5
IT and the Academic Experience

You have to watch! If you see technology being substituted for teaching, run.
—An undergraduate physics student

Key Findings

- Most respondents (59.3%) prefer a moderate amount of information technology (IT) in their courses. Males prefer somewhat more IT in courses than females.
- Seniors report more use of spreadsheet, presentation, and graphics software in their courses the quarter/semester of the survey; freshmen report more use of social networking sites (SNSs); and community college students report generally less use of technology overall. Student major is a differentiator of which technologies are used.
- Only 23.0% of students agree that it would benefit students if their institution required them to take at least one entirely online course; 22.6% disagree and 23.4% strongly disagree.
- Half of respondents say they like to learn through programs they can control such as simulations and video games. About one-third of respondents like to learn by contributing content to websites or through podcasts and webcasts.
- The percentage of respondents who have used a course management system (CMS) increased in 2007 and remains at that level in 2008 (82.3%). Respondents are still positive (69.5%) about their CMS experience; only 5.3% are negative.
- Only half (49.8%) of respondents agree that their institution’s IT services are always available when they need them for course work; 33.4% are neutral and 16.8% disagree.
- Among respondents, 44.4% say that “most” or “almost all” of their instructors use IT effectively in courses, and about one-third of respondents say that “most” or “almost all” of their instructors provide adequate IT training, or understand student IT skill levels.
- Most respondents (62.3%) say they do not skip classes when materials from course lectures are available online. However, 17.1% do so.
- Of IT outcomes about student engagement, improved learning, convenience of course activities, and workplace preparedness, respondents are most positive about convenience. Respondents who are positive about these outcomes more often prefer more IT in courses, adopt IT earlier, and have a positive experience with CMSs and instructor use of IT.

Chris Dede of the Harvard School of Education observes that “faculty have typically used advances in IT either to automate conventional forms of instruction or to make small steps in expanding the range of communication and experience. But we have just scratched the
surface in examining the options emerging technologies offer for expanding the repertoire of ways we think and learn together.”11 Our 2008 data on the technologies students employ in their courses are consistent with this observation. Most undergraduates now use common workplace technologies and some specialized IT tools in their course work, but even though students are quickly adopting technologies emerging from the Web 2.0 world in their personal lives, they do not use them to any great extent in their course work. Blogs, wikis, graphics, video- and audio-creation software, podcasts, webcasts, multiuser games, virtual worlds, and a host of other technologies are still primarily used in the domain of students’ personal, rather than academic, lives.

At the same time, most students report that they are not looking for extensive use of IT in their courses. They are enthusiastic about the convenience afforded by CMSs and other IT, yet they place real value on face-to-face interactions with instructors and classmates. Even when course lecture materials are available online, most say they do not skip classes. To a lesser extent, students perceive that IT can improve their learning. And central to this expectation of IT as enabler of convenience and learning, students count on the institution’s IT services to be available any time they need them. This need is not entirely met, with only half of responding students agreeing that institutional IT services are available whenever they need them for courses.

Chapter 5 continues our 2008 update, looking more deeply into findings about IT and the academic experience, including

- student opinions about their instructors’ use of IT in courses, and
- student perceptions about the impact of IT on their courses.

**Preference for IT in Courses**

Each year, ECAR has asked students how much IT they prefer in their courses, using a 5-point scale from “no IT” to “exclusive IT.” Initially, ECAR expected that today’s undergraduates who have grown up with the Internet and computers would prefer courses heavily weighted with technology, in support of both learning and course administration. This has not been the case. In each of the past three years’ studies, students report preferring only a “moderate” amount of technology in courses (between 55% and 60% of respondents). Now, in 2008, 59.3% of respondents again say they prefer moderate IT in their courses (see Figure 5-1).2 Few respondents, about 1 in 20, prefer the extremes—either no technology (1.9%) or exclusive technology (3.6%) in their courses.

Amazingly, this desire for moderate IT in courses has remained constant, while technology has not. The types and number of technologies in use have increased; what technologies are popular with students has changed; and the overall density of technology is much greater. It follows that what respondents considered “IT” four years ago is likely different from what they consider “IT” today. In addition, various student populations undoubtedly have different views of what constitutes “IT.” For example, students who experience technology as fully integrated into their daily lives (rather like a fish in water) may no longer think of some technologies, such as networked services or enhanced cell phone capabilities (including Internet access), as IT. Despite this fluid technical environment and diversity of perceptions, respondents continue to state that they prefer only moderate IT in courses. This strongly suggests a widespread attitude that IT resources—no matter how
students think about them—are best situated in learning environments where technology is balanced with other learning activities, including face-to-face interactions in the classroom and with faculty and classmates.

Consistent with previous years’ studies, male respondents express a stronger preference for IT in courses, with 33.7% preferring extensive or exclusive IT in courses, compared with 19.8% of females. However, there is little difference on the basis of the other student demographics of age, class standing, major, part-time or full-time status, and on-campus or off-campus residence. Especially interesting is the finding that for the first time this year, age no longer makes a meaningful difference. Previous years’ studies found that younger students preferred less technology in courses and older students preferred more.³ In 2007, that difference was slight, and it appeared that there might be a trend away from age being a differentiator. Now, looking at the 2008 data, that trend is confirmed, and the pattern of preference for IT in courses is generally consistent across age groups. One speculation is that this is largely because technology is becoming increasingly integrated into the lives of learners in all age groups.

The desire for moderate IT in courses was evident in student comments from both the survey’s open-ended question and student focus groups. Students place real value on face-to-face instruction. One student said, “Nothing can adequately replace face-to-face lectures and recitations. Nothing. I don’t care how expensive the computers are, how high-definition the video is, or how fancy the presentation software is.” Research by Lotkowski, Robbins, and Noeth supports these comments. They examined more than 400 studies about factors contributing to student retention and degree completion, validating that improving student success is associated with strengthening the formal and informal contacts with the institution that develop confidence and competence in core communication skills. In sum, “face time” with faculty and peers contributes to students’ feeling included and integrated into the academic environment, and ultimately contributes to their success.⁴ Further, data from previous ECAR studies find that students aren’t always positive about how instructors use IT, and this may also contribute to their preference for only moderate technology in courses.

**Technologies Used the Quarter/Semester of the Survey**

Respondents identified which technologies they were actively using as part of their courses at the time of the 2008 ECAR survey (February 15 through April
Table 5-1 shows that three technologies were used by many respondents: spreadsheets, presentation software, and college or university library websites. Given the prodigious amount of information on the web, it’s significant that two-thirds of respondents (67.7%) report accessing their institution’s library website during the quarter/semester of the survey. Surprisingly, the range of use reported by different majors is relatively small. All majors other than engineering show between 67% and 77% of respondents using the library website during the quarter/semester of the survey; fewer engineering students (55.5%) report doing so.

Seniors from four-year institutions report using more presentation, spreadsheet, and graphics software in courses this quarter/semester than either freshmen or community college respondents. This usage profile reflects that upper-division courses, often smaller and focused on student major, make greater use of these core applications. Community college use is lower for most technologies on the list.

Some technologies are used much more overall (for combined school, work, and recreation) than just specifically in courses during the quarter/semester of the survey (see Table 4-4 for overall use). Of special interest is the much higher overall use of podcasts (29.1%) and

<table>
<thead>
<tr>
<th>Technology</th>
<th>Seniors (N = 11,629)</th>
<th>Freshmen (N = 8,924)</th>
<th>Community College Students (N = 3,317)</th>
<th>All Students (N = 27,317)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Many Students Used This Quarter/Semester</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College or university library website</td>
<td>70.8%</td>
<td>69.5%</td>
<td>53.2%</td>
<td>67.7%</td>
</tr>
<tr>
<td>Presentation software (PowerPoint, etc.)</td>
<td>73.1%</td>
<td>58.9%</td>
<td>41.8%</td>
<td>63.5%</td>
</tr>
<tr>
<td>Spreadsheets (Excel, etc.)</td>
<td>50.9%</td>
<td>38.8%</td>
<td>26.0%</td>
<td>43.3%</td>
</tr>
<tr>
<td><strong>Few Students Used This Quarter/Semester</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wikis</td>
<td>19.3%</td>
<td>21.1%</td>
<td>14.9%</td>
<td>19.3%</td>
</tr>
<tr>
<td>Social networking websites (Facebook, MySpace, Bebo, LinkedIn, etc.)</td>
<td>15.4%</td>
<td>21.0%</td>
<td>11.3%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Graphics software (Photoshop, Flash, etc.)</td>
<td>16.5%</td>
<td>10.7%</td>
<td>10.5%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Instant messaging</td>
<td>12.8%</td>
<td>16.5%</td>
<td>8.8%</td>
<td>13.4%</td>
</tr>
<tr>
<td>Programming languages (C++, Java, etc.)</td>
<td>10.6%</td>
<td>9.7%</td>
<td>5.3%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Discipline-specific technologies (Mathematica, AutoCAD, STELLA, etc.)</td>
<td>10.5%</td>
<td>8.5%</td>
<td>5.1%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Blogs</td>
<td>7.9%</td>
<td>7.5%</td>
<td>5.4%</td>
<td>7.4%</td>
</tr>
<tr>
<td>E-portfolios</td>
<td>8.1%</td>
<td>3.9%</td>
<td>3.0%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Podcasts</td>
<td>4.2%</td>
<td>4.8%</td>
<td>1.5%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Video-creation software (Director, iMovie, etc.)</td>
<td>4.7%</td>
<td>3.6%</td>
<td>2.0%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Audio-creation software (Audible, GarageBand, etc.)</td>
<td>3.4%</td>
<td>3.4%</td>
<td>2.1%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Webcasts</td>
<td>2.9%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Online virtual worlds (Second Life, etc.)</td>
<td>1.0%</td>
<td>0.9%</td>
<td>1.6%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>
webcasts (25.0%) compared with their specific use in courses during the quarter/semester of the survey (4.2% and 2.7%, respectively). Yet, even though webcast and podcast use is low overall, at certain institutions usage of these tools is high. Students in the focus group at Coppin State University, for example, all reported using webcasts in their courses and were pleased with their contribution to learning.

In 2008 as in previous years, student comments about podcasts (both audio and video) were quite positive—valued as a tool for missed classes and for studying course materials. A typical comment was, “Podcasts for my cognitive psychology class were amazing. It made studying for exams so much easier because I was able to look at the holes in my notes and relisten to the lecture to understand. I was also more focused on listening in class rather than frantically taking notes.”

There is a similar pattern for audio-creation and video-creation software. While about a third of respondents report using these software tools overall, fewer than 4% were using them for course work during the quarter/semester of the survey. This suggests that students are learning and using these technologies, but not necessarily for formal academic reasons. In fact, the 2007 ECAR survey found that two-thirds of respondents said they learned video/audio software out of personal interest.5

The data show that 8.8% of respondents are already using online virtual worlds, and 1.0% used them in courses the quarter/semester of the survey. These online environments are in very early stages of adoption, and ECAR will track their growth in future studies. At this point, according to Linden Lab, maker of Second Life, at least 70 U.S. colleges and universities have taken up the challenge of using Second Life in an academic setting.6 A recent ECAR research bulletin describes a sampling of use in higher education teaching and learning. For example, Vassar College has built a Vassar Castle and a re-creation of the Sistine Chapel to enhance the learning experience.7

Blogging in the academic context received mixed reviews. Negative comments came from students who did not like blogs used in place of class discussions, questioned the inclusion of personal information on class blogs, or felt faculty members “force using blogs when it doesn’t seem natural or necessary.” Others were enthusiastic about the course benefits of blogs, with comments such as “I feel I have more freedom to express myself” or “topics that don’t get discussed long enough in class can be fleshed out more online.”

Where Student Major Matters

In Chapter 4, ECAR reported qualitative data about students’ IT experience—specifically, that because their majors vary in the technologies required, students' majors are influential in determining which IT skills they develop. The quantitative data on what technologies are used in courses this quarter/semester, shown in Table 5-2, support this idea, indicating how technology use varies by major. This finding is generally consistent with past years’ studies and lends support to the idea that careful decisions about where IT is introduced in courses can have a positive impact on student skill levels.

Overall, engineering students are the top users of spreadsheets, and also of the complex technologies of programming languages and technologies specific to their engineering discipline. Business majors are second in the use of spreadsheets, essential to the business world. Fine arts majors make greater use of graphics, video-creation, and audio-creation software.

E-portfolios continue to be primarily used by education majors. They are often used as a tool for teacher applicants to communicate the status of their teacher education requirements and qualifications to school district administrators. There is speculation that e-portfolios will be
Table 5-2. Technologies Used in Courses This Quarter/Semester, by Major

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>College or University Library Website</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1,401</td>
<td>55.5%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>12,547</td>
<td>72.8%</td>
</tr>
<tr>
<td><strong>Spreadsheets (Excel, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1,837</td>
<td>72.8%</td>
</tr>
<tr>
<td>Business</td>
<td>2,827</td>
<td>64.8%</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>743</td>
<td>56.1%</td>
</tr>
<tr>
<td>Life/biological sciences</td>
<td>2,372</td>
<td>47.8%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>3,405</td>
<td>31.1%</td>
</tr>
<tr>
<td><strong>Graphics Software (Photoshop, Flash, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine arts</td>
<td>636</td>
<td>33.3%</td>
</tr>
<tr>
<td>Engineering</td>
<td>521</td>
<td>20.6%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>2,108</td>
<td>10.7%</td>
</tr>
<tr>
<td><strong>Video-Creation Software (Director, iMovie, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine arts</td>
<td>186</td>
<td>9.7%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>760</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>Audio-Creation Software (Audible, GarageBand, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine arts</td>
<td>247</td>
<td>12.9%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>587</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Programming Languages (C++, Java, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1,097</td>
<td>43.5%</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>320</td>
<td>24.2%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>986</td>
<td>4.9%</td>
</tr>
<tr>
<td><strong>Discipline-Specific Technologies (Mathematica, AutoCAD, STELLA, etc.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1,009</td>
<td>40.0%</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>331</td>
<td>25.0%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>1,045</td>
<td>6.6%</td>
</tr>
<tr>
<td><strong>E-Portfolios</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>616</td>
<td>22.4%</td>
</tr>
<tr>
<td>All other majors*</td>
<td>975</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

*Responses not coded as one of the standard majors ("other" or "undecided") are excluded.

adopted by other majors linked to professions requiring professional certifications. To date, this does not appear to be the case. Since 2006, when ECAR first asked this question, the overall use of e-portfolios has not significantly increased for education or other majors.

**Textbooks and IT**

In their written responses, students raised issues about online course reading materials and textbooks—with about as many positive as negative comments. Much, but not all, of the discussion centered on costs, and the following themes emerged:
Textbooks with IT elements. Some students find the multimedia approach to content beneficial. A typical comment was, “I really enjoy the websites connected with my textbooks, which offer further study aids. My GPA is 4.0, and I credit these sites with helping me both achieve and maintain academic excellence.” Others objected to the additional costs. For example, one student said, “Books with IT are very expensive. The two books for anatomy cost $240 because of the additional IT.”

Cost savings of online readings and electronic books. Many students are sensitive to textbook costs. One student summed up, “Readings posted online are mercifully free (instead of ridiculously priced textbooks), and it’s nice to be able to access them from anywhere.” Another said, “The best use of IT would be online textbooks. They cost too much, especially when you consider that students, the ones with no money, are the ones required to buy them.”

Too much screen time. Typical comments were, “I do not like sitting at my computer squinting at 30 pages of text, but it is a pain to print them, and at 10 cents a page it can get expensive,” and “I hate reading textbooks online. This is because I spend most of my day on a computer and don’t want to go home and read on the darn thing.”

De-emphasizing textbooks. One student said, “I have found (via Google) other four-year institutions that have physics/chemistry lessons available online that teach key concepts 10 times more effectively. Sometimes I find myself learning concepts from these sites rather than trying to use the assigned textbook.” Another said, “I didn’t buy textbooks this semester. I haven’t missed them.”

Online Courses

Are there differences in perspective between students who are taking more online courses and those who are not? To answer this question, students were asked if they were currently taking “entirely” online courses. Only 2.8% of respondents were enrolled exclusively in online courses, and an additional 11.9% were taking a mix of online and face-to-face courses.

The strongest factor associated with whether respondents are or are not taking online courses is part-time or full-time status (see Figure 5-2). Almost no full-time students were taking all online courses, but more than 1 in 10 part-time students were doing so. Older respondents, regardless of part-time or full-time status, are also more inclined toward online courses. Nearly one-third (30.6%) of respondents aged 30 and older were enrolled in one or more entirely online courses the quarter/semester of the survey, in contrast with only 8.0% of respondents 18 and 19 years old and 13.6% of students 20 to 24 years old. This likely reflects the fact that older students and part-time students often have more family and work responsibilities, and value the flexibility offered by online courses.

In fact, nontraditional students (including part-time and older students) are driving the increase in online enrollments. In a five-year study on the growth of online learning published in 2007, the Sloan Consortium found that between 2002 and 2006, community colleges (with their higher numbers of nontraditional students) had the highest growth rates and accounted for more than one-half of all online enrollments. Bachelor’s institutions had the fewest enrollments and lowest growth rate. Similarly, the ECAR data show 20% of associate’s respondents taking at least one online course the quarter/semester of the survey, in contrast with 6.9% of bachelor’s respondents. The Sloan Consortium expects this trend to continue.
The question about online courses triggered many student comments. For those who like online courses, it is not surprising that the most common reasons were the convenience offered and the ability to take courses that would otherwise not be available to them. Often these responses came from nontraditional students. Some students also commented positively about online courses that were highly (electronically) interactive with other students and the instructor. One student expressed these ideas, saying, "I enjoy the convenience of online classes and believe students put more thought into their online posts than a student would have put into a comment made aloud in a classroom. It also allows discussion on any topic to continue to develop over the course of a semester."

However, despite perceptions that students like online courses, the majority of written comments were negative. The following major themes emerged from the open-ended comments:

- **The lack of face-to-face interaction detracts from learning.** As expected, this is the most common theme, with a typical comment being "I feel that nothing rivals human instruction and interaction. There is more in-depth understanding purveyed in class through discussion and debate. Expressions and body language and verbal cues all contribute to our learning and understanding of key concepts."

- **Online courses are too conducive to cheating.** One student says, "Cheating is practically encouraged in this domain. One person I know has her husband taking the class while she works."

- **There are technical issues.** Problems are cited about network and software performance and error-prone processes, resulting in difficulties taking online exams and submitting course work. One student said, "It is frustrating when the server crashes during finals week or during times of high usage. There's also too much room for error, e.g., hitting the wrong key when taking online exams."

- **Online courses are more demanding and require students to “teach themselves.”** One student summed this up, saying, "I find that the course loads are far heavier than in-class courses, so all gains in terms of convenience are totally lost."
Most comments expressed a preference for balance, to incorporate technology in courses for convenience and creative teaching but to retain the valued classroom experience. This adds support to our earlier finding that most students prefer moderate IT in their courses.

A number of institutions, thinking that it is important for students to experience online courses, are considering the value of making this a requirement. The ECAR survey therefore asked students whether they agreed or disagreed with the statement “It would benefit students if my institution required students to take at least one entirely online course.” Figure 5-3 shows a resounding lack of support for this idea, with only 23.0% of respondents agreeing. Are students who are actively taking one or more entirely online courses more positive? The data show that they are, with 43.9% agreeing that the requirement is a good idea. Still, not even half of these students think a requirement is a good idea. The negative response may be due both to the general lack of enthusiasm for online courses noted earlier from the qualitative data and to respondents’ taking issue with making the course a “requirement.” One student noted, “I have participated in many online courses and my experience is positive. However, I do not feel it should be mandatory. That would restrict freedom of choice, and not everyone learns well in that environment.”

### How Students Like to Learn with Technology

Educators using IT in courses are very interested in understanding how their students think about technologies as learning tools. To gather information about this topic, ECAR solicited help from Edward Dieterle while he was a doctoral student at the Harvard Graduate School of Education. In 2007 he designed a set of four questions (see Figure 5-4), and in 2008 ECAR added an additional question about learning through creating or listening to podcasts or webcasts.

Learning by searching the Internet has become commonplace, and most respondents say they like it (80.2%). The website students most often talked about in focus groups, and one that was also mentioned in survey comments, was Wikipedia—its state of flux and unreliability as a source, its contribution to learning, and how instructors disallow its use as a reference. Some students were adamantly critical, with comments such as “Sites/services like Wikipedia and the general Internet are horrible and should not be used under any circumstances in the academic realm.” Others

![Figure 5-3. It Would Benefit Students if My Institution Required Students to Take at Least One Entirely Online Course (N = 27,110)](image-url)
do turn to Wikipedia for answers, writing comments such as “In one of my classes there is no textbook. Sometimes Wikipedia is where we find the articles we are looking for.”

As in 2007, about half of respondents say they like to learn through programs they can control, such as video games and simulations (males more so than females). This finding that so many respondents are positive about gaming in a learning context is consistent with the assessment of digital game-based learning (DGBL) by Richard Van Eck of the University of North Dakota. He asserts that after years of DGBL research, there is now widespread public interest in using games as learning tools. He cites three contributing factors: the ongoing research conducted by DGBL proponents; the increased popularity of games; and the match between DGBL and Net Generation characteristics—that they require multiple streams of information, prefer inductive reasoning, like frequent and quick interactions with content, and have exceptional visual literacy skills.11

Interestingly, the majority of respondents are selective, with 50.9% reporting that they like to learn using just two or three of these technology groups. The number of respondents who like to learn using all five technology groups is relatively small (only 8.7%), as is the number of respondents who do not like to learn using any of these technology groups (9.4%). Further, since many respondents may not be experienced in these technologies, especially in a learning context, it is not surprising that a large proportion (6.6% to 25.8%) report that they do not know whether or not they like to learn using these technology groups.

ECAR data show consistency between respondents’ choice of technology groups they like for learning and the technologies they report using in general:

- Respondents who like to learn by contributing to websites, wikis, blogs, and the like also report more use of wikis and blogs in their courses the quarter/
semester of the survey and more often add content to wikis, blogs, or photo and video websites in general.

- Respondents who like to learn through creating or listening to podcasts or webcasts also report more use of podcasts and webcasts in their courses the quarter/semester of the survey and make more use of podcasts and webcasts in general.

There is noticeably more enthusiasm for these learning technologies among those who are early adopters of technology (see Figure 5-5). Currently, at least half or more of early adopters/innovators like to learn using each of these technology groups, and the differences between early and late adopters are especially large for the newer technologies on the list.

**Course Management Systems**

The 2005 and 2006 ECAR studies reported that about 72% of all respondents had taken a class using a CMS. Then, in 2007, the data showed a significant jump to 82.0% for the whole respondent population. Other research from EDUCAUSE and the Campus Computing Project report corroborated this 2007 ECAR finding. This year, ECAR data show that exposure to CMSs remains at this increased level (82.3%) and also indicate that the frequency of CMS use has remained the same as last year. Seniors, having spent more years in college, report greater use of CMSs than freshmen. Community college students report the least use of CMSs (see Figure 5-6).

Most respondents say that their overall CMS experience is either positive (57.8%) or very positive (11.7%) (see Figure 5-7). Although only 5.3% of respondents report a negative CMS experience, that represents a large number of actual respondents (about 1 in 20), especially considering the large number of CMS users and their overall high frequency of CMS use. Respondents reporting a positive CMS experience show a stronger technical profile. They prefer more IT in their courses, are more often early adopters of technology, use a CMS more frequently, and are more confident about their CMS skills. These

![Figure 5-5. How Students Like to Learn with Technologies, by Technology Adoption](image-url)

- Late adopter/laggard (N = 2,578)
- Mainstream adopter (N = 9,907)
- Innovator/early adopter (N = 7,368)
findings are generally consistent across the institutional characteristics of Carnegie class, size of student enrollment, and private versus public status; across student demographics of gender, age, and major; and across the past three ECAR studies.

CMSs are very much on the minds of students. Nearly one in six of the written survey comments mentioned CMSs in some context. Positive and negative comments were about equal, with positive comments focusing on the convenience of tracking grades and getting posted assignments and readings. Most of the complaints centered on reliability, but they also included the lack of user friendliness, poor faculty use, and the lack of consistent use by instructors. One student respondent thought that the convenience of the CMS was so great that the university should “make all professors use this technology, at the minimum for posting grades. It is great to have homework, notes, examples, sample tests, etc., available to view. It is more flexible than office hours, and much more convenient for students to keep up with their academic standing.” Results from the
EDUCAUSE 2007 Core Data Service report suggest that many students may have cause for similar sentiments. At the vast majority of campuses, faculty use CMSs selectively; fewer than 30% of institutions report that the CMS is used for all or nearly all courses. Some specific CMSs received more positive (or negative) comments in student responses than other systems, suggesting that from a student perspective there is a difference in CMSs and their implementations.

Availability of IT Services for Course Work

In 2007 a considerable number of respondents discussed problems accessing IT services—interruptions of the network, unavailability of the CMS, difficulty uploading/downloading files, and so forth. So in 2008, the survey asked respondents whether they agreed or disagreed with the statement “My institution’s IT services are always available when I need them for my course work.” The question focused specifically on availability for course work, excluding availability for recreation or work. The goal, of course, would be to have all students agree, but in fact Figure 5-8 shows that only half (49.8%) do so. The mean agreement is 3.39.

That leaves one-third of respondents neutral (33.4%) and another 16.8% actually in disagreement. A natural question, then, is whether this opinion about service delivery is consistent across the board or is found disproportionately at a subset of institutions. By far, most institutions (81.6%) show between 40% and 59% of students agreeing or strongly agreeing that IT services are always available for course work (see Figure 5-9). Very few institutions receive lower marks from students, and only one institution had a rating above 70%. Clearly, from a student perspective, there is room for improvement.

Table 5-3 shows that respondents’ CMS experience is highly associated with how they perceive their institution’s IT services availability for course work. Of those who agree or strongly agree that IT services are always available, 78.3% report a positive or very positive CMS experience; of those who disagree or strongly disagree, only 54.3% do so. This is not surprising, considering that comments about CMSs from the open-ended survey question often speak to their availability.

Student written comments corroborate this finding: They expect the network to be reliable, easy to use, and fast enough not only for course work but also for recreation. In addition to online game players’ complaints about network bandwidth or blocking of games, students talked about videos being too slow to watch, taking too long to load, or experiencing breaks in the video stream.

![Figure 5-8. My Institution’s IT Services Are Always Available When I Need Them for My Course Work (N = 26,947)](image-url)
Figure 5-9.
Institutional Profile of Students Who Agree That IT Services Are Always Available for Course Work (N = 98 Institutions)

Table 5-3. IT Services Are Always Available for Course Work, by CMS Experience

<table>
<thead>
<tr>
<th>CMS Experience</th>
<th>N</th>
<th>Mean*</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very negative</td>
<td>234</td>
<td>2.78</td>
<td>1.298</td>
</tr>
<tr>
<td>Negative</td>
<td>910</td>
<td>2.87</td>
<td>1.108</td>
</tr>
<tr>
<td>Neutral</td>
<td>5,391</td>
<td>3.16</td>
<td>0.949</td>
</tr>
<tr>
<td>Positive</td>
<td>12,340</td>
<td>3.49</td>
<td>0.896</td>
</tr>
<tr>
<td>Very positive</td>
<td>2,484</td>
<td>3.85</td>
<td>0.963</td>
</tr>
</tbody>
</table>

*Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Also, as with prior years, the expectation level for wireless coverage on campus is high. Numerous comments primarily asked for more wireless access or that the existing wireless be made more reliable and faster. For example, “It is rather annoying that in certain places on campus I cannot pick up a wireless signal to access the Internet. I like to be able to reference or look up things online while a professor is giving his/her lecture.”

**Skipping Classes When Materials Are Online**

Increasingly, through the campus CMS and other venues, course materials are made available online—syllabi, reading materials, sample exams, discussion boards, podcasts, lecture notes, PowerPoint presentations, and so on. In fact, in the 2007 study, almost all respondents with access to a CMS used the online syllabus (97.7%) and online readings and links to other text-based course materials (96.5%). Students report that this use of technology is a great convenience. However, they are also clear that they value face-to-face classroom interaction. The survey asked about the effect of easy online access to course materials on classroom attendance—are students tempted to skip classes? Figure 5-10 indicates that most students say “no.” The mean value is 2.26 (on the scale of 1 = strongly disagree to 5 = strongly agree), and almost two-thirds of respondents (62.3%) disagree that they skip classes for this reason. However, about one-sixth of respondents do say that online access to course materials does result in their skipping classes.

Students spoke to the issue of skipping class in their open-ended comments. There was a preference for instructors to post materials and
a general opinion that if professors do not add value in the classroom, then students are more likely to skip class. One student summed it up: “I believe that IT in courses is great when lecture is emphasized along with it. When professors repeat the same material that is on the website, students often skip class. However, if professors are able to communicate the online material creatively, students often do attend class.”

**Instructor Use of IT in Courses**

The 2007 ECAR survey asked respondents whether “Overall, instructors use IT well in my courses.” Although instructors received generally good marks, with more than half of respondents in agreement, more than 13% disagreed. The questions for the 2008 survey were modified on the basis of what students said in the 2007 focus groups and open-ended survey comments about instructor shortcomings using IT. To get more granular data on student perceptions, the measurement scale was changed, asking respondents to estimate how many of their instructors—almost none, some, about half, most, or almost all—used IT effectively, provided students with adequate IT training, and understood their students’ IT skills (see Figure 5-11).

The bottom-line finding is that fewer than half of students think that “most” or “almost all” of their instructors meet the criteria stated in each of our questions about IT in courses. The distributions of responses for these questions are surprisingly consistent across student demographics and types of institutions.

Respondents are most positive about the effective use of IT in courses, with 44.4% indicating that “most” or “almost all” of their instructors provided adequate IT training or understand student skill levels; about half of respondents say that only “some” or “almost none” of their instructors do so. Many students commented that instructors need more training themselves, especially in commonly used software—not only so that instructors will use technology better, but also so they can help students. One comment was, “Instructors should receive IT training (Microsoft Excel, PowerPoint, Desire2Learn, etc.) and pass that knowledge to students. This would make classroom learning more effective.” This was echoed by a senior: “Faculty should just use technology. It’s not going away. The longer they wait, the harder it will be.”
A number of older students confessed to a lack of technology skills compared with their younger peers and noted that instructors do not take older students into consideration. One older student said, “I think many professors are more than willing to use IT in courses but then provide no support at all for students who are older or just unfamiliar with IT. The professors always pass the buck to IT support call centers. The call centers do what they can, but it would be preferable for the professors to provide support, considering it is their content and their choice to use IT.”

What factors make a difference in student perception about instructor use of IT? The data show that respondents who prefer more technology in their courses, use technologies more frequently, and are more skilled are generally more positive about their instructors’ use of IT in courses. This is especially true for CMSs, where 51.6% of respondents reporting positive CMS experience say that “most” or “almost all” of their instructors use IT effectively; only 27.6% of those reporting negative CMS experience do so. This finding confirms that there is high payoff for work done by campuses and their vendors to ensure and improve high-quality, easy-to-use CMSs for faculty and students.

Opinions about faculty use of IT—directly or indirectly—again dominate responses to the survey open-ended question. The content and themes are consistent with those found in the 2007 qualitative data and reported in depth in the 2007 study report.

**IT Outcomes Related to Student Success**

One of higher education’s finest hours will be when it can be shown definitively that its enormous IT investments have a positive impact on student success. Today, however, after decades of research and debate, a full understanding of what leads to student success—even without factoring in the IT component—remains an ongoing challenge. To deepen higher education’s knowledge of student success, the National Postsecondary Education Cooperative (NPEC) sponsored a three-year initiative on student success. In their May 2007 summary report of the project’s culminating symposium, student success is defined at its simplest as getting students into and through college...
to a degree or certificate. The report then acknowledges that student success is a
generic label for a topic with many dimen-
sions, ranging from student flow across the
entire educational pipeline, to quality and
content of learning and skills achieved as a
result of going to college, to positive educa-
tional experiences (such as student engage-
ment or satisfaction).18

Because the question of student success
is so important, ECAR created four positive
"outcome statements" about the impact of
IT in courses and asked students whether
they agreed or disagreed. These statements
are derived from the significant body of
literature generated by the NPEC ini-
tiative, and each represents a key dimension
of student success.19 Findings about these
outcome statements are described in the
sections that follow.

✦ Student engagement. Over time,
student engagement has been consist-
tently and positively linked to student
success.20 ECAR asked if students
agreed with the statement "I get
more actively involved in courses
that use IT."

✦ Convenience. Support for course
activities is known to be associ-
ated with learning.21 ECAR asked if
students agreed with the statement
"IT makes doing my course activities
more convenient."

✦ Learning. ECAR included an overall
self-assessment by students, asking
them if they agreed with the statement
"The use of IT in my courses improves
my learning."

✦ Workplace preparedness. In the 2007
comments, many students expressed
their desire to be prepared, IT-wise,
for jobs upon graduation. ECAR asked
students if they agreed with the state-
ment "By the time I graduate, the IT I have
used in my courses will have adequately
prepared me for the workplace."

Perhaps the most obvious measure of
student success is grade performance (GPA).
For this reason, ECAR asks students for a
self-reported cumulative GPA and looks at
how GPA is related to other survey data.23
For example, are some current techno-
lologies—such as the Internet, spreadsheets,
video- and audio-creation software, or
complex gaming learning tools—associated
with higher GPAs? Are other technolo-
gies—such as downloading music and
video, gaming, or social networking sites
(SNSs)—so distracting to academic studies
that they negatively affect GPA? The ECAR
data suggest that after controlling for
known demographics that are related to
GPA, such as age and gender, the other
factors that ECAR analyzes are not strongly
associated with respondent GPA.

Overview of Student Perceptions about IT's Impact
on Courses

Figure 5-12 shows the distribution of
responses for the ECAR outcome ques-
tions about student engagement, learning,
convenience, and workplace preparedness.
Convenience is the clear front-runner. Here,
the number of agree responses (65.6%) far
outweighs the combined disagree
and neutral responses (34.4%). This is
not surprising, because repeatedly in past
studies—in both the quantitative data and
the qualitative data—students have told us
that convenience was the most valuable
benefit of IT in courses. As one student
told us, "Convenience makes it easier
to learn!"

Perhaps most important is whether
students perceive that IT in courses actu-
ally improves their learning. The data
show that just fewer than half (45.7%) of
respondents agree or strongly agree.
Students made frequent reference to IT in
this context, with comments such as "IT has
greatly enriched my learning experience"
or "I took biology and if it weren't for the computer, I wouldn't have learned it. I could see the visualization of cells." However, typical comments qualified the benefit of IT in learning—recognizing the contribution IT makes and at the same time pointing out that classroom learning is important and that IT must be used effectively. A common thought was, "Used effectively, IT can enhance the learning experience—sometimes even encourage students to learn better. However, IT is only one tool out of the many available for teaching/learning; it is not the only tool."

At the same time, more than one in six students (15.1%) disagree that IT in courses improves their learning. Some of their comments belie the notion that all of today's students are happy digital natives. One 22-year-old student, apparently in this group, commented, "I have found that I learn more, receive higher grades, and participate more in classes that do not require or even use IT as a part of the learning experience. I much prefer taking lecture notes (from a blackboard instead of PowerPoint) and reading textbooks to taking online quizzes and doing other online course activities."

It's noteworthy that in previous years' studies (2005 through 2007), student responses to this question about learning were more positive. More than 60% agreed that IT in their courses had improved their learning, compared with 45.7% agreeing this year. At the other end of the scale, previous years' data showed that fewer than 10% of respondents disagreed, compared with 15.1% disagreeing this year. ECAR looked carefully at possible reasons for this change. One factor may be the 2008 survey instrument itself, which was streamlined and changed the placement of this question vis-à-vis other questions, and also changed the wording from past tense to present tense to be consistent with other questions. These differences in the 2008 survey may have had some impact on respondent answers. Another possibility is that the data may be showing, at least in part, a real trend toward less agreement. As IT continues to be more integrated into respondent lives, it may be shifting how students think about IT in relation to their course work. This
2008 change is interesting and possibly quite important, but it is not yet possible to establish a proper interpretive context for this finding. ECAR will look carefully at both qualitative and quantitative data in 2009 to gain further insight.

About half of respondents (48.0\%) agree that upon graduation the IT used in their courses will have adequately prepared them for the workplace, and another third (37.0\%) are neutral. The large number of neutral responses may indicate a lack of familiarity with the workplace. Student written responses included comments about career and workplace preparedness—most often the need for institutions to teach in their courses the IT that will be needed in the workplace. This need is also evident among those not yet in college. The Project Tomorrow Speak Up 2007 survey found that high school students consistently identified good technical skills as the top capability they need to be successful in the 21st century.\textsuperscript{24}

Students are concerned about knowing both commonly used software and software specific to their majors. One student says, “I have held several internships in major Fortune 500 firms, and they expect you to already have a very good knowledge of software like Excel and PowerPoint. I simply believe that students cannot be successful without this knowledge.” A computer science major says, “For my major, applied math and computer science, I believe I would benefit if the ‘tools of the trade’ were actually used more often—for example, learning and using Linux extensively in labs so that students are not just programming.” A number of students in the focus groups pointed to the value of internship, with comments such as, “As a biology major, we learn background information. We are not learning technology. If it weren’t for internships, I wouldn’t learn the technologies I need.”

Of the four outcome statements, there is least agreement about IT’s contributing to student engagement. Instead of responses skewed toward agreement, as with the other outcome statements, responses here form a more traditional bell-shaped curve. Although nearly one-third (31.8\%) agree, the large majority of respondents are either neutral or actually disagree. The next section reports that IT’s impact on student engagement is most strongly associated with student preference for IT in courses, indicating that those students preferring more IT in courses are the ones who most often report more engagement in courses that use IT.

Chapter 4 reported that student use of and skill with IT varies on the basis of student major. Table 5-4 shows that student perceptions about the impact of IT on courses also vary on the basis of major. Overall, actual differences between majors are small, and the pattern of responses is similar for each of the four outcome statements. Business and engineering majors are somewhat more positive about the value of IT to their academic experience than students in the other disciplines. For example, 56.0\% of business majors agree that IT in courses improves their learning; only 35.1\% of humanities majors do so. Looking back at Table 5-2, one explanation might be that students in disciplines such as business and engineering are using more IT in courses (for example, spreadsheets or programming languages) that directly applies to the course subject. In contrast, students in majors such as social sciences and humanities may use IT more as a support function (such as CMSs) and find face-to-face discussions more central to the course subject matter.

Response patterns for the ECAR outcome statements about the impact of IT on courses are consistent across demographic factors—gender, age, class standing, GPA, part-time versus full-time enrollment status,
Table 5-4. Student Perceptions about IT in Courses, by Major

<table>
<thead>
<tr>
<th>Major</th>
<th>N</th>
<th>I get more actively involved in courses that use IT.*</th>
<th>The use of IT in my courses improves my learning.*</th>
<th>IT makes doing my course activities more convenient.*</th>
<th>By the time I graduate, the IT I have used in my courses will have adequately prepared me for the workplace.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>4,288</td>
<td>3.31</td>
<td>3.54</td>
<td>3.90</td>
<td>3.57</td>
</tr>
<tr>
<td>Engineering</td>
<td>2,498</td>
<td>3.29</td>
<td>3.48</td>
<td>3.83</td>
<td>3.57</td>
</tr>
<tr>
<td>Physical sciences, including math</td>
<td>1,311</td>
<td>3.11</td>
<td>3.37</td>
<td>3.75</td>
<td>3.36</td>
</tr>
<tr>
<td>Education, including physical education</td>
<td>2,701</td>
<td>3.01</td>
<td>3.26</td>
<td>3.63</td>
<td>3.36</td>
</tr>
<tr>
<td>Life/biological sciences, including agriculture and health sciences</td>
<td>4,886</td>
<td>3.00</td>
<td>3.31</td>
<td>3.69</td>
<td>3.33</td>
</tr>
<tr>
<td>Fine arts</td>
<td>1,887</td>
<td>2.92</td>
<td>3.20</td>
<td>3.62</td>
<td>3.29</td>
</tr>
<tr>
<td>Social sciences</td>
<td>4,039</td>
<td>2.92</td>
<td>3.23</td>
<td>3.69</td>
<td>3.26</td>
</tr>
<tr>
<td>Humanities</td>
<td>2,179</td>
<td>2.78</td>
<td>3.10</td>
<td>3.57</td>
<td>3.14</td>
</tr>
<tr>
<td>All students**</td>
<td>26,894</td>
<td>3.07</td>
<td>3.34</td>
<td>3.72</td>
<td>3.39</td>
</tr>
</tbody>
</table>

*Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree
** This includes responses for “other” and “undecided” majors

on-campus versus off-campus residence, Carnegie class, institution size, and private versus public status.

What, then, matters when it comes to IT’s impact on courses? The ECAR data show that the following factors are positively and strongly associated with the four outcome statements:

- student preferences for IT in courses,
- student technology adoption practices,
- experience with instructors’ use of IT in courses,
- positive or negative experience with CMSs,
- perceptions about the availability of IT services for course work at their institution
- how students like to learn using technology, and
- student skill levels in using IT.

These are discussed in the sections that follow.

Preference for IT in Courses, IT Adoption Practice, and Outcomes

The factor most strongly associated with the outcome statements about IT’s impact on courses is how much IT respondents prefer in their courses (see Figure 5-13). Respondents who prefer more IT in courses agree more that IT has a positive impact on course work. With respect to learning, only 15% of respondents who prefer limited or no IT in courses agree that IT improves their learning; in contrast, 74.4% of respondents who prefer extensive or exclusive IT in courses agree. These relationships are extremely strong, and the wide range of student preference for IT is important to recognize and integrate into institutional decisions. For example, some institutions now provide information about the IT that will be used in scheduled courses so that students can factor this into their course enrollment choices.
Although not shown here, there is a similar stair-step pattern when looking at respondents’ technology adoption practices. Respondents who are early adopters of technology are more apt to be positive about the impact of IT on courses and learning. This is expected because students’ technology adoption practices and their preference for IT in courses are highly correlated.

### Instructors’ Use of IT, Student Experience with CMSs, and Outcomes

Research about the connection between instructor competence and student learning validates the intuitive idea that when instructors use effective educational practices, students have a better academic experience.\(^{23}\) It follows that when instructors integrate IT into effective teaching practices, students would be more likely to perceive both that their instructors use IT well in courses and that the effect of IT on their courses is positive. The data support this premise (see Figure 5-14). Among respondents reporting that “most” or “almost all” of their instructors use IT effectively, 56.6% agree that IT in courses improves their learning; among respondents reporting that only “some” or “almost none” of their instructors use IT effectively, only 34% agree that IT in courses improves their learning.

CMS experience is also a strong differentiator when it comes to the ECAR questions about IT’s impact on courses. Respondents having an overall positive CMS experience more often report that IT in courses improves learning, convenience, and student engagement. Also interesting, students who indicate that their institution’s IT services are always available for course work are much more likely to agree with these outcome statements. It makes sense that a robust IT services environment promotes convenience, which can positively impact learning.

Finally, two other factors are associated with positive outcomes of IT in courses, although not nearly as strongly as the factors already discussed. Respondents reporting stronger IT skills and respondents who say they like to learn by using the technologies asked about in the survey—such as programs they can control; contributing to websites, blogs, wikis, and the like; creating or listening to podcasts or webcasts; and text-based conversations over e-mail, IM, and text messaging—are more positive about the benefits of IT in courses.
Endnotes
3. These findings are discussed in detail in the 2005, 2006, and 2007 ECAR studies of undergraduate students and information technology, whose bibliographical data were given in endnotes 1 and 2.
8. The distribution of the 98 participating institutions is as follows: 84 institutions had fewer than 5% of respondents taking entirely online courses, 10 institutions had between 5% and 10%, 2 institutions had between 12% and 15%, and 2 institutions had between 40% and 45%.
10. These results are just an approximation because some of the students who are not taking an entirely online course the quarter/semester of the survey may have taken one in the past, and it is likely this would affect their opinion of whether or not the requirement of an online course would benefit students.
12. Some students do not recognize the term course management systems, especially because institutions often give their CMS a local name. Therefore, this year the wording of the question was changed slightly to explain what is meant by a CMS. The question for
2005 through 2007 was the format “Have you ever taken a course that used a course management system (e.g., ANGEI, WebCT, Blackboard, Desire2Learn, Moodle, Sakai, OnCourse, FirstClass)?” The question for 2008 was “Have you ever taken a course that used a course management system (CMS)? A CMS provides tools such as online syllabi, sample exams, and grade book (e.g., WebCT, Blackboard, Desire2Learn, Sakai, or a campus-specific system).”


16. Ibid., 72–74.

17. Ibid., 85–88.


19. EDUCAUSE explicitly acknowledges important limitations to our data and process, including real limits to the application of survey research and self-reported outcomes about learning and engagement; an unmeasured nonresponder bias to the EDUCAUSE web-based survey coupled with a near certainty that web-based surveys are likely to result in somewhat inflated responses; and unresolved questions about the interplay between institutional action and student impact.


22. The 2005 through 2007 surveys had several questions about different aspects of convenience, such as IT providing support for communication and collaboration, allowing prompt feedback from instructors, and helping students control course activities. These questions received similar responses, so in 2008 they were combined into one statement about convenience, “IT makes doing my course activities more convenient.”

23. In previous years’ studies, the GPA categories in the survey were numerical (for example, under 2.00 to 4.00, in increments of 0.25). Beginning in 2008, EDUCAUSE is using the more standard letters, A to C–, as shown in Table 3-2 of this study.
