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Student Use of IT on the University of Minnesota Campuses: Convenience, Connectedness, Control, and Learning

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Key findings from the EDUCAUSE Center for Applied Research (ECAR) 2005 study

- The following are key findings from a study of student use of IT at 63 institutions in 24 states.
- Fully 96.1% of seniors and freshmen own computers. Laptop ownership in the 2005 study is 55.6 percent. Of students who own laptops, 14.1 percent bring them to class. At Crookston, 92 percent of students report they bring their laptop to class versus 12.1 percent at Duluth, 5.8 percent at Morris, and 8.5 percent on the Twin Cities.
- Students use technology primarily for convenience and connection, both for their academic and social life.
- A student's major is a significant factor in determining the student's use of specialized applications such as PowerPoint™ and spreadsheets. The Crookston curriculum has a major impact on student use and skill with IT.
- Students report that they use computers on average between 11 to 15 hours per week (excluding cell phone use). Crookston students use computers more hours than on the other campuses.
- Students rate themselves as highly skilled in word processing and use of the operating system. They rate themselves as least skilled in graphics, Web pages, and video/audio software. Crookston students rate their skills highest among the campuses in the use of specialized applications and rank among the highest nationally.
- Forty-four percent of the students think that they do not need additional training in order to use IT in their courses.
- Students prefer a moderate amount of technology in courses.
- Students see IT in courses as making a positive contribution to teaching and learning.

- Overall, students give their instructors good marks in their use of technology in courses. The highest grades were given to the Crookston faculty.
- Instructors' effective skills with information technology in courses increase student engagement in the course, student interest in the subject matter, and help them to better understand complex concepts.
- Of the 72 percent of students nationally who report use of a course management system, more than 75 percent report a positive or very positive experience with it. The Twin Cities Campus and Crookston report the highest use at approximately 80 percent but on average University of Minnesota students are less positive about their experience than students nationally – approximately 60 percent with the lowest score at Morris – 50 percent.
- The instructor's IT skills is a major contributor to students having a positive experience with course management systems.
- Students report that using a course management system improves learning.

Methodology and Study Participants

The study is based upon a Web-based survey of undergraduate freshmen and seniors at 63 institutions (21 independent colleges and universities) in 24 states. Included were the Crookston, Duluth, Morris, and Twin Cities campuses. Fully 18,039 students completed the survey (3,466 attended independent colleges and universities). More than 8,000 students commented on information technology in open-ended questions of the survey.

The ECAR Framework

Student activities use information and communications technologies for four purposes (1) convenience, (2) connection, (3) control, and (4) learning. The ECAR taxonomy does not purport to be exhaustive.

Figure 1. Current Student Expectations and Preferences

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|--|--|
| <p>Quadrant 1: Convenience</p> <ul style="list-style-type: none"> • Technology and online resources are readily available • Fast response time – immediacy • Technology, services and resources are available anytime and anywhere • Converged devices • Networks and technical support available at all times | <p>Quadrant 2: Connection</p> <ul style="list-style-type: none"> • Electronic connections are mobile • Multiple devices and media that are personal, customizable, and portable • Always networked for communications • Members of their communities are reachable anywhere and anytime |
| <p>Quadrant 3: Control</p> <ul style="list-style-type: none"> • Multitasking • Customization • Focused on grades and performance • Manage the undergraduate experience • Control the when-and-where of social interaction | <p>Quadrant 4: Learning</p> <ul style="list-style-type: none"> • Rich media and visual imagery, including the ability to integrate virtual and physical • Inductive discovery – experiential and participatory • Real time engagement • Social – work in teams |

Higher education has spent millions of dollars on technology aimed at satisfying these preferences and expectations and on facilitating students' (technology) maturation from exuberant social and recreational users of technology to purposeful and effective users and to well-socialized network citizens. Campus networks, messaging systems, portals, and online student services for example promote widespread student access to one another and connections to institutional services and resources, while course management systems, library systems, and personal information systems (like e-portfolio) offer students greater opportunity to plan and manage their academic experience and affairs than ever. And we believe instructors are steadily responding to the expectations and preferences of students in the learning sphere.

A profile of student use of information technologies on University of Minnesota campuses

Undergraduates live with abundant technology and networks.

The vast majority of the student respondents own at least one computer and a cell phone. These technologies are used on a daily basis for studying, social

interaction, and entertainment. Students are increasingly mobile using a combination of cell phone, laptop, and PDA, and about 25 percent have wireless adapters for their computers. University of Minnesota campus ownership of laptops is lower than what we found nationally and especially at Morris (see Table 1). The same is true with respect to the ownership of laptops. Music devices such as iPod's have the highest level of ownership on the Twin Cities campus and lowest at Crookston.

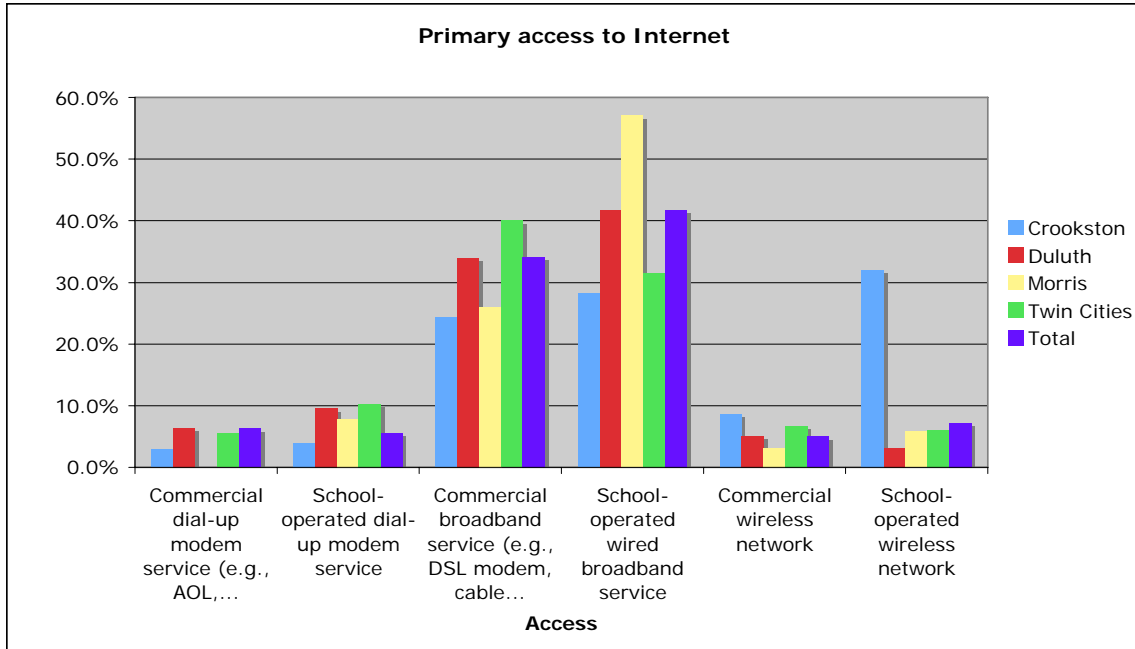
Table 1. Ownership of Selected Technologies

| Technology Owned | Percent Owned - Crookston | Percent Owned - Duluth | Percent Owned - Morris | Percent Owned - Twin Cities | Overall Percent Owned |
|-------------------------|----------------------------------|-------------------------------|-------------------------------|------------------------------------|------------------------------|
| Personal desktop | 44.2% | 61.4% | 60.6% | 69.1% | 61.6% |
| Laptop | 50.0% | 55.1% | 43.9% | 52.7% | 55.6% |
| PDA | 12.5% | 8.9% | 11.0% | 14.5% | 12.6% |
| Smart phone | 1.9% | 0.6% | .6% | 2.4% | 1.3% |
| Cell phone | 82.7% | 88.0% | 58.1% | 87.3% | 90.1% |
| Music device | 19.2% | 31.6% | 32.3% | 42.4% | 38.4% |
| Wireless adapter | 21.2% | 29.1% | 18.1% | 25.5% | 24.8% |

Students look to technology to make things more convenient and to make it easy to connect with others.

Virtually all have access to the Internet and the majority has broadband access (over 90 percent). Nationally institutions provide campus Internet service to 54.6 percent of their students (see Figure 1). The Morris campus exceeds this with 70.7 percent of students using the campus network, followed by Crookston (64.1%), Duluth (54.5%), and the Twin Cities (47.9%). The figures are very much tied to campus residency.

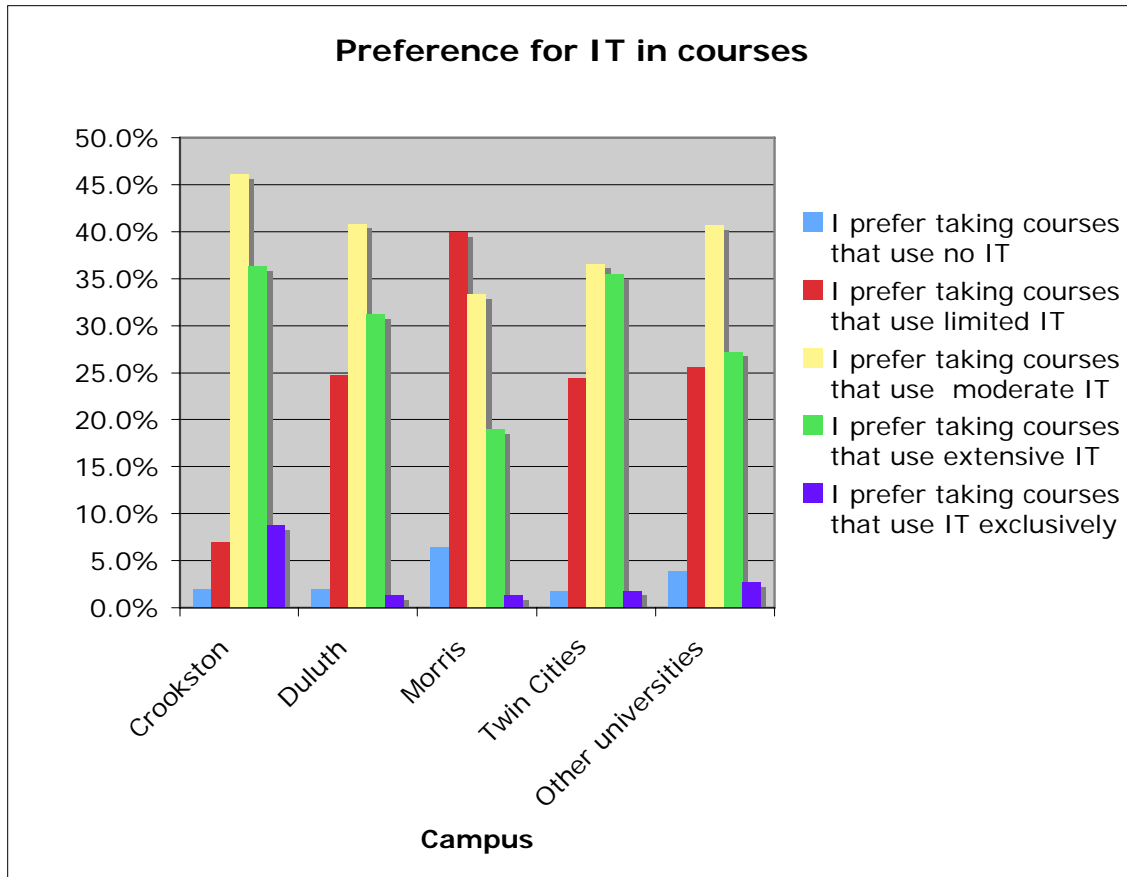
Figure 1. Primary access to Internet



Students expect technology in their courses, to a moderate degree.

Students expect a moderate use of information technology in their courses and they expect faculty to use technology well (see Figure 2). Students at Morris have a lower preference for IT in courses than do students at the other campuses. Morris very much mirrors the findings for the 21 private institutions in the study. However, all students give good grades to their instructors' skill in using IT in courses. Not surprisingly, Crookston students have the highest preference for IT in courses.

Figure 2. Student Preference for Use of Information Technology (IT) in Courses (N=17,856)



Students view technology in the classroom as supplemental to their course experience and not as transformational.

IT in courses is not viewed as transformational but rather as supplemental. Students prefer face-to-face interaction with their instructors and with other students. Social interaction is important to them.

Male and female students are comfortable with a core set of technologies and less comfortable with more specialized technology applications.

The students are comfortable using core information technologies and rate themselves as skilled in their use. The majority of students perceive that they need no additional training to use these technologies. Students differentiate their skills with different technologies – word processing is highest and specialized applications are lowest. Gender differences are small and declining as are differences between engineering and business majors and students in non-science disciplines. The exceptions are specialized applications such as spreadsheets and PowerPoint™ and computer maintenance where engineering, computer science, and business majors rate their skills much higher.

Technologies in use

All students use information technology for recreation and this is especially true for younger students. The largest behavioral gap seems to be between those students below age 20 and those 20 and older that settle into their majors, have jobs, are increasingly concerned about getting good grades, and generally have less discretionary time than younger students.

Virtually 100 percent use their computer for writing documents and e-mail followed by surfing the Internet for coursework (98.6%). The least used activities are creating Web pages (24.6%) and editing video/audio (23.1%). Especially noteworthy is the use of specialized applications such as spreadsheets and PowerPoint™ on the Crookston campus. Not only is the use significantly higher than on the other campuses but also it is among the highest of the 23 institutions in the study. Note, too, that downloading music is lower than what we found nationally and for some unknown reason, the Twin Cities campus students do less instant messaging and use library on-line resources less.

Table 3. Technologies Used by Students On University of Minnesota Campuses

| Activity | Percent who use: all | Crookston | Duluth | Morris | Twin Cities |
|---|-----------------------------|------------------|---------------|---------------|--------------------|
| Creating, reading, sending e-mail | 99.8% | 100.0% | 100.0% | 100.0% | 100.0% |
| Writing documents for your coursework | 99.2% | 100.0% | 98.1% | 98.7% | 98.1% |
| Surfing the Internet for information to support your coursework | 98.6% | 100.0% | 99.4% | 97.4% | 97.0% |
| Surfing the Internet for pleasure | 94.0% | 93.3% | 98.7% | 92.2% | 90.2% |
| Using a library resource to complete a course assignment | 92.1% | 93.2% | 93.7% | 91.6% | 82.2% |
| Creating, reading, sending instant messages | 89.4% | 84.3% | 80.9% | 85.4% | 64.0% |
| Downloading or listening to music or videos/DVDs | 81.0% | 70.2% | 79.5% | 70.1 | 70.6% |
| Online shopping | 71.1% | 61.5% | 69.4% | 69.3% | 62.8% |
| Creating presentations (PowerPoint™) | 68.0% | 92.2% | 64.7% | 55.2% | 58.5% |
| Creating spreadsheets or charts (Excel™) | 64.9% | 87.4% | 65.0% | 64.3% | 65.2% |
| Writing documents for pleasure | 65.7% | 71.2% | 58.9% | 70.8% | 55.8% |
| Playing computer games | 61.7% | 69.6% | 68.2% | 61.4% | 58.5% |

| | | | | | |
|---|-------|-------|-------|-------|-------|
| Creating graphics (Photoshop™, Flash™) | 48.1% | 62.1% | 56.7% | 49.3% | 40.5% |
| Creating Web pages (Dreamweaver™, FrontPage™) | 24.6% | 38.6% | 29.3% | 23.4% | 17.2% |
| Creating and editing video/audio (Director™, iMovie™) | 23.1% | 42.3% | 28.7% | 25.3% | 22.2% |

Curriculum and technology use are inter-twined.

The importance of the curriculum is evident in the use of more specialized applications such as spreadsheets, presentation software, graphics, video/audio, and creation of web pages, and especially at Crookston. Engineering and business students, for example, reported the highest levels of use of spreadsheets and presentation software. Spreadsheets are used by engineering students (79.3%) and business students (78.5%) much more than by fine arts students (47.6%). The same pattern exists for presentation software.

Students spend a lot of time online.

Students indicate that they spend, on average, between 11 to 15 hours per week using their computer. The highest used activities, on average, are course activities (3 to 5 hours/week), writing documents for coursework (3 to 5 hours/week), e-mail activities (between 1 to 2 hours/week and 3 to 5 hours/week), and surfing the Internet for pleasure (between 1 to 2 hours/week and 3 to 5 hours/week). Least used activities are creating graphics (less than one hour/week), creating web pages (less than one hour/week), and creating and editing video/audio (less than one hour/week).

Technology permeates all aspects of student life, but its use as a tool has become paramount.

A pattern emerges from the data that students use technology first for educational purposes, second for communications and connectedness, and third for entertainment. This varies, however, by gender. On the whole, men spend more time each week on their computer for entertainment than women. For example, men report that they spend, on average, 3 to 5 hours/week surfing the Internet for pleasure, while women report on average less than three hours per week,

The Net Generation attributes of today's students are more readily observable in non-academic contexts than in the academic setting despite having enabling technologies readily accessible in both spheres. Technology use in classes is controlled and very much dependent upon instructor preferences and skills. Course management systems, for example, which support new patterns of

interaction, are faculty-centric. The instructor determines the features that will be used.

Outside of courses, students can use the Internet and devices to create social networks and do all kinds of things that they dream up. Social networking, blogging, and instant messaging (IM) are often not understood or used by the faculty. Transferring these activities into the academic setting does not readily happen despite the euphoria in the literature about the value of IT in courses. We see evidence of this in the much lower preference for online discussion groups in courses. New patterns of social interaction, which converged and mobile devices enable, occur mostly outside of the academic setting.

Technology facilitates student communications and academic feedback

When asked about the impact of IT in courses, students respond that IT in courses has a positive impact, especially in communications. The highest scores are given to improved communications – communication with instructors, feedback from instructors on coursework, and communication with classmates. Related to these, but less with less perceived impact are the ability to improve the presentation of one's work and greater personal control of course activities – planning and apportionment of time.

The student perspective: technology is improving their learning. The constraint may be the real or perceived ability of faculty to use technology effectively.

Students report that the most valuable benefit of using technology in courses is convenience (50.2%), followed by connectedness and communications (25.0%). Learning (11.8%) and management of course activities are next (9.5%). Only 2.5 percent of the students perceive that there is no valuable benefit whatsoever from using technology in courses. The percentages are quite similar to the percentages we found for students for University of Minnesota students institutions with the exception of learning and management of course activities, which students at Crookston scored higher (18 percent of Crookston students scored learning as the primary benefit of IT in courses).

While learning is the third highest benefit mentioned when required to pick one benefit, students agree that IT in courses improves learning. A total of 62.1% of the national respondents agree (53.9%) or strongly agree (8.2%) that IT in courses improves learning. The numbers for the University of Minnesota campuses are: Crookston (79.9%), Duluth (70.1%), Morris (57.4%), and the Twin Cities (64.0%). For those students who indicate that IT in courses improves learning, the most important factor indicated is the skill of the instructor. Students also think that IT, used well, can make a good instructor better.

Most students have used course management systems (CMS) and most of those using them have had positive experiences!

Seventy-one percent of all students in this study have used a course management system. For students who have used a course management system, 71.9 percent report a positive or very positive experience using the system. Only 5.1 percent are negative or very negative and 21.8 percent are neutral. University of Minnesota students are less positive about course management systems.

The student feedback on course management system use is fairly consistent – students seem to like many of the features, but wish instructors used them more extensively and consistently.

A good experience with the CMS translates into positive feelings about IT and learning.

Students who report a positive experience with a course management system are more likely to agree that the use of IT in courses has a significant positive impact on student engagement in the course and interest in the subject matter, improve presentation of their coursework, and increase their understanding of complex concepts than students with a neutral or negative experience with a course management system.

Student concerns

- Slow or inadequate access to network and network speed was a significant or major concern for over 50 percent of the students on the Twin Cities campus and 25 percent at Crookston.
- The ability to maintain their computer was a significant or major concern for over 40 percent of the students on the Twin Cities campus and 30 percent on the other campuses
- Spam and computer viruses was a significant or major concern for over 50% of the students on all campuses.
- Seventeen to 25 percent of the students were concerned about the adequacy of technical help available to them on their campus. The students at Morris were least concerned at 17 percent.
- Access to printing was a significant or major concern for over 25 percent of the students on the Duluth and Twin Cities campuses.
- The age of the student's computer was a significant or major concern for over 30 percent of the students on the Duluth and Twin Cities campuses.

Recommendations

The importance of the curriculum

A major finding of the 2005 ECAR study on student use of technology is that students with the highest level of IT skills acquired many of these skills as a result of course (or program) requirements. In certain academic disciplines, curricula are becoming increasingly IT intensive as professional societies and government redefine competencies required of some professions.

Define IT skills needed for learning

We believe that once we have a more global understanding of which information technologies we want to use in courses and in the curriculum, at what level of sophistication, and for what purpose(s), it will become possible to establish a set of required IT skill sets. What level of digital literacy is required to find, retrieve, assess, and manage digital information? And how skilled with IT and mobile devices must students be, especially as they enter the work force.

Invest in comprehensive training

Our campuses should consider articulating concrete IT competencies for students in their programs. Once aggregated, a work plan can be developed to achieve the proposed competency levels – through courses, changes in the curriculum, help centers, and so forth.

We cannot assume that the students are prepared to take advantage of these technologies in the absence of planned, systematic, and just-in-time training that is based on a recognized level of required skills. Students need to learn how learn with the new technologies. Training that is deliberate and continuous will outperform *ad hoc* training strategies.

We should strive to foster increasing faculty comfort with information technologies and to work with faculty to articulate desired competency levels in core areas (word processing, operating system use, email, presentation software, course management system) as well in specialized areas that are influenced strong by disciplinary factors (spreadsheets, Web design, etc). We recognize this may be more difficult to do and harder to implement. Articulating student competencies could of course inform the articulation of faculty members' expected competencies, as the one will likely have to complement the other in a sensible work plan.

IT should be used consistently.

Students are looking for more consistent use of information technologies. This was especially an issue with course management systems, which are perceived as being used inconsistently by faculty. While students overall express a preference for a “moderate” amount of technology in their classroom experience, they want most of their courses to use course management systems and they

want faculty to use them in a consistent manner.

Monitor IT skills and use.

Institutions should measure student and faculty competencies, attitudes toward the use of IT in courses, and how students and faculty actually use IT. Such measures are needed to assess the effectiveness of the curriculum, the use of technologies, and the performance of the training programs.