Technology Adoption and Ownership of IT

I am likely one of the least technologically advanced members of my generation. I don’t have cable TV, I was the last of my friends to get a cell phone, and also the last to upgrade to a smartphone. I did not have Internet access at home until two years ago, and have never owned an MP3 player, iPod, or any other similar device. I hope I do not skew your data!

—An undergraduate student

Key Findings

- Since 2006, about half of our survey respondents have said they “usually use new technologies when most people I know do,” which we categorize as mainstream technology adopters. Fewer fall at the ends of the spectrum, saying that they are skeptical or one of the last people they know to use new technologies (laggards or late adopters) or that they are among the first or usually use them before most people they know (innovators or early adopters).
- Female respondents have consistently assessed themselves lower on this technology adoption scale since we started asking. This year, half of male respondents indicated they were innovators or early adopters, versus just a quarter of female respondents.
- About half of respondents agreed or strongly agreed with the statement “When I entered college, I was adequately prepared to use IT as needed in my courses.” Just under a quarter disagreed or strongly disagreed, and another quarter were neutral.
- The composition of technology owned by students continues moving toward mobility, as more than 8 out of 10 respondents own a full-size laptop computer, while only half own a desktop.
- Slightly more than 1 in 10 respondents own a netbook computer, and only 3% own a dedicated e-book reader.
- Nearly all respondents (99%) own at least one computer, and more than a third own more than one.
- More than half say their newest computer, whether laptop, netbook, or desktop, is one year old or less, and 7 out of 10 own a machine two years old or less. Students from two-year institutions own proportionately more desktops and proportionately fewer laptops than respondents from four-year institutions.
- On average, respondents report spending 21.2 hours per week on the Internet for school, work, or recreation activities.
- Almost two-thirds of respondents own an Internet-capable handheld device.
- Among owners of Internet-capable handheld devices, in 2010, 43% report using the Internet daily, compared with 29% in 2009.

There are more than 18 million undergraduate college students in the United States today, and most of them come to campus with powerful computers in their pockets, purses, or backpacks. Portable devices such as laptops, netbooks, and smartphones have...
Students and Information Technology, 2010

ECAR Research Study 6, 2010

as much or more computing power than the typical desktop computer 10 years ago. Throw in e-book readers, electronic tablets, and handheld gaming and music devices with wireless Internet access and the average college student can do as much or more today while sitting in a coffee shop than such a student could have done a few years ago in the school’s computer lab or library. The rapid pace of technological advancement makes it difficult to determine how IT-savvy students are compared with their counterparts from previous years. A large percentage of today’s incoming freshmen do not think twice about using their mobile phone to view the latest viral YouTube video or to send a text message embedded with freshly taken photos to friends across the room or across the globe. But many of this year’s seniors probably thought these functions were cost-prohibitive and reserved for the technically advanced stereotypical computer geek when they entered school four years ago.

The relentless pace of such change makes determining how proficient students are with IT a difficult endeavor, but it is clear that now, more than ever, students must use a considerable amount of IT in order to get the most out of their college experience. Students apply to their institution, register for classes, pay their tuition, and keep up with their school’s athletic teams online. They must navigate electronic databases in search of scholarly material and use a course management system to submit assignments, monitor their grades, and communicate with faculty. In “The Digital Identity Divide: How Technology Knowledge Impacts College Students,” Joanna Goode writes, “Knowing how to utilize the technological ecosystem of university life is certainly critical for academic success.” However, Goode concludes “there are rarely explicit technology prerequisites for college entrance, resulting in a range of student technology knowledge among the student population.” Indeed, our research finds that college students are as diverse in their ownership and use of IT and opinions of their own technical skills as they are in the many other characteristics that experts analyze when attempting to define the “typical” college student.

Exploring the range of students’ technology skills and perceptions is one of the goals of the ECAR study of undergraduates and IT. This is our seventh year of the study, and it continues to reveal remarkable changes and surprising consistency in students’ ownership, expertise, and opinions regarding the use of IT that has occurred during this short period. In this chapter, we explore student respondents’ technology adoption practices as related to their ownership and use of computers and mobile devices. In subsequent chapters, we look more closely at respondents’ IT activities, their perceived skill levels with various technologies, and their use of technology in the academic environment.

Student Technology Adoption Trends

How individuals decide to adopt a particular technology and the time frame involved has been a subject of research for many years. The technology adoption process affects many aspects of everyday life and has become increasingly more important in higher education as technology literacy is integrated into every facet of the college experience. Since 2006, ECAR has studied undergraduates’ technology adoption practices using a scale developed by Everett Rogers and published in his 1962 book Diffusion of Innovations. Rogers’s framework proposes five categories of adopters—innovators, early adopters, early majority, late majority, and laggards—typically illustrated as a bell curve distribution. Subsequent research employing innovator-to-laggard models has found that adopting and engaging with new technology is associated with many factors, including cultural influences, financial capa-
bility, perceived difficulty versus perceived benefits, past experience with new technology, and gender.\textsuperscript{3}

In our student survey, respondents were given a set of statements about technology adoption and asked to choose the one that best described them. ECAR then mapped their responses into an adapted Rogers technology adoption model (see Table 4-1). Over the years, we have found that student responses about technology adoption are often associated with their use and experience with IT both generally and in the academic context.

Every year that we have asked these questions, overall student responses have distributed into a rough bell curve, and this year is no different: about half (49.3\%) of all respondents identify themselves as mainstream adopters (see Figure 4-1), while the percentages drop off for earlier and later adoption categories. This pattern has been complicated, however, by a persistent gender difference, and once again this year about half of the male respondents see themselves as innovators or early adopters (52.0\%), while just a quarter of females (25.6\%) choose these categories.

<table>
<thead>
<tr>
<th>Table 4-1. Technology Adoption Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Which best describes you?</strong></td>
</tr>
<tr>
<td>I am skeptical of new technologies and use them only when I have to.</td>
</tr>
<tr>
<td>I am usually one of the last people I know to use new technologies.</td>
</tr>
<tr>
<td>I usually use new technologies when most people I know do.</td>
</tr>
<tr>
<td>I like new technologies and use them before most people I know.</td>
</tr>
<tr>
<td>I love new technologies and am among the first to experiment with and use them.</td>
</tr>
</tbody>
</table>

Figure 4-1. Respondent Technology Adoption, by Gender and Overall

- Males (N = 13,579)
- Females (N = 22,641)
- All students (N = 36,220)
The influence of gender on new technology adoption has received a significant amount of attention. A few studies claim the gender gap is lessening as more people are exposed to and using technology, but most research supports the idea that social influences play a much stronger role in technology adoption for females than males. Men appear to be more strongly influenced by their own attitudes toward using new technology, while women’s decisions tend to be driven by their perception of others’ beliefs that they should or should not adopt—findings that are consistent across income, education, and computer self-efficacy levels.4 The ECAR technology adoption results are also potentially influenced by the tendency of women to assess their technical skills lower than men, as other research has found.5

**Preparedness for College-Level IT**

Our technology adoption scale is associated with many other items that we asked about, as we’ll note in several sections of this study. For instance, this year we asked students for the first time whether respondents agreed with the statement “When I entered college, I was adequately prepared to use IT as needed in my courses.” We found that their technology adoption profile had a significant influence on their opinion (see Figure 4-2). Half (49.5%) of respondents overall agreed or strongly agreed. However, almost three-quarters of innovators (74.1%) agreed or strongly agreed, versus just over one-quarter of the students who categorized themselves as laggards (27.2%). Mainstream adopters, who constitute about half of all respondents, also indicated they

![Figure 4-2. Preparedness for College-Level IT, by Technology Adoption](image-url)
may have reservations about their technological preparedness, as nearly a quarter (24.1%) disagreed or strongly disagreed with the statement.

Because knowledge of and comfort with technology are implicitly required for both college and future career success, Goode, an expert on how technology mediates the educational experiences of high school and university students, proposes a reconceptualization of how to study the varying factors that create a potential digital divide. Concurring with the many studies showing that gender and other socioeconomic factors play a part in creating disparities in technology access and technology knowledge, Goode suggests that students come to college with a “technology identity” that creates both academic opportunities and obstacles because their previous relationship with technology tends to be reinforced by their university. Those who identified themselves as fluent and excited or even infatuated with technology continued to feel this way when they entered college. Unfortunately, those whose technology identity was shaped by feeling challenged or not fluent due to lack of access struggled to overcome their shortcomings.

“For many college students,” says Goode, “not having a strong technology identity is a product of an unequal high school education and disparities in home resources, yet the consequences of one’s technology identity have a powerful influence on the attitudes and decisions students make regarding their academic and life plans.” Goode says the positive news is that the dynamic nature of a technology identity allows for beliefs to shift over time as students gain new life experiences, particularly if universities offer adequate technology support services. Our findings on technology adoption and preparedness for college-level IT do not address respondents’ prior experiences with technology in high school or at work, but the fact that almost a quarter of respondents (22.7%) did not agree with the statement about preparedness suggests that institutions should develop strategies to identify and nurture these students. If Goode is correct in her assertion that technology identities can shift over time, institutional efforts to intervene with those students could enable them to catch up to their peers and improve their overall college experience.

**Technology Ownership**

Since we began this study in 2004, ECAR has found that computers are omnipresent on campus and prevalent at home, but the mix of computer equipment student respondents tell us they own has changed along with the rapidly changing technology available to them. In 2004, we asked respondents if they owned a desktop (62.8%), a laptop (46.8%), a PDA (11.9%), a “cell or digital phone” (82.0%), or a smartphone (1.1%), which we defined as a “combination cell phone and PDA device.” Over the next five years the equipment we asked about changed as the mobility of newer, smaller, faster devices came at less of a premium and moved through the technology adoption cycle from innovator to mainstream to laggard. Ubiquity of ownership or convergence of many of the devices caused some of them to fall off our list and affected our definitions over time.

In 2009 and this year, we asked students if they owned “a handheld device that is capable of accessing the Internet (whether or not you use that capability)” and gave as examples the “iPhone, Treo, BlackBerry, other Internet-capable cell phone, iPod touch, PDA, Pocket PC, etc.” (In this study we refer to these as “Internet-capable handheld devices” or “handheld devices.”) Just under two-thirds of respondents (62.7%) indicated that they owned one, although the number may actually be a little higher because some respondents told us they weren’t sure whether their handheld devices were capable of accessing the Internet (see Figure 4-3).
This year, in addition to asking whether students owned Internet-capable handheld devices, we also asked about personal dedicated e-book readers such as the Amazon Kindle, Sony Reader, Barnes & Noble nook, etc., and clarified that this category did not include iPhones or other devices whose primary function is not as an e-book reader. We continued asking questions from past surveys by asking about desktop computers, but we separated laptops into two categories: a personal full-sized laptop computer and a personal small, lightweight netbook computer. As could be expected, we found that the composition of technology owned by students continues moving toward mobility.

It is not surprising that so few students tell us they own e-book readers (3.1%). Several university pilot programs with different e-book readers have revealed functionality issues such as battery life, inability to quickly note or highlight text, clumsy book navigation, and complex copyright and digital rights management (DRM) technology as stumbling blocks for effective use in the academic environment. Unlike the physical book it is attempting to replicate, it is nearly impossible to share an e-book with someone, even if for just a few days. Expressing anger at the restraints that publishers put on their e-books, one student commented in the open-ended question at the end our survey, “I despise e-books that have DRM on them, especially when I lose access to them at some point... they are scams.”

Of course, by the time you read this study, the newborn gorilla in this market may have achieved its proverbial 800-pound size. On May 3, 2010, Apple announced that it sold its one-millionth iPad just 28 days after its introduction, and iPad users had already downloaded more than 12 million apps as well as more than 1.5 million e-books from the new iBookstore. In comparison, about 2.5 million e-readers were sold in all of 2009. Barely two months after Apple’s impressive launch, students with iPads already had an impact on campuses around the country. Several schools found that iPads had problems connecting to their networks, and more than a few universities expressed concern about potential bandwidth issues as more and more of these devices show up in students’ backpacks. Though the iPad was released...
after we placed our survey in the field, a few students commented in open-ended responses that they were eager to use them. One student wrote, “Wish I had an iPad for textbooks … but it’s cost-prohibitive right now!” Another wrote, “Since the new iPad was just released by Apple, courses should start to be able to be accessed on them.” It is too soon to say just how great an effect the iPad and other similar devices will have on higher education, but it seems likely we will need to adjust our survey questions in the coming years to find out.

### Desktops, Laptops, and Netbooks

The type, age, and numbers of computers owned by students have shifted during the years ECAR has conducted the student study. In 2004, 93.4% of respondents owned either a desktop or a laptop computer. This year, 98.6% owned at least one desktop, laptop, or netbook computer, and more than a third told us they owned more than one of these types of computers (see Figure 4-4). Desktop ownership declined by more than 25 percentage points from 2006 to 2009, while laptop ownership increased by nearly as many points. We find about the same percentage of ownership of desktops among all respondents this year (45.9%) as last year (45.8%); however, a lower percentage of respondents told us they owned laptops this year (83.8%) than last year (87.8%). This difference may be explained by the fact that in 2010 we distinguished for the first time between “full-sized” laptops and “small, lightweight” netbooks. This year, 89.3% own either a laptop or a netbook, which may be a more comparable number to last year’s percentage of students who said they owned laptops.

Last year we speculated that if student PC ownership reflected industry trends in desktop sales globally, the appearance of inexpensive netbooks might fuel the ongoing decline in desktop ownership by lowering the overall price premium for portable computers. Many experts were saying the economic downturn was “kicking the desktop PC industry while it’s down” and that netbooks would likely cannibalize both the desktop and full-sized laptop markets. That may be the case for laptops, but our findings reflect a leveling-out of desktop ownership. Over the last four years, while overall desktop ownership gradually declined, the percentage of students who own a desktop one year old or less has not declined to the same degree. A fairly stable

![Figure 4-4. Types of Computers Owned](N = 35,755)
percentage of students own newer desktops: of the respondents who owned them last year, 19.2% had a desktop that they said was a year old or newer, compared with 22.0% of those who own them this year (see Figure 4-5).

As in previous years, IT administrators concerned about supporting obsolete student equipment can take comfort in the relatively up-to-date profile of computer ownership. More than half (55.7%) of respondents say their newest computer, whether laptop, netbook, or desktop, is one year old or less, and 7 out of 10 (70.7%) report owning a machine two years old or less. However, many respondents own older computers, including 16.9% whose newest computer is four years old or older, and nearly half of desktops owned (48.3%) are four or more years old.

We have observed some fairly consistent demographic characteristics when looking at computer ownership over the years. For instance, in this year’s responses, while we find no meaningful difference between freshman and senior respondents regarding their ownership of desktops, proportionately more students from two-year institutions told us they owned desktops than did respondents from four-year institutions (see Figure 4-6). More than two-thirds (68.7%) of the two-year respondents own desktops, including more than half (52.9%) who say that those desktops are two or more years old (this equates to 78.3% of desktop owners at two-year institutions). In addition, at four-year institutions, substantially more students who live off campus own desktops (50.6%) than do those living on campus (31.2%). Overall, male respondents are slightly more likely to own desktops (53.4%) than are female respondents (41.4%).

As would be expected, freshmen are more likely than seniors or students from two-year institutions to own new laptops (less than one year old). We find no meaningful difference between males and females. Three out of 10 respondents from two-year institutions do not own a laptop (30.9%), and more than a third (36.0%) say they have a laptop that is two or more years old. While 84.2% of senior respondents own laptops, these machines, as would be expected, are older: more than half of all seniors (58.3%) own laptops that are two or more years old. Netbooks are so uniformly rare that there is no meaningful variation in ownership by other factors.
Industry experts concur that netbooks have cannibalized laptop sales to a degree, but many say that Apple’s iPad will have a more significant impact on both netbooks and laptops. While few iPad owners are purchasing them to replace their traditional computer, sales of netbooks, priced from $200 to $500, slowed markedly in the first quarter of 2010, and most attribute this decline to the launch of the iPad. Indeed, our data seems to indicate that netbooks have not caught on in significant numbers among college students (refer to Figure 4-3). It will take several more years of tracking to determine the ultimate fate of the desktop, laptop, netbook, and iPad or tablet PC market and how that plays out on campus. If the relatively slow integration of netbooks and e-book readers into the undergraduate experience is any indication, students are resisting industry marketing and may be healthily skeptical of these newer devices.

Ownership of Internet-Capable Handheld Devices
In the 2009 ECAR student study, we focused on student ownership of Internet-capable handheld devices and found that these devices already had an impact on campus, a fact that anyone walking through the student union could likely corroborate. About half of last year’s respondents (51.2%) owned an Internet-capable handheld device, and another 11.8% told us they planned to purchase one in the next 12 months. Not surprisingly, we found ownership of Internet-capable handheld devices continued to grow this year as nearly two-thirds (62.7%) own one, and demand does not appear to be weakening. More than 11% still say they intend to purchase one in the next 12 months (see Figure 4-7).

Many possible factors influence the likelihood of owning an Internet-capable handheld device, such as price of the device, being locked into an existing cell phone contract, or not finding a need for the functionality; but it appears some barriers to ownership are falling. Last year, more than a third of respondents (35.5%) told us they did not own an Internet-capable handheld device and did not plan to purchase one in the next 12 months, whereas just a quarter of this year’s students (24.6%) responded this way.
If college students follow global trends, we can anticipate even more growth in Internet-capable handheld device ownership and use over the next few years as the perceived cost-benefit improves. According to International Data Corporation (IDC), growth of the worldwide converged mobile device market (commonly referred to as smartphones, a segment of what we classify as Internet-capable handheld devices) more than doubled that of the overall mobile phone market in the first quarter of 2010. More growth is expected as a result of greater awareness, increasingly affordable data plans, and the global economic recovery.

Technology adoption (refer to Table 4-1) is a factor in device ownership: those who own, or plan to purchase, an Internet-capable handheld device are somewhat more likely to be early adopters and innovators than those who do not own or plan to own a device (see Figure 4-8). However, we are seeing a shift
as the students who said they didn’t own but planned to purchase an Internet-capable handheld device within the next 12 months were slightly more likely to be early adopters or innovators last year (41.6%) than this year (34.4%). Correspondingly, there was a larger percentage of students who identified as late adopters or laggards among those who said they didn’t own and didn’t plan to purchase in this year’s responses (26.6%) versus last year’s (18.9%), perhaps indicating that the population of students we are surveying is moving fairly rapidly through the adoption cycle of these devices.

Our findings may be supported by research from the Nielsen Company, which, like IDC, projects very strong growth in smartphones. Just under half of respondents to a Nielsen survey indicated that their next mobile phone will be a smartphone, and Nielsen believes that continued falling prices and increasing capabilities of these devices along with an explosion of applications have created the beginning of a groundswell. According to Nielsen, this increase will be so rapid that by the end of 2011 there will be more smartphones in the U.S. market than feature phones.16

Interestingly, more than 7 of 10 who don’t own and don’t plan to own an Internet-capable handheld device in the next 12 months view themselves as mainstream or early adopters, but the data reveal no demographic associations, including age, that distinguish this group. It may be that these students still feel that there are plenty of other ways to access the Internet or the costs are still prohibitive for them. Or, we may find this group continuing to shrink if the groundswell of smartphone ownership that is predicted by industry experts comes to fruition.

Hours Online

Respondents vary widely in how much time they spend each week actively doing Internet activities for school, work, and recreation (see Figure 4-9). About a third (32.7%) are online 10 hours or less each week, and the same percentage (32.7%) report spending 11 to 20 hours per week online. At the high end of time spent online, 9.1% of respondents spend more than 40 hours per week on the Internet. The overall mean of time spent actively on the Internet is 21.2 hours per week, while the median is 16 hours per week for this year’s respondents.17 In the responses to the survey’s open-ended question, a few students expressed concern about the amount of time they spend online for both school and nonschool activities. One wrote, “While I enjoy using IT, I also feel that I spend too much time

![Figure 4-9. Hours per Week Actively Doing Internet Activities for School, Work, and Recreation (N = 28,413)](image-url)
online, and that negatively affects my mental health; but it is difficult to decrease my usage because of school.” Another had a similar sentiment: “My experience is that IT outside of courses is highly distracting, and I often end up getting more stressed out than I need to because I wasted too much time online.”

Table 4-2 reveals differences in the amount of time spent per week using the Internet for the majors students reported in our survey. Engineering majors indicated they spend the most time online, with a mean of almost 25 hours per week; education majors reported a mean of just over 18 hours per week. We found no significant differences in online hours based on class standing, GPA, age, or gender.

Respondents who identify themselves as early adopters or innovators spend more time actively doing Internet activities than those who identify themselves as late adopters or laggards (see Table 4-3). While our technology adoption framework does not measure respondents’ comfort or skill with technology, it stands to reason that the time spent using technology is related to an individual’s comfort with using it. This is supported by other research studies that have found that the amount of time and experience using a computer has a direct positive relationship with an individual’s self-perceived experience and promotes a more positive attitude toward technology.  

**Frequency of Using the Internet from a Handheld Device**

Corresponding with the growth in worldwide smartphone ownership, Internet access via handheld devices is growing. According to the online audience measurement service

<table>
<thead>
<tr>
<th>Major</th>
<th>N</th>
<th>Mean Hours per Week</th>
<th>Median Hours per Week</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>2,504</td>
<td>24.6</td>
<td>20</td>
<td>20.19</td>
</tr>
<tr>
<td>Physical sciences, including math</td>
<td>1,467</td>
<td>23.5</td>
<td>20</td>
<td>19.22</td>
</tr>
<tr>
<td>Fine arts</td>
<td>1,917</td>
<td>22.1</td>
<td>18</td>
<td>19.63</td>
</tr>
<tr>
<td>Business</td>
<td>4,631</td>
<td>21.9</td>
<td>17</td>
<td>18.68</td>
</tr>
<tr>
<td>Social sciences</td>
<td>4,544</td>
<td>21.9</td>
<td>18</td>
<td>18.12</td>
</tr>
<tr>
<td>Humanities</td>
<td>2,402</td>
<td>21.8</td>
<td>18</td>
<td>16.66</td>
</tr>
<tr>
<td>Life/biological sciences, including agriculture and health sciences</td>
<td>5,062</td>
<td>19.7</td>
<td>15</td>
<td>16.75</td>
</tr>
<tr>
<td>Education, including physical education</td>
<td>2,454</td>
<td>18.1</td>
<td>15</td>
<td>15.70</td>
</tr>
<tr>
<td>Total (includes “undecided” and “other” responses)</td>
<td>28,413</td>
<td>21.2</td>
<td>15</td>
<td>18.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology Adoption Category</th>
<th>N</th>
<th>Mean Hours per Week</th>
<th>Median Hours per Week</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laggard</td>
<td>1,348</td>
<td>17.1</td>
<td>12</td>
<td>16.57</td>
</tr>
<tr>
<td>Late Adopter</td>
<td>2,906</td>
<td>17.6</td>
<td>14</td>
<td>15.86</td>
</tr>
<tr>
<td>Mainstream Adopter</td>
<td>13,963</td>
<td>19.8</td>
<td>15</td>
<td>16.20</td>
</tr>
<tr>
<td>Early Adopter</td>
<td>6,995</td>
<td>23.4</td>
<td>20</td>
<td>19.34</td>
</tr>
<tr>
<td>Innovator</td>
<td>2,964</td>
<td>28.4</td>
<td>20</td>
<td>24.84</td>
</tr>
<tr>
<td>Total</td>
<td>28,176</td>
<td>21.2</td>
<td>16</td>
<td>18.35</td>
</tr>
</tbody>
</table>
comScore, in an average month during the period from December 2009 through February 2010, browsers were used by 29.4% of U.S. mobile subscribers, up 2.4 percentage points from the previous three-month period, and 27.5% of subscribers used downloaded applications (up 1.8 percentage points over the same period). Much of this growth was driven by increasing mobile access of social networking sites or blogs, up 2.9 percentage points to 18.0% of mobile subscribers. 19

ECAR findings seem to reflect this rapid growth in use of the mobile Internet. When we asked students who owned Internet-capable handheld devices this year how often they used their device to access the Internet, two-thirds (66.6%) told us they access it weekly or more often, and more than 4 in 10 (42.6%) said they use it daily, compared with just half (49.5%) who used it weekly or more often and 29.0% who used it daily in 2009 (see Figure 4-10). We also found a drop in the percentage of device owners who said they never use the Internet from their device even though it has the capability (35.4% in 2009 versus 22.1% in 2010).

As with ownership of Internet-capable handheld devices (refer to Figure 4-8), technology adoption is associated with time spent using the Internet from a handheld device. Those who use the Internet from their handheld device daily are more likely to be early adopters or innovators than are those reporting less frequent use. A majority of those who report using the Internet weekly or less often are mainstream adopters, and those who say they never use the Internet capability had the highest proportion of laggards and late adopters of all the use frequency categories.

While these ownership and use numbers appear poised to continue to grow, it is important to note that in 2010 about a quarter of respondents (24.6%) neither owned nor planned to purchase a handheld device in the next 12 months, and 22.1% of those who do own a device never access the Internet with it (refer to Figure 4-7 and Figure 4-10). We are unable to tell whether cost, perceived lack of benefits, or other reasons are preventing these students from accessing the mobile Internet. Other than technology adoption, we found no common demographic or other characteristic of these nonusers, including the number of hours they spend on the Internet or the age or type of their other equipment. It may be that these students are part of the group identified by the Pew Internet & American Life Project as Americans who do not feel, or have yet to feel, the “pull of mobility” into the digital world. 20

![Figure 4-10. Frequency of Using the Internet from Handheld Device, 2009 and 2010*](image)

* Includes only respondents who own an Internet-capable handheld device.
The Changing Portrait of Student Mobility

Like the rest of the world, students are becoming more and more invested—financially and personally—in using the Internet from handheld devices. In July 2009, Apple announced that customers had downloaded more than 1.5 billion applications from the company’s App Store during its first year, and as previously discussed, nine months later the company sold more than 1 million iPads in less than 30 days, adding even more potential App Store customers. This extraordinary growth in mobile Internet technology is expected to continue. According to a report issued by Morgan Stanley in December 2009, the mobile Internet is ramping up significantly faster than desktop Internet did, and they believe more users may connect to the Internet via mobile devices than through desktop PCs within five years.

What does this mean to higher education? Last year’s ECAR study Spreading the Word: Messaging and Communications in Higher Education, based on survey data from mid-2008, found only half of respondent institutions reporting they had adapted any preexisting web-based services for mobile services, and 6 in 10 said they had developed no new services. Our research indicates significant growth in undergraduate ownership and use of handheld devices to access the Internet, and campus IT departments should be preparing for this rising tide of mobile-Internet-using students—and their rapid pace of adoption.

Last year we observed that students were moving into the mobile Internet in complex, nuanced ways and identified four emerging types of student adopters of the mobile Internet, as shown in Figure 4-11:

- power users who owned and used their devices to access the Internet weekly or more often,
- occasional users who owned devices but used them to access the Internet monthly or less frequently,
- potential users who owned but didn’t use their device or did not own a device but planned to purchase one in the next 12 months, and
- nonusers who did not own a device or plan to purchase one in the next 12 months.

The mix of user types among this year’s respondents shows that students are adopting the mobile Internet in ways that we would expect for a maturing technology. Figure 4-11 indicates an increase in power users and a decrease in nonusers from 2009 to 2010, demonstrating the progress of these devices through the technology adoption cycle.

Looking at these user types by their overall level of technology adoption supports this idea, as the percentage of power users who identify themselves as innovators or early adopters decreased from 2009 to 2010, and among nonusers we see that the proportion of late adopters or laggards is more pronounced in 2010 (see Figure 4-12). From these findings it would seem that using the Internet from handheld devices is becoming more of a mainstream activity as power users are close to becoming a majority of the student population and a lower percentage of these power users are early adopters.

In 2008, a poll conducted by the Wi-Fi Alliance confirmed what was already becoming obvious to higher education IT departments: 9 out of 10 college students considered Wi-Fi to be as essential to their academic lives as classrooms and computers. In fact, 48% of the students polled light-heartedly said they would give up beer before giving up Wi-Fi access, and nearly three-quarters said they would wear their school rival’s team colors for a day rather than go without wireless access. Students said they used Wi-Fi in the classroom to get a head start on assignments before a class was finished, but more than half admitted to using wireless devices to check social networking websites, send e-mail,
perform other non-class-related activities. With near-ubiquitous ownership of wireless devices—including laptops, netbooks, and smartphones—as indicated in our study, it is important for higher education IT to keep up with the demand for Wi-Fi access and understand the impact 3G and 4G cell networks may have on this demand.

Mobile learning tools are becoming more prevalent, and more and more students are coming to campus expecting to use the mobile Internet in support of their education. According to ECAR’s messaging and communications study, as of summer 2008 many institutions were not prepared for a significant base of handheld device users. As we
Figure 4-12. Internet-Capable Handheld Device Users, by Technology Adoption, 2009 and 2010

wrote in last year’s study, this may be reason for concern if student adoption far outpaces institutional support capability.

Endnotes
8. This change in language may have had an impact on how students interpreted the question, because in 2009 the combined percentage of those who owned an Internet-capable handheld device (52.0%) or planned to purchase one within the next 12 months (11.8%) was less than in 2008 (66.1% and 5.3%, respectively). We were unable to determine whether the decline was a result of this change in our survey, the students are more or less familiar with the functionality of their devices and thus more accurate in their responses, or a true decline occurred in ownership of Internet-capable handheld devices in the 2009 respondent population. For the most recent survey text and location of the question, see Appendix B. For comparison, previous ECAR surveys may be found at http://www.educause.edu/ECAR/ResearchPublications/SurveyInstruments/1004.


12. From 2006 to 2009, desktop ownership declined from 71.0% to 44.0% while laptop ownership increased from 65.4% to 88.3%. This was among only those institutions that participated every year from 2006 to 2009 (see Chapter 4 in the 2009 study).


17. The question asked in the survey was “Approximately how many hours each week do you spend actively doing Internet activities for school, work, or recreation?” with a dropdown list including “Less than 1” and 1 to 168 in 1-hour increments. A large percentage (23.1%) of students did not answer this question this year. Previous years’ respondents did not have this proportion of missing responses, so we believe the issue is related to the position of the question within the survey. Analysis of the data for those who did respond is comparable to that for previous years, and we could find no demographic or other factor that distinguished those who did answer versus those who skipped the question, so we chose to report the findings this year.


