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Methodology and Respondent Characteristics

You should continue to make these surveys and encourage students to take them because, quite honestly, it made me think about how technology has benefited us all.

—An undergraduate student

Methodology

This research study represents an important milestone in one of ECAR's most ambitious undertakings. In 2001, ECAR fellows discussed the paucity of data and analysis of undergraduate students and their uses, preferences, expectations, and experiences with information technology. With the help of knowledgeable leaders, the audacious idea of creating a new survey of students focusing on technology was hatched and given flight.¹ In 2004, the first ECAR study was launched at 13 institutions, and a baseline was established.

The 2005 study builds on and extends this success and consists of eight data collection and analytical initiatives:

- ◆ We undertook a literature review and reviewed other surveys, both U.S.-based and international.
- ◆ The results of *ECAR Study of Students and Information Technology, 2004: Convenience, Connection, and Control* provided necessary insight into student perceptions about their IT experiences (Kvavik et al., 2004).
- ◆ The 2003 ECAR study *Faculty Use of Course Management Systems* provided useful data on how faculty members actually use course management systems. It includes comparative data for analysis of student and faculty perceptions (Morgan, 2003).
- ◆ A Web-based survey of undergraduate freshmen and seniors supplied student quantitative data based upon their experiences with IT in higher education. A sample of 143,730 students at 63 higher education institutions in 24 states received the e-mail invitation to participate in the study. Fully 18,039 students responded.²
- ◆ We supplemented quantitative data with interviews of 82 undergraduate students at seven institutions to provide diverse perceptions of IT's impact in higher education.³ We recognize, of course, that as consumers of higher education, few students can offer expert opinions about either instructional methods or IT. Opinions and perceptions nevertheless have meaning.
- ◆ Interviews with 20 instructional technology support staff at University of Wisconsin System institutions gave further insights on student IT issues. This activity, too, was designed more to inform and calibrate the investigators' understanding of issues than to fulfill a direct research objective.
- ◆ More than 8,000 students commented on IT in open-ended survey questions. They expressed opinions on their use of and

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skill with IT, the state of their institutions' IT support services, and their perceptions of technology use in their courses. They also offered advice on how to improve IT at their institutions. These comments are analyzed and give additional perspectives on the undergraduate IT experience.

- ◆ A comparison of 2004 and 2005 results to identify similarities and dissimilarities is also an important part of this study.⁴ It is important to note that this study does not attempt to follow the same students over time.

The ECAR research team extended the 2004 literature review, looking especially to the EDUCAUSE Learning Initiative for new findings on student use of technology and learning. Of particular interest is the recently published volume edited by Diana G. Oblinger and James L. Oblinger, *Educating the New Generation* (Oblinger & Oblinger, 2005). We also reviewed case studies for both the United States and international institutions on student use of technology. The bibliography appears in Appendix A.

ECAR designed a quantitative Web-based survey to assess student skills and learning with information building on the ECAR 2004 survey.⁵ A few questions were deleted because we found that they did not work well in 2004. We improved other questions with better wording or clearer definitions. We also added some questions in 2005 to address issues we learned were important in 2004, especially with respect to student learning with IT. We were careful not to change too many questions in order to track changes in student behavior and opinions from 2004 to 2005. When appropriate, we included questions from other surveys, which makes possible a limited but useful comparison with student behavior at other higher education institutions and affords us an opportunity to cautiously track trends in student technology use.

This year's study presented a challenge

to the principal investigators because we increased from 13 institutions in 2004 to 63 institutions in 2005.⁶

Institutions were asked to construct a sample of their students to achieve a 95 percent level of confidence with a ± 5 percent margin of error. However, a number of them chose to include their entire freshman and senior classes. In the absence of our weighting of institutional responses, this means that we can generalize to the sampled students but not to the 63 institutions. For the sampled students, we achieved a 99 percent level of confidence with a ± 2 percent margin of error, which means that one can say with 99 percent confidence that the error attributable to sampling and other random effects is ± 2 percent.⁷

We use means and standard deviations in this study. Means are arithmetic averages and measures of central tendency. Standard deviations are measures of dispersion or variability. What this means is that the larger the standard deviation, the more disagreement exists among the respondents. We also did some comparison of means and regression analyses to determine levels of correlation among the variables. We refer to these analyses but for reasons of simplicity do not present the figures.⁸

Research Team

Robert B. Kvakik and Judith Borreson Caruso are the principal investigators. Mark R. Nelson's contribution to the study is a content analysis of almost 400 pages of commentary provided by students in two open-ended survey questions. Judith A. Pirani provides interview data from student focus groups.

Judith Borreson Caruso

Judith Borreson Caruso is director of policy and planning at the University of Wisconsin–Madison and has been an ECAR research fellow since July 2002. She previ-

ously served for many years as the University of Wisconsin–Madison’s director of applications technology. Caruso is active in several IT professional organizations, including CUM-REC and EDUCAUSE. She has served on the EDUCAUSE Current Issues and *EDUCAUSE Quarterly* editorial committees. Recently she accepted the position of chair-elect of the University of Wisconsin System IT Management Council. While with ECAR, she participated in the enterprise resource planning (ERP), IT security, and student studies.

Robert B. Kvavik

Robert B. Kvavik earned his Ph.D. from Stanford University (1971). He is currently associate vice president at the University of Minnesota. He directed the University of Minnesota’s implementation of the People-Soft student and human resources modules. He has published extensively in his academic discipline and increasingly on the impact and organization of information technologies on institutional services. Kvavik is a nationally known speaker on e-business and IT-enabled services in higher education. He was appointed an ECAR senior fellow in January 2002. Kvavik has been a principal author of ECAR’s ERP, IT security, IT leadership, business process performance, and student use of technology studies.

Mark R. Nelson

Mark R. Nelson earned his Ph.D. in information science from the University at Albany, SUNY (1998). He is the Digital Content Specialist at the National Association of College Stores. Formerly, Nelson was assistant professor in management information systems and information technology at the Lally School of Management and Technology at Rensselaer Polytechnic Institute. Nelson has served as an ECAR fellow since summer 2003. In this capacity, he has contributed to major research studies including IT leadership, and he authored

several research bulletins. He is a specialist in qualitative research methods and led the review and analysis of open-ended qualitative student responses to the survey undertaken for this study.

Judith A. Pirani

Judith A. Pirani earned her M.B.A. from Hofstra University (1984) and her B.A. from Simmons College. She is an ECAR research fellow and president of Sheep Pond Associates. Her expertise is in the area of educational technology. Her research includes the use of e-learning to improve employee efficiency and sales demand, marketability of course management systems for corporate training applications, and Web site development strategies in higher education and government. She was a principal author on three ECAR studies. Previously, she was vice president at Lyra Research and Giga Information Group, where she managed worldwide research practices in digital imaging technologies.

Participating Institutions

This study does not describe the behaviors, perceptions, skills, or attitudes of students in higher education overall. The 63 institutions that participated in this study reflect a mix of the different higher education institution types in the United States, in terms of Carnegie class as well as location, source of funding, and levels of technology emphasis. None of the above factors are used in our analysis.

Institutions participating in the 2005 ECAR study do not represent a statistical representation of U.S. higher educational diversity as a whole. Specifically, participating institutions are overwhelmingly four-year institutions whose undergraduate students are generally traditional in age (87 percent are 24 years old or younger). We therefore consider our findings to be instructive or indicative rather than conclusive of student experiences at different types of institutions.

Notwithstanding these cautions, our findings in 2005 are strengthened both by the striking similarities that we find when we compare data from the 2004 and 2005 survey results (see Chapter 6) and by the remarkable similarity of findings in three European studies. In 2004, the University of Oslo conducted a survey of student use of IT using a modified ECAR student survey instrument (Jacobsen, 2004).⁹

Participating institutions, by Carnegie class, appear in Appendix E.

The number of respondents by their institution's Carnegie classification includes 13.0 percent enrolled at BA institutions, 36.9 percent at MA institutions, 48.7 percent at doctoral institutions, and 0.1 percent at other institutions. Our data show that 8.4 percent of our respondents are from institutions with enrollments of 2,000 and under, 5.9 percent from institutions with 2,001–4,000, 12.2 percent from institutions with 4,001–8,000, 30.8 percent from institutions with 8,001–15,000, 35.2 percent from institutions with 15,001–25,000, and 7.5 percent from institutions with over 25,000. Note that 78.2 percent of our respondents are enrolled in 42 public institutions and 21.8 percent in 21 private institutions.

Sample and Response Size and Characteristics

Invitations to participate in the survey were sent by e-mail to 65,491 freshmen and 78,239 seniors at 63 institutions (see Appendix E). Of those we invited to participate, 7,997 freshmen and 10,042 seniors responded. Seniors make up 55.7 percent of the respondents and freshmen make up 44.3 percent. Each university used a different sampling model.¹⁰

The overall student response rate in the 2005 study is 12.6 percent, compared with the 23.7 percent response rate in 2004. Seniors' responses are higher at 12.8 percent than freshmen's at 12.2 percent. There is sig-

nificant variation by institution. The reduced response rate, we think, is likely caused by the proliferation of spam e-mail over the past 12 months. Students have received numerous e-mails throughout the year asking them to take a survey and win a prize. And, since many spam e-mails can contain computer viruses and other forms of malware, it is not unlikely that students were cautious about responding to the e-mail invitation.

Female students made up 65.9 percent of the respondents, despite our strategy of oversampling male students in the population.

We would emphasize again that our student respondents are heavily weighted with so-called traditional students: 39.4 percent of the students in our study are 18 or 19 years old, and 47.6 percent are ages 20 to 24 (see Figure 2-1).

Fully 92.3 percent of the respondents are full-time students, and 7.7 percent are part-time. Fifty-three percent of responding students live off campus and 47 percent live on campus, reflecting in part the differing lifestyle patterns of collegiate freshmen and seniors.

The grade point averages for our respondents appear to follow a fairly normal distribution (see Table 2-1). More than 71 percent of the students have a B or better grade point average.¹¹

We asked the students to identify their major (see Figure 2-2). Note that *N* is larger than the sample size due to students' reporting double majors. Because so many students are freshmen, it is not surprising to find that 18.1 percent are undecided or do not know. Social sciences (15.0 percent), business (14.3 percent), and life sciences (12.2 percent) are the largest major areas of declared interest.¹²

Qualitative Data

ECAR collected qualitative data by means of student focus groups at Brandeis University, Bridgewater State College, Colgate Univer-

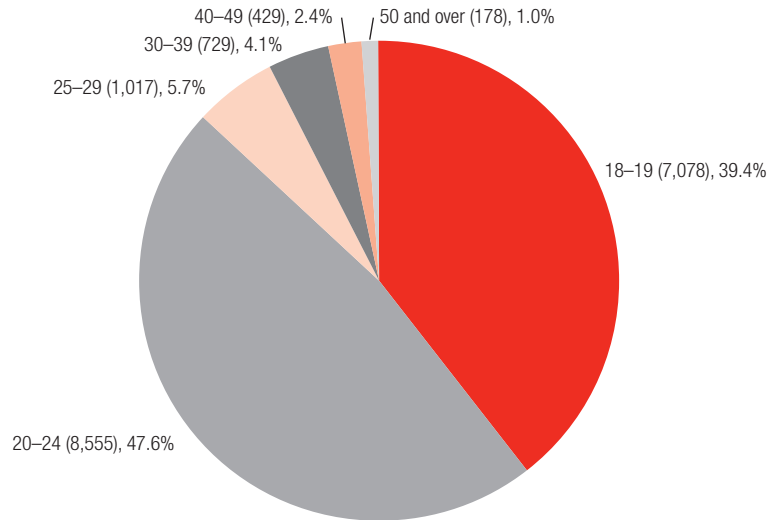


Figure 2-1. Age of Student Respondents (N = 17,986)

Table 2-1. Respondent Grade Point Average (GPA) (N = 17,966)

GPA	Frequency	Percentage	Cumulative Percentage
3.75-4.00	3,124	17.4%	17.4%
3.50-3.74	3,155	17.6%	35.0%
3.25-3.49	3,161	17.6%	52.6%
3.00-3.24	3,348	18.6%	71.2%
2.50-2.99	3,240	18.0%	89.2%
2.25-2.49	694	3.9%	93.1%
2.00-2.24	502	2.8%	95.9%
Under 2.00	225	1.3%	97.2%
Don't know	517	2.9%	100.1%
Total	17,966	100.1%	

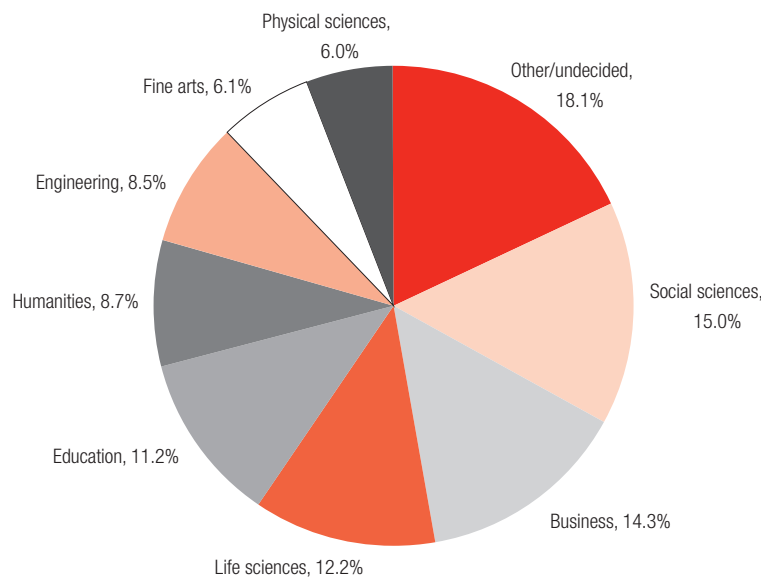


Figure 2-2. Students' Majors (N = 22,390)

sity, Franklin W. Olin College of Engineering, South Dakota State University, the University of Wisconsin–Madison, and the University of Wisconsin–Milwaukee. We strove to interview as diverse a group of students as possible. A total of 82 students participated in the focus groups, and each focus group meeting lasted for an hour. The focus group questions appear in Appendix D.¹³

ECAR also interviewed 20 instructional technology support staff and faculty, mostly at University of Wisconsin System institutions. We selected administrators and faculty who supported undergraduate students in their use of technology for academic purposes. We chose, for example, employees of computer help desks and those providing instructional technology support to faculty. Discussions with these professionals were designed to broaden (and leaven) our understanding of student perceptions as reflected in both survey work and interviews. Appendix D includes the interview questions.

In addition, more than 8,000 students responding to the quantitative survey took the opportunity to provide additional insights by responding to two open-ended questions. Mark Nelson analyzed their comments using the content analysis tool NVivo, thereby providing us with additional insight into the substance of the qualitative data.¹⁴

The students articulated several themes, which we have incorporated into the main text of this study. Noteworthy are assessments and recommendations on

- ◆ the learning experience using IT;
- ◆ online features of their courses and course management systems;
- ◆ faculty and student use of IT;
- ◆ access to IT and quality of the IT infrastructure available to students; and
- ◆ the reliability, convenience, and quality of support services.

Students' comments form the basis for a set of recommendations to administrators for

improving IT use, presented in the concluding chapter. We characterize such comments as the wisdom of students, and policymakers should take them as one important input to the complex set of choices and options they face.

Endnotes

1. ECAR is indebted to Robert Albrecht (ECAR), Carole Barone (EDUCAUSE), Darwin Handel (University of Minnesota), Richard Katz (EDUCAUSE), Diana Oblinger (then with ECAR), and many others who consulted on this research and survey design.
2. Students in this sample attend 30 doctoral institutions, 18 MA institutions, 12 BA institutions, two AA institutions, and 1 specialized institution. Two-thirds of the respondents are female. Thirty-nine percent of respondents are 18 or 19 years old, 48 percent are 20 to 24 years old, and 13 percent are over 25. Only 1.1 percent of the students are over 50. Ninety-two percent of respondents are full-time students. In the absence of our weighting of institutional responses, this means that we can generalize to the sampled students but not to the 63 institutions.
3. Interviews were conducted at Brandeis University, Bridgewater State College, Colgate University, Franklin W. Olin College of Engineering, South Dakota State University, University of Wisconsin–Madison, and University of Wisconsin–Milwaukee.
4. The information collected from the student respondents is confidential, and no personally identifiable data is available from the quantitative survey.
5. To encourage a larger response from the students, ECAR offered a \$50 gift certificate to be awarded to 100 students, using a lottery. We had learned from other institutions' experiences that the absence of an incentive would greatly reduce the response rate. Such awards are prohibited in some states; as a result, some institutions had to withdraw from participation.
6. Each institution required approvals from institutional executives and their institutional review board (IRB) in order to participate in the study. The approval processes, while navigated by an institutional contact, varied considerably in difficulty from institution to institution. Often, the information required for approval was different from one institution to the next. While the investigators made every attempt to provide all information required at the start of the study solicitation, additional details were added throughout the approval process to provide what each institution required. The information collected is confidential. The data files we used for analysis have been purged of any information that would make it

- possible to identify a particular respondent. The IRB applications, application dates, and approval dates are available from ECAR.
7. The confidence interval (margin of error) refers only to the statistical error associated with the size of a sample, assuming a representative and random sample. This is the only type of error that can be readily quantified. Note, however, that there are other potential sources of error that are non-sample related, such as the wording of the survey questions (may not be clear) and most notably nonrepresentative responses (a large percentage of the students declined to take this survey). Since the response rates in this study were lower than hoped for at a number of schools, one cannot be certain of how representative the respondents are of their respective campuses or of this population in general. Therefore, caution should be exercised in assuming that the findings generalize beyond the sampled students.
 8. Note also that percentages in some of the tables do not add up to 100 percent because of rounding. Rounding occurs in the figures as well.
 9. Note that the report is available only in Norwegian. Especially noteworthy are their findings that students prefer a moderate amount of technology in courses and that students use their computers most in support of class activities. The Survey of European Universities Skills in ICT of Students and Staff (SEUSISS) is a multinational project funded by the European Commission under the Socrates Program that collects information about the information and communication technology experience, skills, confidence, and attitudes of students and academic staff at seven European universities (SEUSISS, 2002). Their findings are quite similar to ours, as are the 2003 findings of the Students' Perspectives on Technology in Teaching and Learning in European Universities (SPOT+) project, which analyzes students' views on the use of IT at 13 European universities (European Commission, 2003). See SEUSISS Project, 2002.
 10. There are a few small discrepancies in the tables appearing in Appendix E due to students' miscoding their institution or class (senior or freshman). Because the students were anonymous, it was impossible for us to go back and correct these errors. But because we rarely use institution in our analysis, the impact on the study is minimal.
 11. Nationally, one source from 2002 assessed the average student grade point average at 21 four-year public and private postsecondary institutions as 3.09. See Rojstaczer (2003).
 12. Nationally, 21.4 percent of undergraduate degrees are issued in business and marketing, 10.3 percent in social science and history, and 4.8 percent in biological/life sciences (U.S. Dept. of Education, 2003).
 13. To recruit students, staff from participating institutions posted advertisements in various campus locations, made announcements in large enrollment classes, and e-mailed students. Food and beverages were provided as incentives to attend. Students who work in general-access undergraduate student computing laboratories or for student technology help desks were also included in the focus groups. Students were advised of IRB regulations that govern the research and their rights and the responsibility of the investigators to protect their rights. Notes were taken or recordings were made and transcripts produced. None of the comments made by students and cited in this study identify any individual student. In some instances, we corrected their English but made no change in meaning.
 14. NVivo is a member of QSR/Sage's NUD*IST line of qualitative analysis software tools and is designed specifically to help with grounded-theory approaches to content analysis. NUD*IST stands for Non-numerical, Unstructured Data—Indexing, Searching, and Theorizing. NVivo uses a hierarchical approach to content analysis.