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## Methodology and Respondent Characteristics

*This is a great survey...glad to see that the school is seeking feedback! :)  
—An undergraduate student*

This 2007 research on undergraduates and information technology (IT) marks the fourth annual study. In 2001, ECAR fellows discussed the paucity of data and analysis of undergraduate students and their uses of, preferences for, expectations of, and experiences with IT. With the help of knowledgeable leaders, the idea of creating a new survey of students focusing on technology was hatched and given flight.<sup>1</sup> In 2004, the first ECAR study was launched with a baseline of 13 institutions; 63 institutions participated in 2005, 96 institutions in 2006, and 103 institutions in 2007.<sup>2</sup>

### Methodology

The 2007 study builds on and extends previous studies and consists of the following data collection and analytical initiatives.

### Literature Review

We undertook a literature review (extending the 2006 literature review) and also reviewed other relevant surveys. Previous ECAR studies on student use of IT provided additional insight for the current 2007 study.<sup>3</sup> The bibliography appears in Appendix E.

### Web-Based Survey

A Web-based survey of college and university undergraduates supplied the quantitative data about student experiences with IT in

higher education. The 2007 survey was based on the 2006 survey, with some improvements. A few questions were deleted because we found that they did not work well; others were changed with better wording or clearer definitions. We also added some questions in 2007 to address issues we learned were important in 2006. The online survey appears in Appendix B.<sup>4</sup>

We asked institutions to construct a sample of their students to achieve a 95 percent level of confidence with a  $\pm 5$  percent margin of error. However, each university used a different sampling model, and some 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 103 institutions.<sup>5</sup>

### Student Focus Groups

ECAR collected qualitative data by means of student focus groups at Middle Tennessee State University, the University of Wisconsin–Madison, the University of Wisconsin–Milwaukee, and Vanderbilt University. We strove to interview as diverse a group of students as possible. A total of 50 students participated in the focus groups, and each focus group meeting lasted for an hour. The focus group interview questions appear in Appendix C.<sup>6</sup>

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## Qualitative Analysis of Student Comments

Fully 4,752 students (17 percent of respondents) responded to an open-ended survey question. They expressed opinions on their use of and skill with IT, the state of their institution's IT support services, and their perceptions of technology use in their courses. Mark Nelson analyzed their comments, focusing on selected topic areas, using the content analysis tool SPSS Text Analysis for Surveys.<sup>7</sup> This provided additional insight into the substance of the qualitative data, and these findings have been incorporated into the study text.

## Longitudinal Analysis

We compared the results of the 2005, 2006, and 2007 data where possible to identify any significant changes over the past three years. Where questions were consistent over the past three years, ECAR was able to use comparative data from the 40 institutions that participated in each of the 2005, 2006, and 2007 studies. Where survey questions were consistent over only the past two years, we were able to use comparative data from the 65 institutions that participated in both the 2006 and 2007 studies. However, it is important to note that this study does not attempt to follow the same students over time.

## Analysis and Reporting Conventions

We observe the following conventions in analyzing the data and reporting the results:

- ◆ Some tables and figures presented in this study include fewer than 27,846 respondents. They were adjusted for missing information.
- ◆ Percentages in some charts and tables may not add up to exactly 100.0 percent due to rounding.
- ◆ The Likert scales used in the online surveys are footnoted in the tables and figures showing results for these survey questions.

- ◆ Significant associations between survey questions (variables) that were both statistically significant and meaningful were reported in the text and/or supporting figures and tables. Note that a statistically significant relationship between two variables doesn't necessarily indicate a causal relationship.

## Research Team

Judith Borreson Caruso and Gail Salaway are the principal investigators. Mark R. Nelson's contribution to the study is a content analysis of student comments to an open-ended survey question. Chris Dede of the Harvard Graduate School of Education contributed the Introduction.

### Chris Dede

Chris Dede is the Timothy E. Wirth Professor in Learning Technologies at the Harvard Graduate School of Education. His fields of scholarship include emerging technologies, policy, and leadership. In 2007, he was honored by Harvard University as an outstanding teacher. His co-edited book, *Scaling Up Success: Lessons Learned from Technology-Based Educational Improvement*, was published by Jossey-Bass in 2005. A second volume he edited, *Online Professional Development for Teachers: Emerging Models and Methods*, was published by the Harvard Education Press in 2006.

### Judith Borreson Caruso

Judith Borreson Caruso is Director of Policy and Planning at the University of Wisconsin–Madison and has been an ECAR Fellow since July 2002. She has been in higher education IT roles for almost 30 years in the areas of application development, data management, policy, and security. Caruso is active in several IT professional organizations, including EDUCAUSE. She has served on the EDUCAUSE Current Issues

and *EDUCAUSE Quarterly* editorial committees. Currently she serves on the executive committee 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.

### **Mark R. Nelson**

Mark R. Nelson earned his PhD 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 IT 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.

### **Gail Salaway**

Gail Salaway earned her PhD in management of information systems from the University of California, Los Angeles (1984). She is a former Director of Administrative Computing and Communications at UCLA, where she was responsible for campus-wide administrative information systems and telecommunications services and management of academic and general computing initiatives. As an ECAR Fellow, she has been principal investigator of research studies on IT leadership, IT alignment, IT networking, and undergraduates and IT.

### **Participating Institutions**

Participation in the study was voluntary, and each institution obtained approvals from their institutional executives and their

institutional review board (IRB).<sup>8</sup> Therefore, the institutions participating in the study do not represent a statistical representation of U.S. higher educational diversity as a whole. Specifically, they are overwhelmingly four-year institutions (99 out of 103 institutions participating). Responses are further biased toward doctoral institutions (49.2 percent), larger institutions (70.6 percent enroll more than 8,000 students), and public institutions (79.8 percent). We therefore consider our findings to be instructive or indicative rather than conclusive of student experiences at different types of institutions.

Even considering these biases, the 103 institutions that participated in this study do reflect a mix of the different higher education institution types in the United States, in terms of Carnegie class, size of institution, private versus public status, sources of funding, and levels of technology emphasis (see Table 3-1). In this 2007 study, we had less participation from AA institutions—four institutions accounting for 6.6 percent of student respondents, compared with eight institutions accounting for 11.8 percent of student respondents in the 2006 study.

### **Respondent Characteristics**

We e-mailed invitations to participate in the survey to 109,684 freshmen and 131,109 seniors at 103 four-year institutions and 18,109 students at four community colleges (see Appendix D).<sup>9</sup> A profile of the 27,846 students who responded appears in Table 3-2. While four-year institutions invited only seniors and freshmen, some students responded “other” when asked, “What is your class standing?” Their understanding of their own class standing differed from that of the official institutional record. Eighty-three students did not respond to this question at all.

Freshmen from four-year institutions make up 36.7 percent of the respondents, seniors from four-year institutions make up 47

**Table 3-1. Profile of Participating Institutions**

	<b>Number of Institutions (N = 103)</b>	<b>Number of Respondents (N = 27,846)</b>	<b>Percentage of Respondents</b>
<b>Carnegie Class</b>			
DR	45	13,711	49.2%
MA	36	10,515	37.8%
BA	14	1,532	5.5%
AA	4	1,824	6.6%
ENGR	2	96	0.3%
Other	2	168	0.6%
<b>Student FTE Enrollment</b>			
1–2,000	16	1,362	4.9%
2,001–4,000	13	1,731	6.2%
4,001–8,000	21	5,102	18.3%
8,001–15,000	28	9,638	34.6%
15,001–25,000	15	6,319	22.7%
More than 25,000	10	3,694	13.3%
<b>Control</b>			
Private	35	5,636	20.2%
Public	68	22,210	79.8%

percent of the respondents, and community college students make up 6.6 percent. Female students make up 62.1 percent of the respondents, despite the strategy of oversampling male students in the population. We emphasize again that our student respondents are weighted with so-called traditional students. The majority of respondents are under 25 years old (83.9 percent) and go to school full time (89.5 percent). Most freshmen live on campus (79.7 percent), while most seniors (77.1 percent) and community college students (97.4 percent) live off campus. The grade point averages for our respondents appear to follow a fairly normal distribution, with 70.9 percent of respondents having a B or better grade point average.

The overall student response rate in the 2007 study is 10.8 percent,<sup>10</sup> identical to the 2006 rate but lower than the 12.6 percent in 2005 and 23.7 percent in 2004.

We noted significant variation by institution, but no significant difference between seniors, freshmen, and community college students. Several factors might affect the response rate. First, spam continues to proliferate, and since many spam e-mails can contain computer viruses and other forms of malware, students are increasingly cautious about responding to the e-mail invitation. Second, students receive numerous e-mails throughout the year asking them to take a survey and win a prize.

We asked respondents to identify their major (see Table 3-3). The total number of responses exceeds the overall number of respondents (N = 27,846) due to many respondents' reporting double majors (17.4 percent). Because so many respondents are freshmen, it is not surprising to find that 6.9 percent are undecided. Social sciences (19.2 percent) and business (19.0 percent) are the largest major areas of declared interest.

Table 3-2. Profile of Student Respondents

	Four-Year Institutions			Two-Year Institutions	Total
	Seniors (N = 13,057)	Freshmen (N = 10,189)	Other (N = 2,693)	All Students (N = 1,924)	All Students (N = 27,846)
<b>Gender</b>					
Male	38.2%	37.7%	40.3%	33.3%	37.9%
Female	61.8%	62.3%	59.7%	66.7%	62.1%
<b>Age</b>					
18–19	0.4%	93.5%	13.3%	40.3%	38.4%
20–24	78.5%	4.0%	56.9%	23.6%	45.5%
25–29	9.3%	1.1%	11.1%	11.0%	6.6%
30–39	6.0%	0.8%	10.3%	14.0%	5.0%
40 or older	5.7%	0.6%	8.4%	11.1%	4.5%
<b>Residence</b>					
On campus	22.9%	79.7%	27.1%	2.6%	42.8%
Off campus	77.1%	20.3%	72.9%	97.4%	57.2%
<b>Full/Part-Time Status</b>					
Full time	88.7%	97.8%	79.3%	63.4%	89.5%
Part time	11.3%	2.2%	20.7%	36.6%	10.5%
<b>GPA</b>					
Under 2.00	0.2%	2.6%	3.2%	1.3%	1.4%
2.00–2.49	5.0%	8.7%	8.9%	6.2%	6.7%
2.50–2.99	17.5%	18.1%	19.7%	16.3%	17.7%
3.00–3.49	36.8%	33.1%	26.1%	30.9%	34.2%
3.50–4.00	40.0%	33.0%	29.8%	40.1%	36.7%
Don't know	0.6%	4.4%	12.3%	5.2%	3.2%
<b>Family Income</b>					
Less than \$30,000	19.1%	10.7%	18.2%	25.5%	16.4%
\$30,000–\$74,999	25.7%	20.9%	24.7%	31.8%	24.3%
\$75,000–\$149,999	20.9%	21.0%	21.7%	13.0%	20.5%
\$150,000 or more	7.9%	8.5%	6.5%	2.8%	7.6%
Decline to answer	11.2%	10.8%	12.4%	9.0%	11.0%
Don't know	15.2%	28.1%	16.5%	17.8%	20.2%

**Table 3-3. Student Respondents' Majors**

Major	N	Percentage
Social sciences	5,340	19.2%
Business	5,294	19.0%
Other	5,006	18.0%
Life sciences, including agriculture and health sciences	4,557	16.4%
Education, including physical education	3,646	13.1%
Humanities	2,876	10.3%
Engineering	2,655	9.5%
Fine arts	2,332	8.4%
Physical sciences	2,043	7.3%
Undecided	1,925	6.9%

## Endnotes

1. ECAR is indebted to Robert Albrecht (ECAR), Carole Barone (then with EDUCAUSE), Darwin Handel (University of Minnesota), Diana Oblinger (then with ECAR), and many others who consulted on this research and survey design.
2. This year ECAR included one non-U.S. institution, the University College of Dublin, as an experiment. This institution is not included in any data analysis or reports.
3. Robert B. Kvik, Judith B. Caruso, and Glenda Morgan, *ECAR Study of Students and Information Technology, 2004: Convenience, Connection, and Control* (Boulder, CO: EDUCAUSE Center for Applied Research, 2004); Robert B. Kvik and Judith B. Caruso, *ECAR Study of Students and Information Technology, 2005: Convenience, Connection, Control, and Learning*, (Boulder, CO: EDUCAUSE Center for Applied Research, 2005); and Gail Salaway, Richard N. Katz, and Judith B. Caruso, *The ECAR Study of Undergraduate Students and Information Technology, 2006* (Boulder, CO: EDUCAUSE Center for Applied Research, 2006).
4. The information collected from the student respondents is confidential and no personally identifiable data is made available from the quantitative survey. Institutional review board (IRB) approval was received from every participating institution.
5. 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 several institutions, we cannot be certain how representative the respondents are of their respective institutions or of this population in general. Therefore, caution should be exercised in assuming that the findings generalize beyond the sampled students.
6. Staff from participating institutions used various methods to recruit students—posting advertisements in various campus locations, making announcements in large-enrollment classes, and e-mailing 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 investigators' responsibility to protect their rights. Notes were taken. 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.
7. The qualitative analysis for this study used a simple, iterative codification analysis process. SPSS Text Analysis for Surveys (v2.0) software was used as follows: (1) terms and concepts were identified by frequency, (2) the terms were evaluated by "type," such as whether a term or combination of terms had a positive or negative tone, (3) terms and term pairings were reviewed for accuracy and greater contextual understanding than provided by the software, and (4) as needed, responses were force-coded into additional categories or reclassified as synonyms, and/or new study-specific terms were added to the software dictionary. In addition, all responses were reviewed manually for additional concepts, topics, or patterns that need to be codified within the data.

This process required multiple data reviews, as is common in grounded theory and similar approaches to qualitative data analysis.

8. 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. No data from the quantitative survey are presented that would make it possible to identify

a particular respondent. The data files we used for analysis have been purged of any information that would have similar consequences. The IRB applications, application dates, and approval dates are available from ECAR.

9. To encourage a larger response from the students, ECAR offered 35 \$50 gift certificates and 25 \$100 gift certificates to be awarded to students via lottery. We learned from other institutions' experiences that the absence of an incentive would greatly reduce the response rate.
10. One participating institution did not provide enrollment and sample information, so this data was not included in the calculation for overall response rate.