phones. Long-distance services are becoming obsolete on campus.

Students spend more time with technology, causing potential liabilities for the university as both legal and illegal use rise. This study, however, suggests that students might be willing to pay for music downloads, which is the most urgent legal issue.

As technology changes and as students' uses of these technologies change, the university must respond fluidly and dynamically. Only by meeting students' technology needs can on-campus housing compete with off-campus housing options. e

Endnotes

1. M. Meline, "A New Campus Sign: No Vacancy," *Chronicle of Higher Education*, Vol. 50, No. 11, November 7, 2003, p. A41, <http://chronicle.com/weekly/v50/i11/11a04101.htm> (retrieved July 10, 2007).
2. University of South Carolina, Institutional Assessment and Compliance, Fact Books, 2007, <http://www.ipr.sc.edu/factbook/2007/university/Ufallen.htm> (retrieved July 10, 2007).
3. Student Committee on Undergraduate Education (SCUE), "The 2001 White Paper on Undergraduate Education," University of Pennsylvania, 2001, <http://dolphin.upenn.edu/~scue/Papers/White_Paper_2001/index.html> (retrieved July 10, 2007).
4. J. Benson, "St. John's University Outfits Students with the Technology Needed to Learn and Succeed," *T.H.E. Journal*, Vol. 31, No. 8, 2004, p. 38.
5. M. Villano, "Imagination on the Move," *Campus Technology*, June 24, 2005, pp. 32–37, <http://campustechnology.com/articles/40326> (retrieved July 26, 2007).
6. See results of the 2006 national survey of IT in U.S. higher education from the Campus Computing Project, "Wireless Networks Reach Half of College Classrooms; IT Security Incidents Decline this Past Year," October 2006, <http://www.campuscomputing.net> (retrieved July 10, 2007).
7. B. Wolff, "Laptop Use in University Common Spaces," *EDUCAUSE Quarterly*, Vol. 29, No. 1, 2006, pp. 74–76, <http://www.educause.edu/ir/library/pdf/eqm06113.pdf>.
8. C. Riley, "If You Build It, They Will Come," *EDUCAUSE Quarterly*, Vol. 28, No. 4, 2005, pp. 54–56, <http://www.educause.edu/ir/library/pdf/eqm0548.pdf>.
9. S. Carlson, "Are Personal Digital Assistants the Next Must-Have Tool?" *Chronicle of Higher Education*, Vol. 49, No. 7, October 11, 2002, p. 33, <http://chornicle.com/weekly/v49/i07/07a03301.htm> (retrieved July 10, 2007).
10. Information Technology Update, "Duke Freshmen Get iPods," *Techniques*, Vol. 79, No. 7, October 2004, p. 15.
11. V. Hallett, "Teaching with Tech: Podcasts, Back Channels, and Bookless Libraries Come to Campus," *U.S. News & World Report*, Vol. 139, October 9, 2005, pp. 54–58, <http://www.usnews.com/usnews/edu/articles/051017/17elearn.htm> (retrieved July 10, 2007).
12. B. Read, "Duke Stops Giving Students Free iPods but Will Continue Using Them in the Classes," *Chronicle of Higher Education*, Vol. 52, No. 36, May 12, 2006, p. 39, <http://chronicle.com/weekly/v52/i36/36a03901.htm> (retrieved July 10, 2007).
13. J. Graham, "Duke's Free iPods Will Go Just for Classes," *USA Today*, April 6, 2005, <http://www.usatoday.com/money/industries/technology/2005-0406-ipod-usat_x.htm> (retrieved July 26, 2007).
14. D. T. Chapman, "Strategic Planning for Information Technology," in *The 21st Century Community College: Technology and the New Learning Paradigm*, L. Johnson and S. T. Lobello, eds. (Mission Viejo, Calif.: League for Innovation in the Community College, 1996), pp. 65–70; and W. Holmes, "The Transforming Power of Information Technology," *Community College Journal*, Vol. 70, No. 2, 1999, pp. 10–15.
15. Information Technology Services, "ITS 2006 Annual Report," Northern Illinois University, <http://www.its.niu.edu/its/annualreport/36216its.pdf> .
16. S. Workman et al., (2006). "Get Connected: An Approach to ResNet Services," *EDUCAUSE Quarterly*, Vol. 29, No. 4, 2006, pp. 14–21, <http://www.educause.edu/ir/library/pdf/eqm0643.pdf>.
17. Y. Li, M. C. Sheely, and D. F. Whalen, "Contributors to Residence Hall Student Retentions: Why Do Students Choose to Leave or Stay?" *Journal of College and University Student Housing*, Vol. 33, No. 2, 2005, pp. 28–36, see p. 28.
18. Riley, op. cit., p. 54.
19. Campus Computing Project, op. cit., p. 1.

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