

ECAR
NATIONAL STUDY OF
UNDERGRADUATE STUDENTS
AND INFORMATION TECHNOLOGY
2011



EDUCAUSE

**CENTER FOR
APPLIED RESEARCH**

CONTENTS

Foreword	page 3
Executive Summary	page 4
Key Findings	page 7
Observations, Opportunities, and Recommendations	page 29
Appendix: Methodology	page 33

AUTHORS

Eden Dahlstrom, EDUCAUSE Center for Applied Research

Tom de Boor, Grunwald Associates LLC

Peter Grunwald, Grunwald Associates LLC

Martha Vockley, Grunwald Associates LLC and Vockley•Lang

Foreword by **Diana Oblinger**, EDUCAUSE

Citation for this work:

Dahlstrom, Eden, Tom de Boor, Peter Grunwald, and Martha Vockley, with a foreword by Diana Oblinger. *The ECAR National Study of Undergraduate Students and Information Technology, 2011 (Research Report)*. Boulder, CO: EDUCAUSE Center for Applied Research, October 2011, available from <http://www.educause.edu/ecar>.

EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

The mission of the EDUCAUSE Center for Applied Research is to foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education. ECAR will systematically address many of the challenges brought more sharply into focus by information technologies.

Design: Judith Lang

Copyright 2011 EDUCAUSE. CC by-nc-nd

Foreword

SECTION 1



We look to students as harbingers of the future. Information technology is interwoven into their lives, not something separate. Students are customers of our institutions, as well. We seek to attract them, serve them, and earn their satisfaction. Of course, they are also learners, who need education and support no matter how technology savvy they might be.

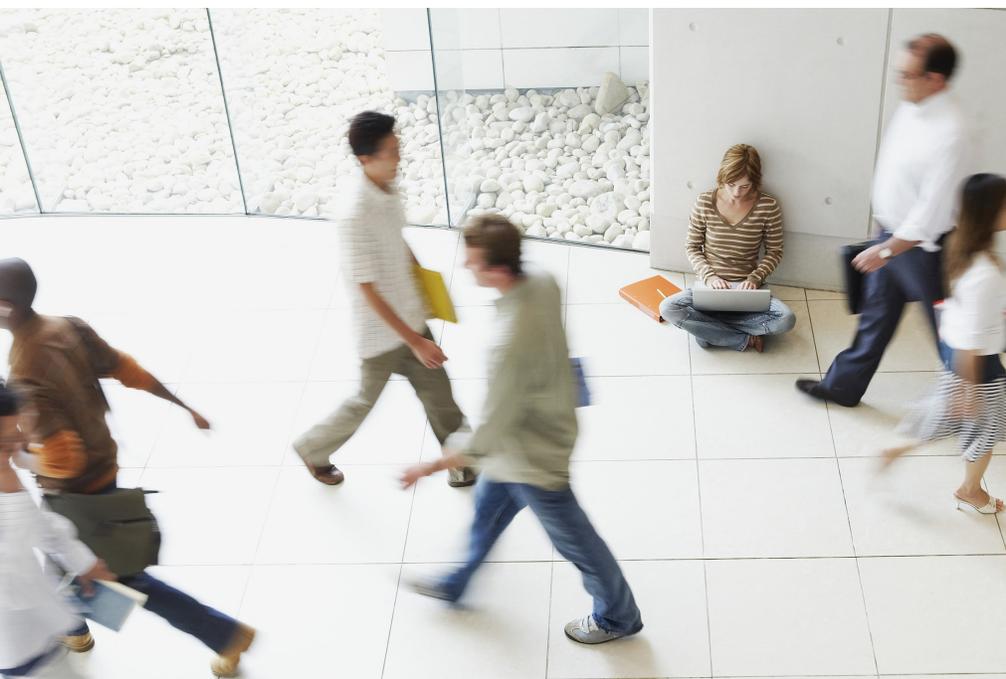
The ECAR Student Technology Study looks at student use and perceptions of technology. While no single study can mirror results you might find on your campus, the 2011 study used a stratified random sample of students so you can extrapolate these results to higher education. In the report differences among student populations are highlighted (e.g., older students, community college students, etc.). Not all students are alike.

The common assumption that students are technology gurus is challenged in the study. The majority of students are not advanced technology users. As you would expect, use of technology, and its perceived value, varies by institution type and student age. And, whether an application or device is high-tech or low-tech, convenience drives student technology use and perceptions.

For institutions looking for advice about where to invest, new isn't necessarily better. Students' perception of an institution's technology is based on how well faculty use IT, not how cutting edge the technology is.

Many institutional uses of technology are linked to students, whether services (registration, grades, library access) or learning or recreation. To serve students well, it is important to listen to them directly. The student technology survey shares their voice with our institutions.

Explore the findings. Compare them to your institution. Make better decisions and ask better questions. Understanding student use of technology will help us serve students, and our institutions, better.

A handwritten signature in blue ink that reads "Diana Oblinger".

Diana Oblinger
President and CEO
EDUCAUSE

Executive Summary

SECTION 2

If there is one resounding message about undergraduate perceptions about technology in higher education, it is this: Technology could be used much more strategically to engage students in academic life.

This report highlights key findings from a national study of undergraduates on their ownership, use, and value of technology for personal and academic purposes, along with observations, opportunities, and recommendations from the findings for higher education institutions.

Technology Ownership

Most students come to campus with multiple technology devices—a majority of students own about a dozen—and they use these devices for a broad assortment of activities, both personal and academic. Students have a clear preference for smart, mobile devices (nearly nine in 10 students own laptops, more than half own smartphones, and one in 10 owns an iPad or other tablet), but a majority of students are still attached to “standard issue” technology, such as printers and desktop computers, as well.

Technology Use and Value

The major academic benefits of technology encompass four areas:

1. Technology gives students easy access to resources and helps them dispense with administrative tasks and keep track of academic progress.
2. Technology makes students more productive.
3. Technology helps students feel connected.
4. Technology can make learning a more immersive, engaging, and relevant experience.

The average undergraduate uses a broad assortment of software for academic or personal purposes, ranging in popularity from e-mail, text messaging, and word processors to virtual worlds, geotagged environments, and speech recognition software (used by one in seven students). But a surprising number of students say they are not fully confident that they have the core software skills to meet their needs—and they wish they had more specialized software skills.

Students cite a number of technologies as “extremely valuable” to their academic success. There is a strong correlation between the technologies that students value most and the technologies their instructors use—and use effectively—to teach, mentor, and communicate. On the other hand, students say, many instructors need help getting technology to work successfully, and while they give their professors high marks for

There is a strong correlation between the technologies that students value most and the technologies their instructors use—and use effectively—to teach, mentor, and communicate.

their use of presentation devices, when it comes to devices that inspire participation or interactivity, not so much. More than half feel they know more about technology than their instructors, and many of the technologies that professors use effectively are nevertheless ones students still wish they would use more often.

Substantial majorities of students say their institution delivers most basic technology services successfully, such as offering online course registration; making grades, transcripts, and financial aid information available online; and offering online library resources. In students' eyes, effective, frequent, and seamless use of technology by instructors characterizes institutions that make effective use of technology. Fewer than a quarter of students strongly support the view that their institution's instructors make effective, frequent, or seamless use of technology.

When it comes to technology effectiveness, there are no "magic bullets" in terms of which technologies are used or how much they are used, and the differences that do exist are often fairly mundane, as are the technologies students value most and wish their instructors used more often. But the impact of effective technology use by instructors, in particular, appears to be substantial, with students who say their instructors make effective use of technology also significantly more likely to agree that technology provides every potential educational benefit tested, including all the ways in which technology can make learning a more engaging and relevant experience.

There are differences in how students experience technology in different Carnegie Classification institutions. In general, for example, associate's college students are less likely than students at doctorate-awarding institutions to use a number of different technologies—and associate's college students are less comfortable with many technologies as well. Associate's college students also generally report their instructors and institutions use less technology, but these students give their institutions higher marks on the delivery of a number of basic services, and they feel their instructors are more effective and competent in their use of the technologies they do use.

Technology for Connecting, Relationships, and Learning Online

The role of social networking tools for academic purposes is complicated. Many students say they are comfortable using social networking as a way to communicate and connect with other students, and even professors, about coursework. Some students draw a line between their academic and social lives, however, saying they like to keep them separate. One consistent finding is that e-mail remains a potent form of communication, both widely and frequently used—and the tool students most wish instructors would use more often.

Finally, students prefer—and say they learn more in—classes with online components. More students prefer a blended learning environment of seminars and other smaller classes with some online components

to any other configuration of face-to-face and online options. Even large lecture classes are more desirable with some online components.

Observations, Opportunities, and Recommendations

There are indications that technology could deliver more pronounced benefits both for students and for institutions. Already, students own and use an array of technologies—yet institutions and instructors do not fully harness them to create opportunities for more varied, inspiring, and beyond-the-classroom learning experiences.

Based on the study findings, this report offers 11 recommendations for action that could lead to more strategic use of technology to address top challenges, including improving student retention and attainment, closing achievement gaps, and meeting the needs of diverse student populations. ◆



Key Findings

TECHNOLOGY OWNERSHIP

SECTION 3

Drawn to Hot Technologies, But Reliant on More Traditional Devices

Students own many different kinds of technology devices—and their clear preference is for small, mobile devices that fit in a pocket or backpack and go with them everywhere. A majority of students own a laptop (87 percent), a USB thumb drive (70 percent), an iPod (62 percent), a smartphone (55 percent), a digital camera (55 percent), and a webcam (55 percent). Figure 1 shows a sampling of technologies students own.

Fewer students (11 percent) own a netbook or an iPad (8 percent) or another tablet (2 percent). But those who do are highly likely to use them for educational purposes: in fact, 70 percent of students who own a netbook, and 67 percent of students who own an iPad or another tablet, use these devices for academic activities. In addition, 57 percent of all students use e-books or e-textbooks, which lend themselves to these devices.

E-reader and iPad ownership is more prevalent among more affluent students. Sixteen percent of students who report household incomes of more than \$100,000 own e-readers, compared to 10 percent of students with household incomes of less than \$50,000. Fourteen percent of higher-income students own iPads, compared to 5 percent of lower-income students. Women and seniors also are more likely to own e-readers: 13 percent of women own e-readers, compared to 9 percent of men; 15 percent of seniors own e-readers, compared to 8 percent of freshmen.

Ownership patterns of e-readers and iPads correlate to students' desire to see these devices used for academic purposes. Overall, almost one-third of students (31 percent) wish their instructors used e-books or e-textbooks more often—but women (35 percent) are significantly more likely than men (25 percent) to express this sentiment. Similarly, upperclassmen are more likely to wish their instructors used e-books and e-textbooks more often: 35 percent of juniors and seniors and 27 percent of freshmen and sophomores would like their instructors to use e-books and e-textbooks more often.

A majority of students (67 percent) say they own Wi-Fi devices or have access to Wi-Fi networks—and students want anytime, anywhere access to Wi-Fi. However, given that a much greater percentage of students (87 percent) report that they own laptops—and many other standard-issue devices that typically feature built-in Wi-Fi capability—some students may not enjoy full Wi-Fi coverage on their campus. Others might not understand Wi-Fi connectivity and, thus, might be underreporting their ownership and access to Wi-Fi. In fact, students on college campuses have access to Wi-Fi at a myriad of locations. EDUCAUSE data from the 2010 Core Data Services report show:



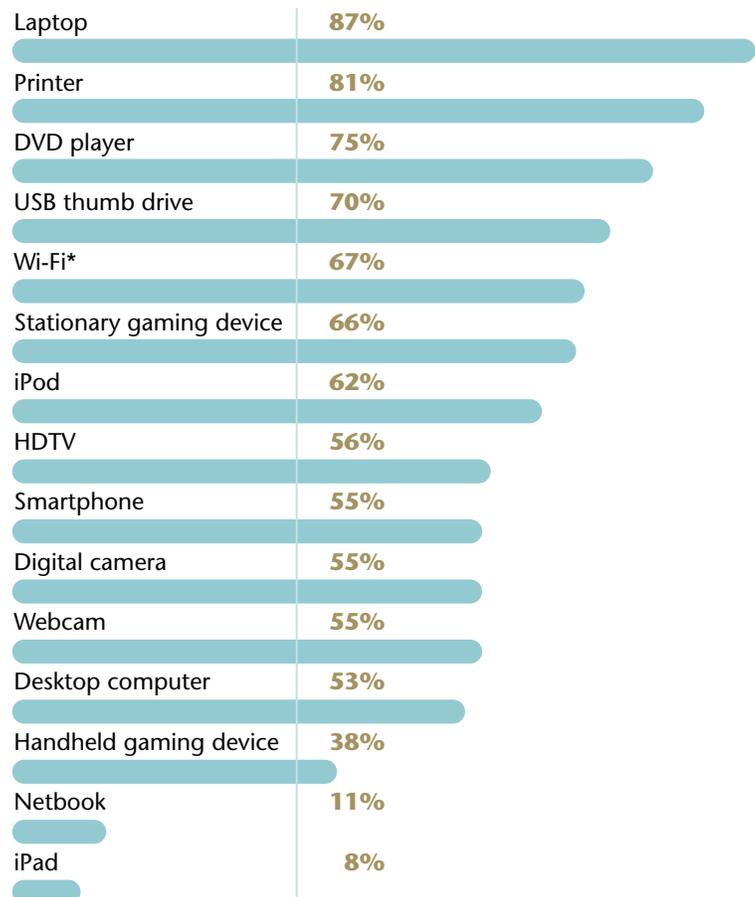
- Libraries have the most Wi-Fi coverage, with 73 percent of institutions reporting that 76 percent to 100 percent of their library areas are serviced with a “robust” Wi-Fi network.
- About two out of every three institutions offer “robust” Wi-Fi coverage for their computer labs (66 percent), student union (65 percent), and classrooms (63 percent).
- Open spaces on campus are the least well covered by Wi-Fi, with only 27 percent offering “robust” coverage.

In any case, campus provisioning of Wi-Fi is important, since 78 percent of students who use Wi-Fi, or whose instructors use Wi-Fi, say that Wi-Fi is “extremely valuable” to their academic success. Other technologies that students value are discussed in the next section.

STUDENT VOICES

“Finding some way to make e-books more widely available to students would be amazing.”

Figure 1. **Undergraduate Student Technology Ownership**
n = 3,000



* Likely interpreted by students as having access to Wi-Fi

Students are still attached to “standard issue” technology.

A majority of students own a printer (81 percent), a DVD player (75 percent), a stationary gaming device (66 percent), an HDTV (56 percent), and a desktop computer (53 percent).

Students have a stronger platform preference (65 percent prefer Windows PCs) than they say their institutions do (67 percent say their institutions are open to any platform). Age makes a difference in undergraduates’ platform preferences. Thirty-one percent of younger students (those under 25 years old) prefer Macintosh computers, compared to 13 percent of students who are 25 or older. Still, a clear majority of even younger undergraduates (57 percent) prefers Windows platforms.

Students at two-year institutions differ from other undergraduates in their technology ownership and preferences. Students at associate’s colleges and other two-year programs are more likely to own stationary technologies, such as desktop computers and stationary gaming and video devices, particularly in comparison to students at doctorate-granting institutions. Students at institutions that award master’s and doctorate degrees are more likely to own portable technologies, such as laptops, iPods, webcams, thumb drives, and Wi-Fi devices. Still, there are both mobile devices (e.g., iPads) and stationary technologies (e.g., HDTVs) for which there are no significant differences among students at institutions of different Carnegie Classifications.

In addition, the preference for Windows platforms is significantly higher among students attending associate’s colleges or other two-year programs than it is among those attending other institutions. Seventy-four percent of students at associate’s colleges prefer Windows PCs, compared to 58 percent of all other students.

TECHNOLOGY USE & VALUE

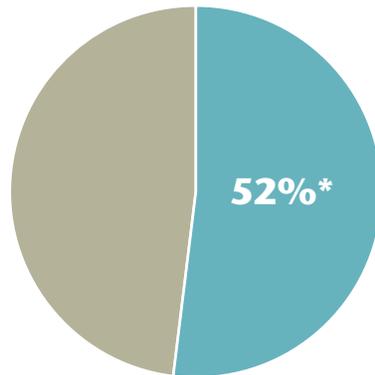
Major Academic Benefits of Technology

For students, technology today is mostly about access and efficiency. Above all else, technology makes it easier to access a wide range of resources, dispense with administrative tasks, track academic progress, and work faster. The major academic benefits of technology, in decreasing magnitude of students' experience, encompass four areas, as summarized in Figure 2:

1. Technology gives students easy access to resources and helps them reduce the burden of administrative tasks (e.g., registering for classes, paying tuition) and keep track of academic progress. An average of 52 percent of students "strongly agree" with statements about the benefits of technology in helping them access resources and information.
2. Technology makes students more productive. An average of 44 percent of students "strongly agree" with statements about the productivity and efficiency benefits of technology.
3. Technology helps students feel connected. An average of 35 percent of students "strongly agree" with statements about the benefits of technology in helping them connect with people and information.
4. Technology can make learning a more immersive, engaging, and relevant experience. An average of 33 percent of students "strongly agree" with statements about the benefits of technology to make learning more creative and more applicable to real life and post-graduation plans—and to elevate teaching.

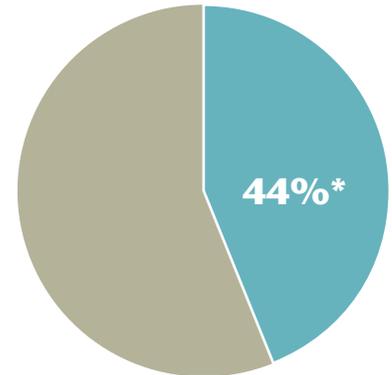


Figure 2. **Major Benefits of Technology for Academic Success**



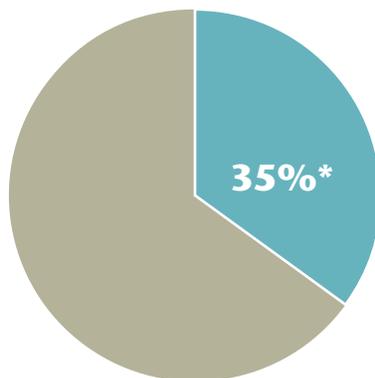
Gives Me Access to Resources and Progress Reports

- Easy to track my academic progress
- Helps me know how I am doing
- Simplifies administrative activities
- Gives me access to resources
- Easier to get help when I need it



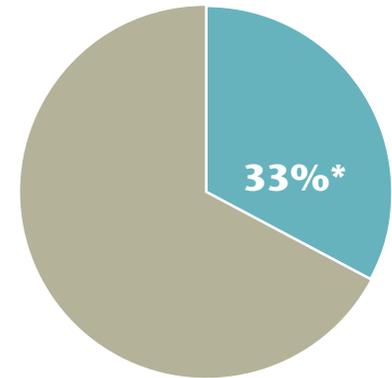
Makes Me More Productive

- Helps me do my work faster
- Allows me to produce higher quality work
- Gives me an efficient way to store my work
- Makes college easier



Helps Me Feel Connected

- Allows me to connect to other students
- Allows me to connect to professors/staff
- Lets me know what's going on
- Gives me access to experts in my field



Makes Learning More Engaging and Relevant

- Makes learning more creative
- Makes learning more fun
- Helps me think out of the box
- Makes learning more relevant to real life
- Makes learning more engaging
- Elevates teaching
- Helps me reach my academic potential
- Helps me take control of my learning
- Extends learning beyond the classroom
- Prepares me for the workforce
- Prepares me for graduate school

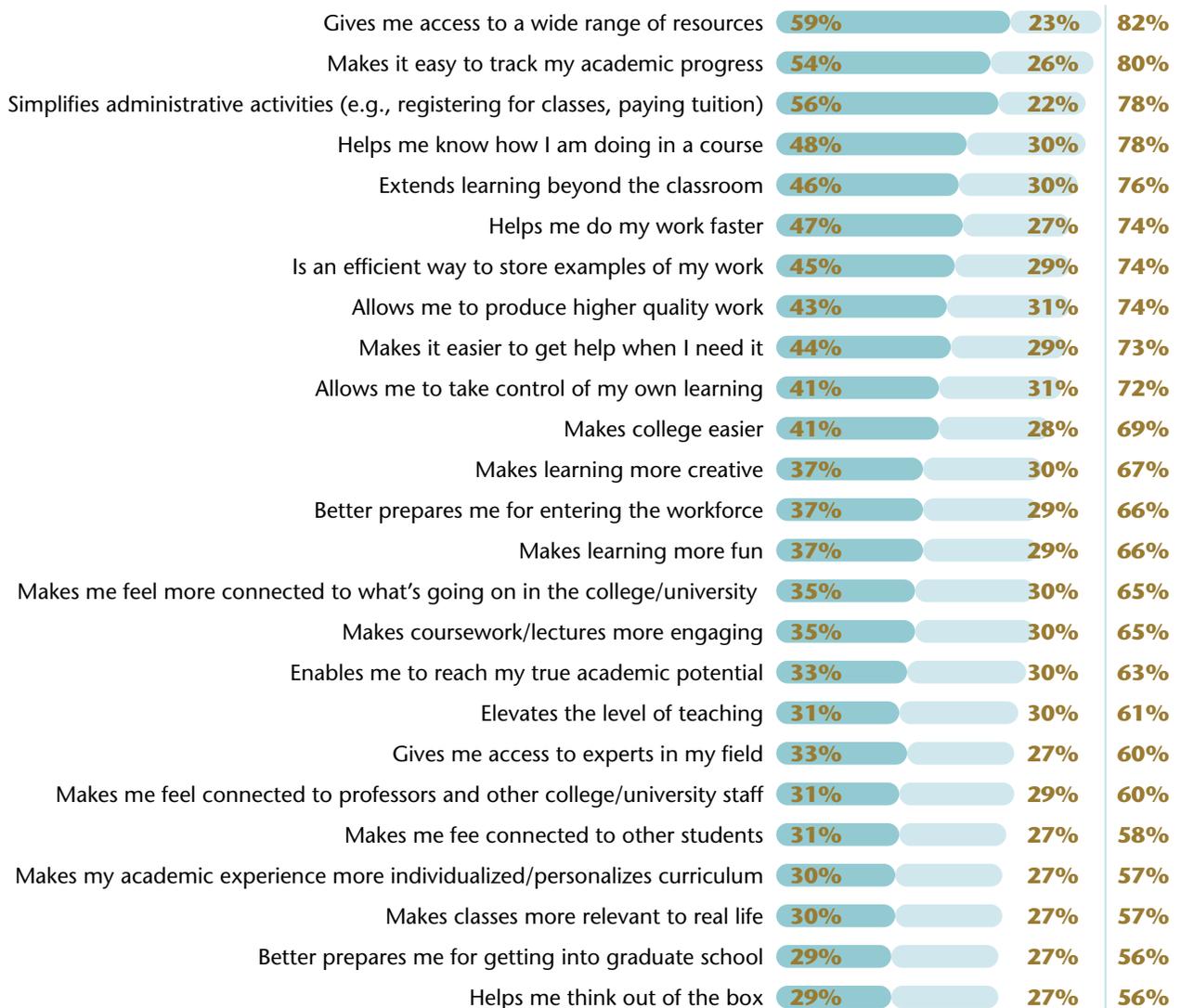
* Average level of "strong agreement" about potential technology benefits

These magnitudes of experience are conservative, based on students’ strongest—and, presumably, most certain and deeply held—levels of agreement about a number of potential benefits of technology. The fact that a majority of students strongly agree with only the “access” benefits of technology doesn’t mean, however, that students are largely ambivalent about the wide variety of potential benefits. Far from it. A majority of students recorded positive agreement (agreed or strongly agreed) with every one of the 25 potential benefits about which they were asked, as shown in Figure 3.

The highest levels of disagreement were for the statements that technology “makes my academic experience more individualized/personalizes the curriculum” (15 percent disagreed or strongly disagreed) and “helps me think out of the box” (15 percent disagreed).

Figure 3. **Distinct Benefits of Technology for Academic Success**

Percentage of students who strongly agree or agree with statements about technology benefits
 ■ 5 = Strongly agree ■ 4 = Agree n = 3,000



STUDENT VOICES

“The classes are getting larger because of state budget cuts and the teacher–student relationship isn’t as personal as it used to be. E-mail is a good way for me to maintain a positive relationship with my teacher with minimal effort.”

The average undergraduate uses a broad assortment of software for academic or personal purposes. Overall, the average student spends at least some time engaging in about 21 different kinds of software applications and activities out of 40 they were asked about. This ranges from e-mailing, reading Wikis, and downloading or streaming music or videos to geotagging, participating in virtual worlds, and using speech recognition software. Even for these latter software applications and activities, substantial proportions of students are involved—one in seven in the case of speech recognition software, more than one in seven in the case of virtual worlds, nearly one in five in the case of geotagging. Of the 40 different kinds of software applications and activities asked about, the average student engages in about 13 distinct activities fairly frequently—at least a few times every week.

E-mail is the most frequently used application for academic or personal purposes. Virtually all students (99 percent) use e-mail—and virtually all (97 percent) use it at least a few times a week and most students (75 percent) use it several times a day. Text messaging, Facebook, and instant messaging are very popular communication tools as well; 93 percent of students use text messaging, 90 percent use Facebook, and 81 percent use instant messaging. Text messaging rivals e-mail in terms of frequency of use, with 74 percent of students reporting they use it several times a day. A majority of students (58 percent) also use Facebook several times a day. More than one in four students (27 percent), use instant messaging several times a day as well. While Facebook is the clear hub of social networking for undergraduates, 31 percent of students report that they use other social networking sites, such as MySpace.

Almost seven out of 10 students (68 percent) use the Internet for academic or personal phone or video calls, albeit with less frequency than they use e-mail, text messaging, Facebook, or instant messaging. More than one-third of students (37 percent) use Twitter. One in four students (25 percent) uses LinkedIn, the online professional network. Juniors and seniors use LinkedIn more frequently than freshmen, presumably to establish a professional presence that could support job searches and transitions to the workforce.

Large majorities of students use their technology devices for academic or personal purposes to consume information by downloading videos (85 percent) and music (79 percent), reading Wikis (85 percent) and blogs (72 percent), and watching podcasts or webcasts (59 percent). More participatory activities that students engage in include online forums or bulletin boards (70 percent); online chats, chat events, and webinars (53 percent); using photo-sharing websites (50 percent); tagging, bookmarking, and “liking” online content (49 percent); playing online multi-user games for recreation (43 percent); contributing to blogs (43 percent); and posting videos to a video-sharing website (42 percent).

Other than core communication tools (e-mail, text messaging, and Facebook), word processing, presentation, and spreadsheet software are

STUDENT VOICES

“I’d like them to use [a commercial learning management system] to give us more resources outside the classroom, to post grades, and to have discussions outside the classroom. The tools are all there, but they’re not used.”

A Blizzard of Messages

Students who use communication tools the most frequently (several times a day or more) rack up sizeable tallies of messages sent or received:

- Frequent e-mail users (75 percent of students) send or receive an average of **25 e-mails a day**.
- Frequent texters (74 percent of students) send or receive an average of **84 text messages a day**.
- Frequent Facebook users (58 percent of students) **log into and/or check Facebook 13 times a day**.
- Frequent Twitter users (11 percent of students) read or post **112 tweets a day**.

the most frequently used applications for academic or personal purposes, along with the institutional library website and course or learning management system. But this core academic software is not necessarily coming out of a box; students could be using newer productivity software accessed “in the cloud” that offers more collaborative and participatory experiences (e.g., Google Docs).

Notably, 73 percent of students use a course or learning management system and 27 percent of these students use it several times a day. This seems to be an indication that essential or valuable learning resources are continuing to migrate to online environments. Course and learning management system platforms are commonplace on college campuses; nearly all respondents to the EDUCAUSE 2010 Core Data Services survey said that their institutions had deployed a commercial, homegrown, or open source system. A quarter of respondents in that survey said they were reviewing their options or planning to change their current approach, and other 10 percent had recently migrated from one course or learning management system to another.

A majority of students (57 percent) also use e-books or e-textbooks for academic or personal purposes, 55 percent use graphics software, and 51 percent use web-based citation or bibliography tools.

Smaller, but still substantial, numbers of students engage in a handful of other software applications, some of which support more creative and immersive experiences. For example, 37 percent use simulations or play educational games, 35 percent use video-creation software, 32 percent use programming languages, 30 percent use freely available course content, 28 percent use audio creation software, 23 percent use social studying sites, 21 percent use e-portfolios, 18 percent use geotagging or geotagged environments, 15 percent participate in online virtual worlds, and 14 percent use speech recognition software, all for academic or personal purposes.

Students turn smartphones into academic tools. More than one in three students (37 percent) have used an iPhone or another smartphone in one or more courses or academic activities in the past year. Forty-five percent of smartphone users have used these devices to look up information on the Internet *in class*. Figure 4 shows the many ways in which smartphone users rely on these devices to accomplish their work.

Students view anytime, everywhere access with Wi-Fi connectivity as critical to their academic success. Laptops and Wi-Fi connectivity are the most valued technologies to students, along with other computing devices (desktops and netbooks) and accessories (printers, USB thumbdrives or portable hard drives, and projectors). A sampling of other technologies considered valuable is shown in Figure 5.

**Top Apps for Mobiles?
Math, Language, and
Search Tools**

Among smartphone and tablet users, the three types of applications used most for coursework and other institution-related activities are calculators or mathematical equations (selected by 52 percent), dictionaries or thesauruses (49 percent), and search tools (43 percent). One in five students (20 percent) use these devices for foreign language or translation apps.

STUDENT VOICES

“The campus needs a more reliable Wi-Fi connection, available everywhere. It’s gone out repeatedly and there always seem to be new bugs every month!”

Figure 4. **In Class and on the Go, Smartphones Serve Academic Purposes**
Percentage of smartphone users who use these devices for academic purposes
n = 1,222

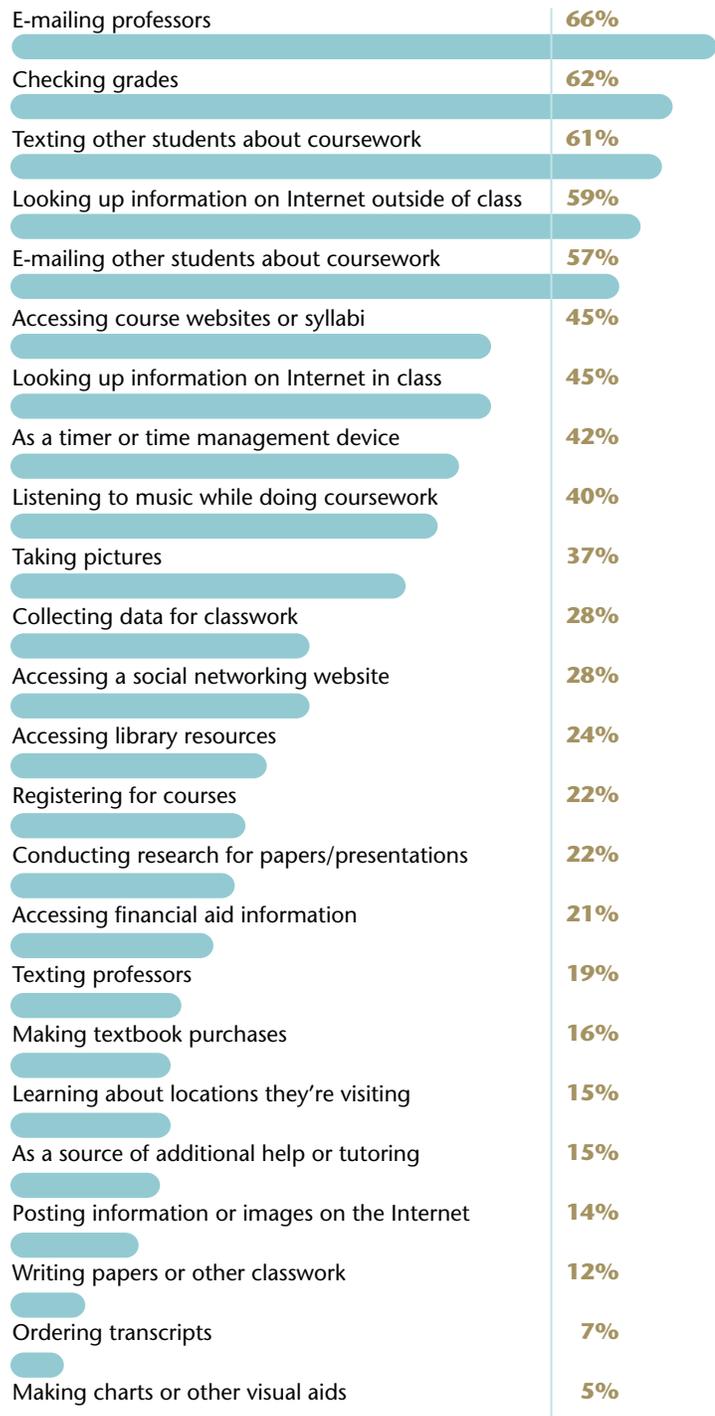
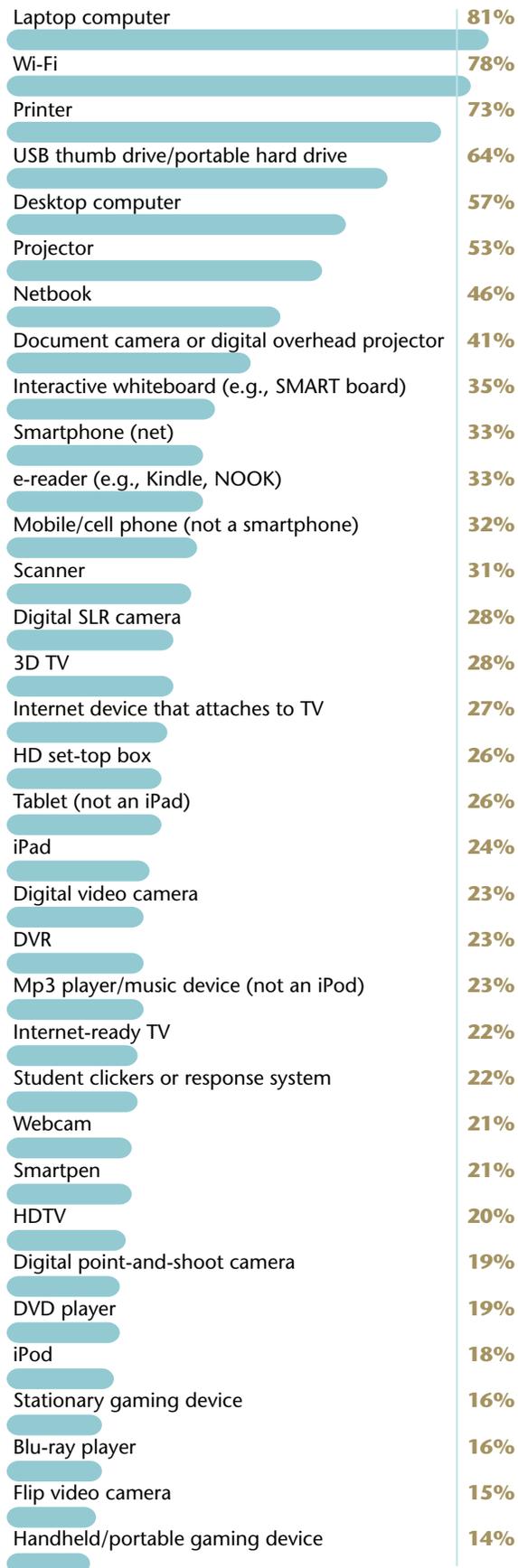


Figure 5.
**A Bevy of Technologies
 Seen as “Extremely Valuable”
 for Academic Success**

Percent responding “extremely valuable for academic success” among users and those whose instructors use the technology
 n = Bases vary



WHY DO STUDENTS WANT MORE?

"I wish instructors e-mailed more so that students and teachers could communicate easier, faster, and more efficiently."

"Only half of my instructors currently use [the course management system]. I wish more did."

"E-books are cheaper than regular hardbound textbooks, easier to carry around, and more accessible all the time."

"Open discussion can be stifled in a classroom environment. Online chats give the students the freedom of anonymity so that they can engage in chat freely."

"Online discussions are easier to keep track of than offline ones."

"I commute to campus. Social studying sites would make it easier to bring study groups together."

"Web-based videos make learning the material more interesting, as the videos are more visually stimulating."

"I enjoy learning through fun visual projects. I think a simulation game would give me a better sense of the material."

More than a third of students wish their instructors used e-mail more often. Nearly a third of students wish their instructors used course or learning management systems and e-books or e-textbooks more often. Presentation software and online forums or bulletin boards make the top five on students' wish lists as well.

Other technologies, while further down on students' wish lists, also gained double-digit support, including web-based videos, video sharing websites, podcasts and webcasts; tagging/bookmarking/"liking" and social studying sites; and chat and online forums or bulletin boards. The technologies that at least 5 percent of all students wish their instructors used more often are shown in Figure 6. Students at advanced-degree awarding universities generally have stronger desires for their instructors to use more technologies than do their peers at associate's and bachelor's institutions.

Many of the software applications and activities students most value academically are among those they wish instructors used more often. These include e-mail, content or learning management systems, e-books or e-textbooks, presentation software, online forums or bulletin boards, college/university websites, word processors, text messages, spreadsheets, and wikis.



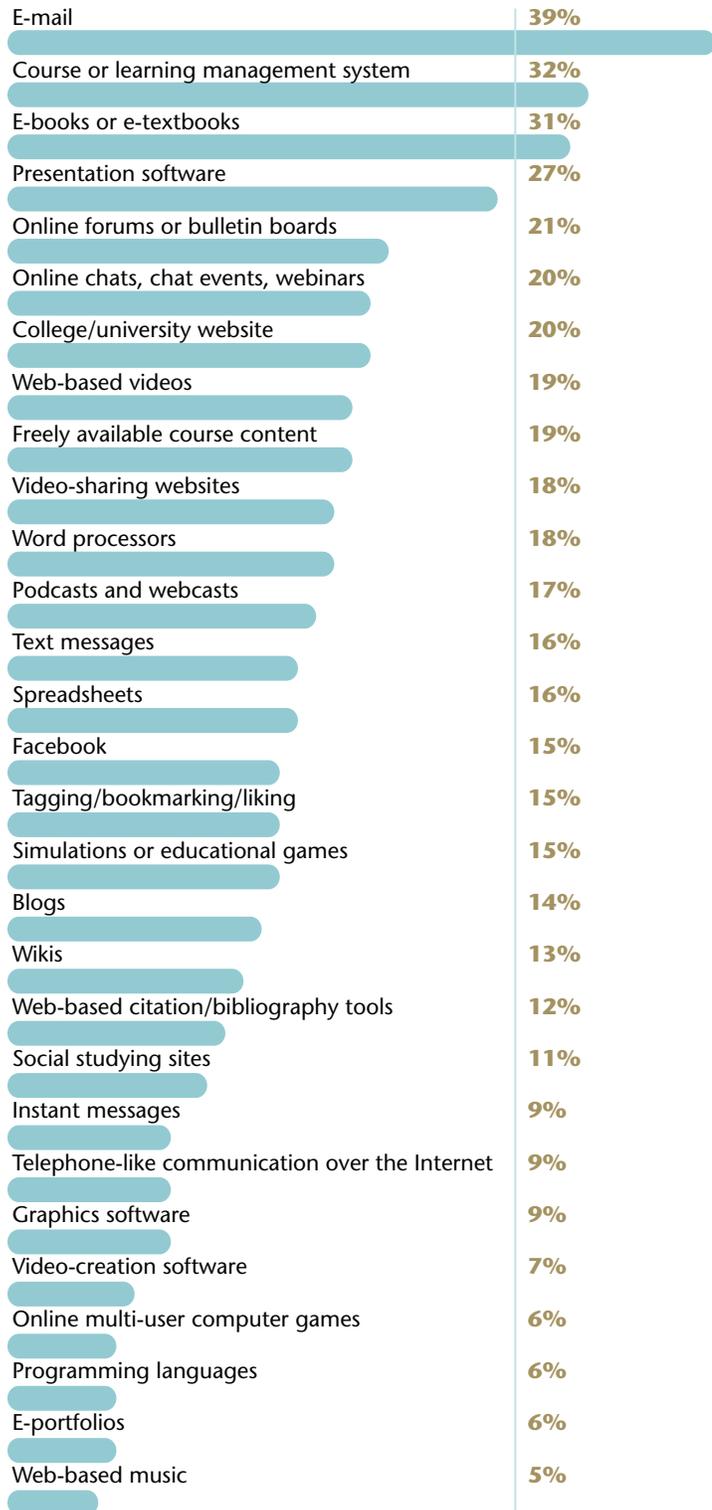
WHY DO STUDENTS WANT MORE?

"I believe it is much easier to multi-task with instant messaging. As a mother of two young boys, married and working full-time, I juggle a lot. So instant messaging would allow me to continue a conversation while also having to take whatever mandatory steps away for a moment without losing the conversation. Also, in case my mommy brain forgets something, I can go back and look thru our conversation."

"I personally prefer to play games in my free time, and if this could be tied into school work, it could make it more easy to learn and retain for me, and others like me."

"In my junior and senior year I will have to keep an e-portfolio and would like some experience with them before my junior year."

Figure 6. **Technologies Students Wish Instructors Used More Often**
n = 3,000



Note:
Only items mentioned by at least five percent of students are listed.

STUDENT VOICES

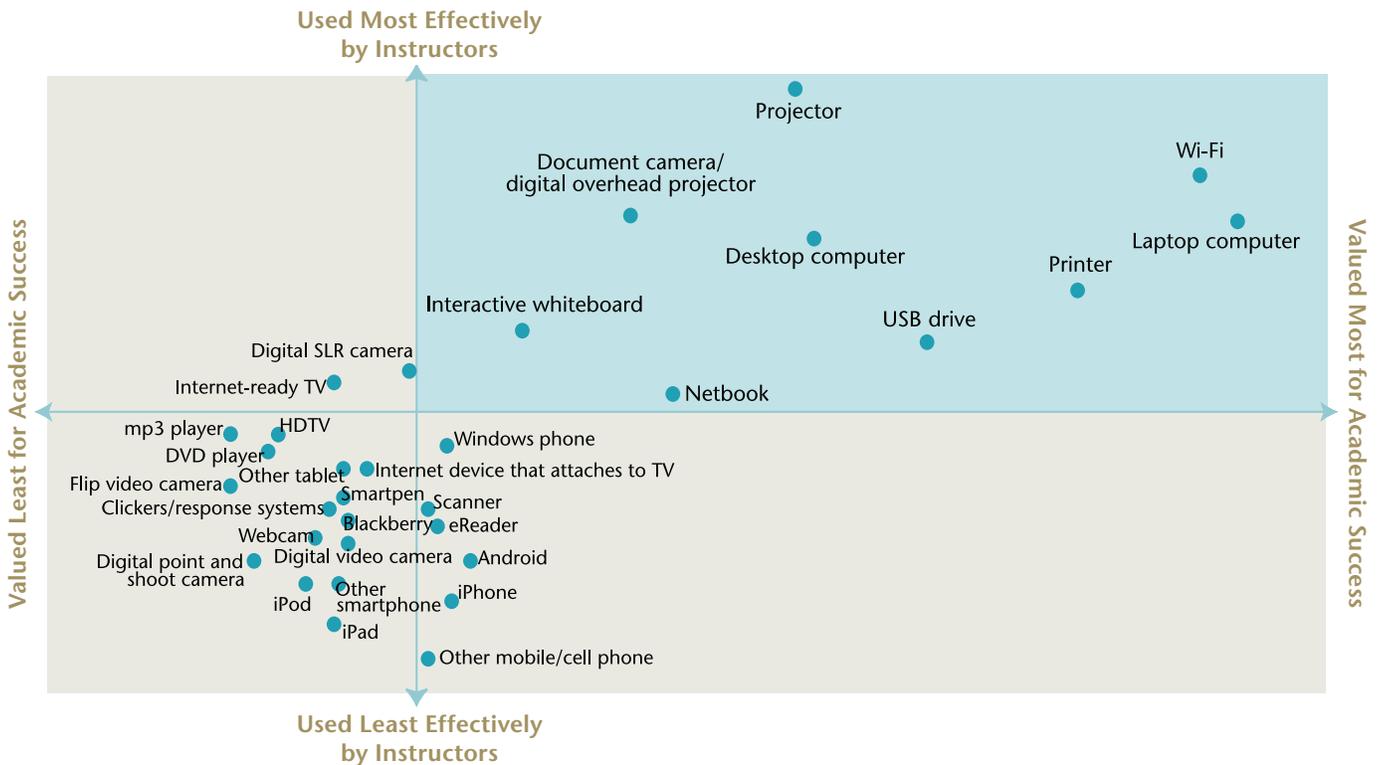
“I have used [video creation software] in one class to make a presentation. I learned more from that class and remembered more from that presentation than anything I have ever done in college. I also think that, as an education major, learning to make these videos could really help teachers know how to make some amazing lesson plans.”

There is a strong correlation between the technologies students value most and the technologies their instructors use—and use effectively—to teach, mentor, and communicate.

For academic purposes, students tend to most highly value the technologies that they see their instructors using—and using “extremely effectively,” including laptops, Wi-Fi, printers, USB thumb drives or portable hard drives, and desktop computers.

The three devices most used by instructors in the classroom are projectors, laptops, and desktop computers, with 69 percent, 67 percent, and 65 percent of students reporting their instructors use these technologies, respectively. These three technologies, along with Wi-Fi (which 44 percent of students report their instructors use) and printers (which 42 percent of students report their instructors use), top students’ perceptions in terms of those that their instructors use most effectively as well. Figure 7 shows the correlation between the technologies students value and the technologies they report that their instructors use most effectively.

Figure 7. **Students’ Value of Technologies Correlates with Effective Use by Instructors**



Note: Items with Ns below 45 are not included on this chart

STUDENT VOICES

“I went to school to learn this software and I still have no idea how. All we do is write papers and answer discussion questions. Then on the rare occasion we do create something in a software program, I have no idea how to use it.”

“I would like to create more oral reports and audio presentations in order to better the ability to concisely and clearly explain things. Working with things in audio would also bolster how good our presentations could be (think good things for our portfolios).”

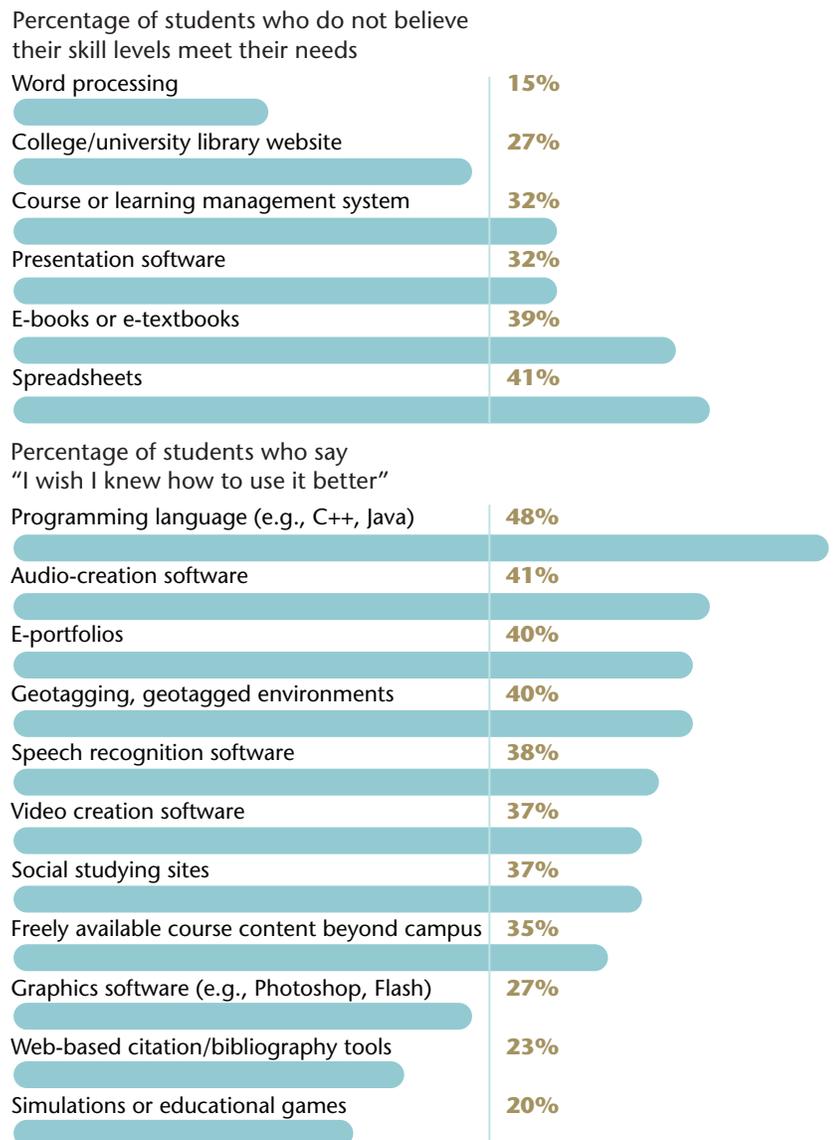
“More employers are looking for online portfolios than the binders full of information.”

A surprising number of students say they are not fully confident that they have the technology skills to meet their needs.

This applies to core as well as more specialized applications. Nearly one-third of students (32 percent) say their skills using a course or learning management system, which is intended to facilitate academic life for students and instructors, aren’t where they believe they should be.

At the same time, there apparently is substantial interest in relatively sophisticated uses of technology, including programming languages, audio-creation software, e-portfolios, geotagging and geotagged environments, and video creation software. Figure 8 shows samplings of students’ perceived skills deficiencies and their “wish list” for specific software skills.

Figure 8. Surprising Numbers of Students Lack Confidence in Their Core Software Skills—and They Want Specialized Skills
n = 3,000



Note: These charts show a sampling of software skills about which students were asked and include responses about software installed on a computer as well as cloud-based applications.

STUDENT VOICES

“I think geotagging is an exciting emerging technology that has potential to enhance learning by adding an active component, enhancing multimodal stimulation in a creative way, also allowing for collaborative opportunities.”

The technologies that students use and value differs, depending on the type of institution they attend, and contrasts with differences in their general use patterns and comfort levels.

Students in associate’s colleges and other two-year programs are generally less likely to engage in many technology applications and activities than students at institutions of other Carnegie Classifications. In fact, associate’s college students are significantly less likely than at least one other Carnegie Classification to have used more than half of the 40 software applications and activities tested. Across a broad range of technologies, students at institutions that award doctorate degrees are more comfortable with their skills than students at associate’s colleges, and in many cases compared to students in institutions that award bachelor’s and master’s degrees as well.

Students at institutions that award doctorate degrees tend to find a number of core communication, course, and social networking tools more valuable than their counterparts in associate’s colleges. These core tools include e-mail, LinkedIn, wikis, learning or course management systems, presentation software, word processors, and bibliographic tools.

On the other hand, students in associate’s colleges tend to find non-core technologies more valuable than do students in doctorate degree-granting institutions. These technologies include multi-user games, educational simulations and games, speech recognition software, and, to a lesser extent (significant at the 90 percent confidence interval), virtual worlds, geotagging, and graphics software. Still, neither group feels strongly about these applications, with fewer than a third of students saying that any of them are academically valuable.



INSTITUTIONAL AND INSTRUCTIONAL TECHNOLOGY COMPETENCIES

Uneven Perceptions of Institutions and Instructors on Technology

In students' eyes, effective, frequent, and seamless use of technology characterizes a highly effective institution. A regression analysis conducted on the study data identified the variables that are most predictive of whether students would rate their institution as highly effective in its use of technology. The strongest predictors, in order of relative importance, include students' perceptions of:

- Their instructors' *effective* use of technology
- Their instructors' use of technology *frequently enough*
- The *seamless integration* of technology into their courses

These three predictors alone accounted for approximately 54 percent of the variance in students' perceptions of their institution's effectiveness in using technology. The bottom line: *Effective, frequent, and seamless* use of technology influences students' perceptions.

How well are institutions and instructors doing on these predictors of students' perceptions? Fifty-five percent of students agree that their instructors use technology effectively (and 22 percent strongly agree), compared to 12 percent who disagree. Fifty-seven percent of students agree that their instructors use technology frequently enough (and 20 percent strongly agree), compared to 11 percent who disagree. Forty-six percent agree that technology is seamlessly integrated into their courses (and 19 percent strongly agree), compared to 15 percent who disagree.

When it comes to technology effectiveness, there are no "magic bullets" in terms of which technologies are used or how much they are used. Students in institutions rated as highly effective in their use of technology say they engage in about as many software activities as their peers and that their instructors use about the same number of devices in their coursework. Gaps in use of individual technologies between the two groups, where they exist, are generally relatively small as well.

There are no significant differences between students' frequency of use of most software applications in institutions rated effective and less effective in their use of technology. This is part of a larger pattern that suggests there are no "magic bullets" among individual technologies; for example, virtually no high or even moderate correlations exist between individual technologies and any of the major academic benefits of technology described earlier.

Differentiating technologies, where they exist, often are mundane (e.g., printers, spreadsheets, even USB thumb drives) and tend to fall into the following categories: portable/mobile devices; devices designed for classroom use; core academic and productivity software; basic social networking and communications software and services.

STUDENT VOICES

"Make the technology more integrated to the learning environment and use more than just PowerPoint."

"Classes can get very boring, just reading and taking a quiz, reading, take a quiz. Something, anything, to make it more enjoyable to learn would be wonderful."

STUDENT VOICES

“Professors can utilize e-mails a lot more to inform the class of important announcements.”

Substantial majorities of students say their institution delivers most basic services online successfully. Many students say their institution does an excellent or good job offering course registration (86 percent), making grades available (81 percent), offering library resources (75 percent), making transcripts available (70 percent), and making financial aid information available (70 percent), as shown in Figure 9. There is one notable exception—a smaller percentage of students (53 percent), while still a majority, say their institution does a good job of offering textbooks for sale online; 12 percent disagree.

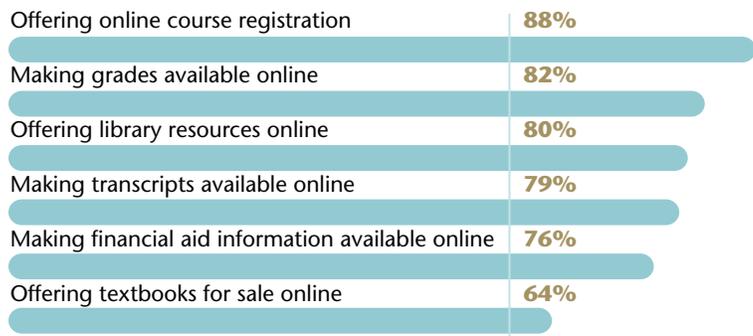
Overall, in institutions that offered these online services, and among students who actually used them, student perceptions are even more favorable. The percentages of these students who rate their institutions as excellent or good at providing basic services are as follows: 88 percent for online registration, 82 percent for online grades, 80 percent for online library resources, 79 percent for online transcripts, 76 percent for online financial aid information, and 64 percent for online textbooks sales, as shown in Figure 9.

Figure 9. **Institutions Deliver Most Basic Online Services**

Successfully

Percentage of students whose institutions offer online services and who use these services

n = Bases vary



Students in associate’s colleges and other two-year programs are more likely to rate their institutions highly than do other students in providing online textbook sales and some basic technology services, including online course registration and access to grades. For example, 69 percent of students in associate’s colleges rate their institutions as “excellent” in online course registration, compared to 54 percent of students in master’s degree-awarding institutions and 45 percent in bachelor’s degree-awarding institutions. Sixty-two percent of associate’s college students rate their institutions as “excellent” at making grades available online; in no other Carnegie Classification institution do more than 53 percent of students agree. And 38 percent of students in associate’s colleges say their institutions excel at offering textbooks for sale online; no more than 30 percent of students in any other Carnegie class institution agree.



STUDENT VOICES

“Videoconferencing and webcams could and should be more widely used. The technology is widely available and is easy to use, and can help bring these online classes to life and give the teacher more influence over their material.”

On the other hand, based on all student responses, students at doctorate degree-awarding institutions are more likely to generally agree that their institutions do a better job than associate’s colleges in several areas:

- Offering library resources online (80 percent of students at doctorate degree-awarding institutions expressed some level of agreement compared to 67 percent for associate’s colleges)
- Providing online transcripts (75 percent of students at doctorate degree-awarding institutions expressed some level of agreement compared to 66 percent for associate’s colleges)
- Providing financial aid information online (76 percent of students at doctorate degree-awarding institutions expressed some level of agreement compared to 65 percent for associate’s colleges)

Student perceptions of the benefits of technology are tied to how effectively they believe their instructors are using it.

Students who rate their instructors as highly effective in their use of technology are significantly more likely to agree that technology delivers substantial benefits to their academic experience. These benefits include basic access to resources and information, simpler administrative activities, and increased productivity. These benefits extend to more transformative learning experiences, such as extended learning beyond the classroom; better preparation for the workforce; more creative, engaging and fun experiences; and the capacity to reach their true academic potential.

Not surprisingly, students at doctorate-awarding institutions believe that they are experiencing more of technology’s benefits. However, these greater perceived benefits are not nearly as strong or as striking as the differences in the perceptions of the use of technology by students at institutions rated as highly effective and not so effective in their use of technology—regardless of institutional Carnegie Classification.

On another note, many students (44 percent) say they have a close mentoring relationship with a faculty member—someone they know well and can go to for advice and guidance. Sixty-five percent of those students describe these faculty mentors as effective or highly effective in their use of technology, compared to just 9 percent who say their mentors are ineffective in using technology.

Overall, students say their instructors use presentation devices effectively—but devices that inspire participation or interactivity, not so much. Projectors, Wi-Fi, laptops, desktops, and document cameras or digital overhead projectors are devices that instructors use “extremely effectively” to teach, mentor, or communicate, students report—and they’re generally technologies students also value highly. More personal technologies, such as e-readers, iPads, smartphones, and student response systems (clickers) are not used as effectively, students say. That students do not consider student response systems as more effectively used is notable, given that this technology is designed specifically for instructional support, as opposed to other, general-purpose devices.

STUDENT VOICES

“Professors should be able to actually use the technology that is available to them. Many of my professors must enlist the help of students to get the technology up and running which wastes valuable class time.”

Successful teaching with technology is like a coin, with obverse and reverse sides together constituting the whole. Successful instructors combine technology (obverse) with targeted pedagogical activities (reverse). Managing diverse technologies and weaving them all into a coordinated pedagogy is a challenging business requiring diverse expertise. As demonstrated by students’ lackluster response to student response systems (clickers), there are opportunities to inspire student participation and interactivity with existing technology, but the technology by itself isn’t sufficient and doesn’t guarantee successful learning outcomes.

Instructors at associate’s colleges and other two-year programs are significantly less likely to use a wide variety of technologies in class, students say. Devices that associate’s college instructors are significantly less likely to use than instructors at two or more other institutional types include laptops, projectors, Wi-Fi, student response systems, document cameras, USB thumb drives, interactive whiteboards, smartphones, webcams, iPads, and digital and flip video cameras.

Notably, however, the technologies that associate’s college instructors do use, they often use more effectively, according to students. These technologies include desktop computers, laptop computers, webcams, scanners, printers, projectors, and interactive whiteboards. In fact, instructors in other institution types do not use any devices more effectively than associate’s college instructors do, according to students.

Many instructors need help getting technology to work successfully. Almost one-third of students (31 percent) agree that their instructors require help in getting technology up and running. More than one in four students (26 percent) agree that their professors don’t know how to use technology that is available. About half of students (51 percent) agree that they know more about technology than their professors do. However, students in associate’s colleges are significantly less likely to feel they know more about technology than their professors, that their instructors don’t know how to use the technology that is available, or that their instructors need help from others to get technology up and running.



TECHNOLOGY FOR CONNECTING AND RELATIONSHIPS

Facebook Generation Juggles Personal and Academic Interactions

The role of Facebook and other social networking tools for academic purposes? It's complicated. As reported earlier, the vast majority of students (90 percent) use Facebook, including 58 percent who report using it several times a day. Students at associate's institutions use Facebook less frequently than other students, but nearly half (49 percent) still use it multiple times a day. In contrast, only 32 percent of students participate in online forums or bulletin boards at least once a month, while 24 percent say they participate in online chats, chat events and webinars that often.

Twelve percent of students say Facebook is "extremely valuable" to their academic success—and one in four students (25 percent) consider it "valuable" or "extremely valuable." On the other hand, more than half of students (53 percent) think its academic value is limited or nonexistent. A majority of students (58 percent) say they are comfortable using Facebook as a way to communicate and connect with other students about coursework. Some students draw a line between their academic and social lives, with 30 percent saying they "strongly agree" that they like to keep them separate. Thirty-nine percent of students say it would be inappropriate for a teacher or professor to "friend" them on Facebook. Still, more than 60 percent of students say it would be appropriate (31 percent) or no big deal (30 percent reported a "neutral" reaction).

At the same time, while students were not asked about the appropriateness of Facebook interactions with instructors if the students themselves were to initiate the "friending," 15 percent say they wish their instructors used Facebook more often.

Associate's college students are generally more inclined to keep their academic and social lives separate and are less comfortable using Facebook to talk about coursework, although nearly half (49 percent) are comfortable with this. This may be a function of the demographics of these institutions: older, part-time, and lower-income students are all less comfortable using Facebook to talk about coursework than associate's college students in general.

STUDENT VOICES

"My generation is a social networking generation. We devote most of our time to Tweeting and or reading tweets, it would help if we could communicate with our professors in this way because most of us aren't able to contact them during their office hours."

ONLINE LEARNING

Students Prefer—and Say They Learn More in—Classes with Online Components

More students (36 percent) prefer a blended learning environment of seminars and other smaller classes with some online components to any other configuration of face-to-face and online options. Students in advanced degree-awarding and bachelor’s institutions have even stronger preferences for smaller classes with some online components (42 percent to 47 percent of these students prefer this format, compared to 27 percent of students at associate’s colleges).

More than one in five students (22 percent) prefer classes that give them the option to use as many or as few online components as they need to.

Even large lecture classes are more desirable with some online components, with 16 percent of students saying this is their preferred learning environment, compared to 5 percent who prefer large lecture classes with no online component and 5 percent who prefer large lecture classes that are completely online.

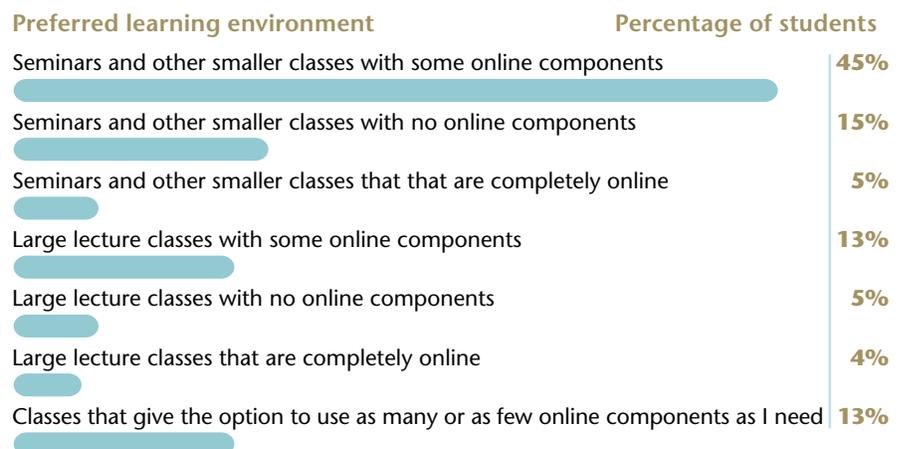
The new curricular models emerging under the umbrella term of blended learning is where a great deal of experimentation is going on right now.

This mix of face-to-face (F2F) and online elements is captured under the umbrella term of blended learning and may well prove to be one of the most important ways the digital revolution changes higher education.

The blended environment has the potential to provide a number of advantages. It can combine the best elements of F2F and online, while also giving instructors and students more flexibility and options as the course progresses. Learning research tells us that students are helped when they have multiple “pathways” through the course content, and the mix of F2F and online makes it possible to provide such alternatives.

Moreover, students report that they tend to learn more in classes with online components—both in seminars and smaller classes and in large lecture classes, as shown in Figure 10.

Figure 10. **Students Say They Learn More in Blended Classes**
n = 3,000



As with preferred learning environments, students in bachelor's, master's, and doctoral degree-awarding institutions express stronger sentiments about this, with 50 percent, 51 percent, and 52 percent of students, respectively, saying they tend to learn more in seminars or other small classes with online learning components. In contrast, only 37 percent of students in associate's colleges say they tend to learn more in this learning environment. ♦

STUDENT VOICES

“Many of the courses that I take are online-based courses. Instead of only being able to access my course content online, it would be helpful to be able to access it on my TV. Sometimes we have long videos to watch as supplemental course content; getting to watch it on the TV would be a cool, new way to do that.”

“It would be nice if say, between 7 and 8, you knew you could have a ‘virtual’ classroom to ask about things you are not sure about.”

Students send mixed signals about online-only courses.

Most students (80 percent) say their institutions offer some courses entirely online. A majority of students (65 percent) whose institutions offer courses that are completely online have taken one. But 58 percent of all students say that online-only courses do not provide the same educational value as courses that blend face-to-face and online components, compared to 30 percent who say they believe they do provide equal value.

Face-to-face (F2F) context is still very powerful and meaningful for students. Online learning environments are evolving, for the better, to accommodate students as social beings. For example, there is an emergence of more effective presentation of material, and of better ways to facilitate discussion and collaborative work. Institutions are even developing ways to conduct science labs in online environments. These instructional techniques are being optimized in online educational venues. Also under development are techniques for intelligent tutoring and the deployment of learning analytics that will provide additional tools to monitor student progress and success in the near future. The online learning environment is starting to come into its own, and this will influence student perception of taking courses online in the future. Rather than obviate F2F learning, the improvements in the online learning environment will be of great benefit as they are incorporated into blended learning models.

At the same time, some students place differential value on online-only courses. Forty percent of older students (age 25 and up) say that online courses have the same educational value as face-to-face courses, compared to 23 percent of students under 25. And 33 percent of students who live off campus say that online courses have the same educational value as face-to-face courses, compared to 18 percent of students who live on campus. In addition, 36 percent of students at associate's colleges and 29 percent students at master's degree-granting institutions feel that online only-courses provide equal value. Perhaps most tellingly, among the students who have actually taken an online-only course, 45 percent feel these types of courses are as educationally valuable as in-person offerings.

Observations, Opportunities, and Recommendations

SECTION 4

STUDENT VOICES

“I feel that a mobile/dynamic classroom would be more interesting than a static one.”

If there is one resounding message about undergraduate perceptions about technology, it is this: Technology could be used much more strategically to engage students in academic life.

There are indications that technology could deliver more pronounced benefits both for students and for institutions. Already, students own and use an array of technologies—yet institutions and instructors do not fully harness them to meet student expectations for more varied, inspiring, and beyond-the-classroom learning experiences.

Already, technology supports greater student productivity, self-efficacy, engagement, and motivation—qualities that society values. Yet some students are not fully confident in their technical skills and they wish they knew more.

Already, students believe that technology promotes creative and engaged learning, elevated levels of teaching, and the ability to produce higher quality work. While technology in higher education delivers some of these benefits, some of the time, for some students, there is room for improvement. Businesses and other organizations put a premium on workforce and citizenship skills that align well with these benefits, such as creativity, innovation, and critical thinking, among other higher-level skills.

The small sampling of the thousands of open-ended responses interspersed throughout this report give further glimpses of students' perceptions of technology. While it's clear that most students currently see only standard uses of technology as educationally valuable, many students go out of their way in making these optional comments to say that they are drawn to unconventional uses of technology in higher education, citing the potential for learning with online multi-user games, educational games and simulations, social studying sites, e-portfolios, geotagging, and music, among other technologies. Quantitatively, while each of these technologies currently attracts only a minority of interest in the survey—perhaps because instructors rarely model them in an academic context—collectively they indicate a realm of potential future expansion of educational value.

Already, technology helps students feel connected to institutions and to institutional faculty, staff, and other students. These relationships foster a sense of belonging and can help students overcome academic or personal obstacles. Technology also gives students and instructors access to many different kinds of online resources that can make coursework more appealing, and it could make higher education more personal and relevant to students' interests and ultimate success.

OBSERVATIONS AND OPPORTUNITIES

STUDENT VOICES

“Nontraditional teaching methods, such as online virtual worlds, help me learn more effectively than lectures and paper assignments.”

This survey suggests a number of opportunities for higher education to broaden the effective, frequent, and seamless integration of technology into academic life:

- Given students' ownership of and preference for small, mobile devices, institutions and instructors may have an opportunity to make more effective use of mobile technologies to communicate with, educate, and support students. Many students seem eager to communicate more with their instructors online, to use their mobile devices for coursework, and to reach out for help when they need it.
- Given the technologies that students most use and value in their academic and personal lives, institutions may have an opportunity to differentiate themselves in terms of how effectively they support both standard and specialized devices, applications, and services. Students use and value standard-issue productivity tools and technologies, but many also use and value a broad and sometimes innovative assortment of devices and software, if only in their personal lives so far. The limitation in using technology to improve students' academic experiences is not due to students. Rather, institutional and instructor use of technology seems more limited than students want and need.
- Given that instructors' effective, frequent, and seamless integration of technology into coursework is associated with student perceptions of institutional technology effectiveness, institutions may have an opportunity to examine and improve not just their technology infrastructure, but their instructional practices. At the most basic level of pedagogical effectiveness, students want technology to work and for instructors to know how to use it. From a more ambitious perspective, students value instructional uses of technology that go beyond the basics of access and efficiency and beyond the classroom, lecture hall, or lab. They value the connections to instructors, and to experts in their field, that technology makes possible outside the classroom. And they value a number of more profound instructional benefits of technology, including its potential to make learning more creative, enable students to reach their true academic potential, and elevate the level of teaching.
- Given that there are differences in student use, value and perceptions about technology, depending on their institution's Carnegie Classification, institutions may have an opportunity to explore their own students' technology needs and wants to deliver more responsive learning environments. Associate's college students give their instructors and institutions higher marks than other students do for delivering basic technology services and using specific technologies effectively. Associate's college students also are more likely than other students to agree that technology lowers the cost of their education and more likely to

STUDENT VOICES

“Until this survey, I wasn’t aware of [social studying] sites. I think it would be helpful if instructors mentioned and encouraged the use of them.”

disagree that it makes college less affordable. At the same time, the fact that associate’s college students use fewer technologies, are less comfortable with technology, experience less technology in the classroom, and perceive fewer of the benefits that technology can offer all suggest there are considerable opportunities for associate’s colleges, in particular, to use technology to enhance the academic experience at their institutions.

- Given that many students are not fully confident in the technology skills they believe they need—and given that many students report that instructors experience difficulty in getting technology to work successfully—institutions may have an opportunity to offer training that improves technology skills campus-wide. This applies both to core skills for academic productivity and access to learning resources and to specialized skills in more advanced applications, based on their needs or interests. Institutions need to commit to providing and supporting technology that students want and that faculty can use; faculty need to commit to using the technology students want and institutions support.
- Given that students prefer their courses to have online components—and given that they believe they learn more in classes with this format—institutions may have an opportunity to provide more blended learning environments. Even unpopular large lecture classes get a boost in students’ opinions when they feature online components.
- Given that students are not of one mind when it comes to their preferences for using social networking as a tool for academic purposes, institutions and instructors may need to walk a fine line to satisfy students’ different expectations about online social learning and academic relationships. Every student has preferred modalities of interacting. Multiple communications channels are useful and necessary to communicate and interact with students. Given many students’ use of, interest in, and desire to learn more skills for using social studying sites, however, there does seem to be an opening for institutions and instructors to explore online social learning tools. Online communities dedicated to academics could help students who are reluctant to blend their personal and academic lives.



RECOMMENDATIONS

1. Investigate *your* students' technology needs and preferences and create an action plan to better integrate technology into courses and help students access institutional and academic information from their many and diverse devices and platforms.
2. Provide professional development opportunities and incentives so that instructors can make better use of the technology they have and feel more comfortable with the technologies students find more engaging and relevant.
3. Expand or enhance students' involvement in technology planning and decision making.
4. Meet students' expectations for anytime, everywhere, Wi-Fi access on the devices they prefer to use.
5. Meet students' expectations for joining the consumer migration to eContent.
6. Nail the basics. Help faculty and administrators excel at supporting students' use of core productivity software and applications for academic use, including, e-mail, word processing, spreadsheets, content or learning management systems, library sites, and bibliography tools.
7. Make more and better use of technologies that students value—and that are easily integrated into learning experiences in the shared environments in higher education (e.g., tablets, smartphones, student response systems or clickers). In many cases, these are the technologies that distinguish highly rated from less highly rated institutions on the effective use of technology today.
8. Use technology in more transformative ways, such as participatory and collaborative interactions, and for higher-level teaching and learning that is engaging and relevant to students' lives and future plans. Use technology more to extend learning beyond the classroom.
9. Give students different options for interacting with the institution and with instructors, including "standard" and more forward-leaning options. Leverage the value that students find in instructional relationships, using face-to-face, online, and blended strategies.
10. Move strategically toward blended/hybrid learning environments to meet students' preferred styles of learning. Offer many different ways for students to engage in learning using technology and meet differentiated needs (e.g., for different student populations and preferences, academic disciplines, and coursework).
11. Establish or refine social media policies, using information about how your students use social media to enhance their educational experience. ◆

Appendix

METHODOLOGY

Study Background and Design

Since 2004, ECAR has conducted an annual study of undergraduate students and information technology that sought to shed light on how information technology affects the college experience. These studies have relied on students recruited from the enrollment of self-selected institutions, which allowed a very large sample size, but the sample itself was not representative of higher education institutions nationwide. To broaden the impact and meaning of results of this study to higher education professionals, EDUCAUSE pursued a new student technology study with an independent, nationally representative sample.

This year's student study was completed with our contractor, Grunwald Associates LLC, a research firm experienced with industry surveys using large representative samples. The sample for the ECAR National Study of Undergraduate Students and Information Technology, 2011 was stratified by region, institution type, and key demographics, with results from 3,000 college students from 1,179 colleges and universities. The survey was administered in an online format over 10 days in June 2011 to a large e-Rewards® consumer panel using double opt-in, invitation-only respondent recruitment methods. The consumer panel service employed quality-control mechanisms to assure that only qualified respondents took the survey.

The survey instrument was re-engineered this year to elicit responses that are conducive to actionable recommendations as a result of data analysis. The analysis focused on more multivariate analyses than past student technology survey findings to tell a story about students' technology experiences and interests in higher education. The study report format has been condensed and focuses on key findings and supporting infographics to visually communicate the most important results to stakeholders. Recommendations for how these results may be acted upon to improve the experiences of students with technology in higher education are emphasized in the report.

Population and Sample

The sample universe for this study is one of the largest online consumer panels consisting of more than 6 million members. Key information about the panel, sample, and respondents follows:

- Panel members initially were recruited via phone, mail, and banner ads on a diverse representation of websites.
- An identity validation routine was run on each potential panel member to disqualify candidates with incongruous answers to screening questions (e.g., 18-year-old physician).

- Panel members receive incentives for each study interaction they participate in to provide motivation for honest and accurate responses. The average tenure of panel members is three years, with an average of five study interactions per year.
- A random sample of self-identified college students was invited to participate in the EDUCAUSE survey. Survey invitees had pre-validated consumer panel profiles, and the initial invitation directed potential respondents to a brief, closed (non-public) online screening survey that further qualified them for the study.
 - Respondent candidates with profiles that fulfilled the screening criteria continued on to the main survey instrument. The survey was designed not to exceed 25 minutes.
 - Survey responses were monitored for disqualifying behavioral patterns (e.g., straight-liners, speedsters) to maintain high standards for quality assurance.

Data were weighted to match statistics from the National Center for Education Statistics on the following variables:

- Year (freshman, sophomore, junior, senior)
- Gender
- Age
- Geographic region
- Major
- Public/private Institution
- Institution size
- Two-year/four-year Institution
- Ethnicity

To present the results of this survey in a way that would be most meaningful to higher education institutions, the responses were analyzed in terms of students' institutional Carnegie Classification, the leading framework for recognizing and describing institutional diversity in higher education. Meaningful differences in the perceptions of students at institutions that award associate's, bachelor's, master's, and doctorate degrees are presented throughout the report.

Nearly all significant differences are reported at the 95 percent confidence interval, with a margin of error of +/-1.79 percentage points for the full sample and up to +/-6.80 percentage points for the smallest Carnegie class subgroup. There are a very limited number of instances in which significant differences at the 90 percent confidence interval are reported as part of general trends that include a number of other differences significant at the 95 percent confidence level. These are identified as less significant or strong results. ◆



EDUCAUSE

CENTER FOR
APPLIED
RESEARCH

4772 Walnut Street, Suite 206
Boulder, CO 80301-2538
303-449-4430 (phone)
303-440-0461 (fax)
info@educause.edu