

How Do Engineering Faculty Use Instructional Technology?

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Abstract – The Southeastern University and College Coalition for Engineering Education (SUCCEED) was an NSF-Sponsored Engineering Education Coalition that functioned from 1992 through 2002, comprising eight engineering schools that accounted for approximately 1/13 of all U.S. engineering degrees awarded. As part of its ongoing program assessment activities, SUCCEED periodically surveyed the 1600+ engineering faculty members on its member campuses to assess their usage of various teaching practices and their opinions about the importance of teaching at their institution. Surveys conducted in 1999 and in 2002 specifically addressed uses

of technology-based methods in both on-campus and off-campus course offerings. This paper briefly outlines the survey response analysis methodology and summarizes the principal results related to technology use.

Index Terms – Instructional technology, technology

SURVEY ITEMS AND METHODOLOGY

The survey asked whether the recipients used the techniques enumerated in Table 1 in their classes.

TABLE 1
TECHNOLOGY-RELATED TECHNIQUES INCLUDED IN THE SUCCEED FACULTY SURVEY

• Sent information by email to the whole class.	• Posted grades on-line (2002 only)
• Responded to student questions by email.	• Posted frequently asked questions
• Used a course management tool (2002 only)	• Posted links to other sites
• Provided a class listserv or mailing list	• Provided a class chat room
• Posted course syllabus	• Offered on-line tutorials
• Assigned on-line homework (2002 only)	• Posted lecture notes/slides
• Posted student assignments	• Provided on-line quizzes
• Posted old tests	• Provided on-line video
• Posted solutions to problems	• Provided on-line audio
• Posted handouts (2002 only)	• Other, specify []

The 1999 survey was sent by e-mail to 1621 faculty e-mail addresses and a follow-up survey was sent a month later to non-respondents. After blank surveys and duplicates were eliminated from the returns, 586 valid and usable surveys remained for a return rate of 36%. Of those, 75 were excluded from most analyses (except for demographic summaries) because the respondents had not taught undergraduates in the prior three years. In 2002, the survey was sent to 1589 addresses and 375 valid and usable surveys remained after elimination of blanks and duplicates, a return rate of 24%. The lower response rate in 2002 was consistent among the eight SUCCEED schools. We surmise that some

of the decrease was caused by a diminished faculty attention to SUCCEED as its programs wound down. The demographic profile of the respondents to both survey administrations closely matched that of the full faculty with respect to rank, position, engineering discipline, and level of participation in faculty development programs. Women were slightly overrepresented among the respondents.

The survey responses were classified according to respondents' sex, rank, position, years of service, level of involvement with SUCCEED, prior attendance at teaching seminars, and Carnegie classification of the respondents' schools. Responses to questions were analyzed using the

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Chi-square test for independence. A full report of the results is given by Brawner *et al.* [1].

As can be seen in Figure 1, the use of all on-line resources increased from 1999 to 2002. All of these increases were significant at the .05 level except responding to student questions by email, providing a class listserv, offering on-line tutorials and providing on-line quizzes.

FINDINGS

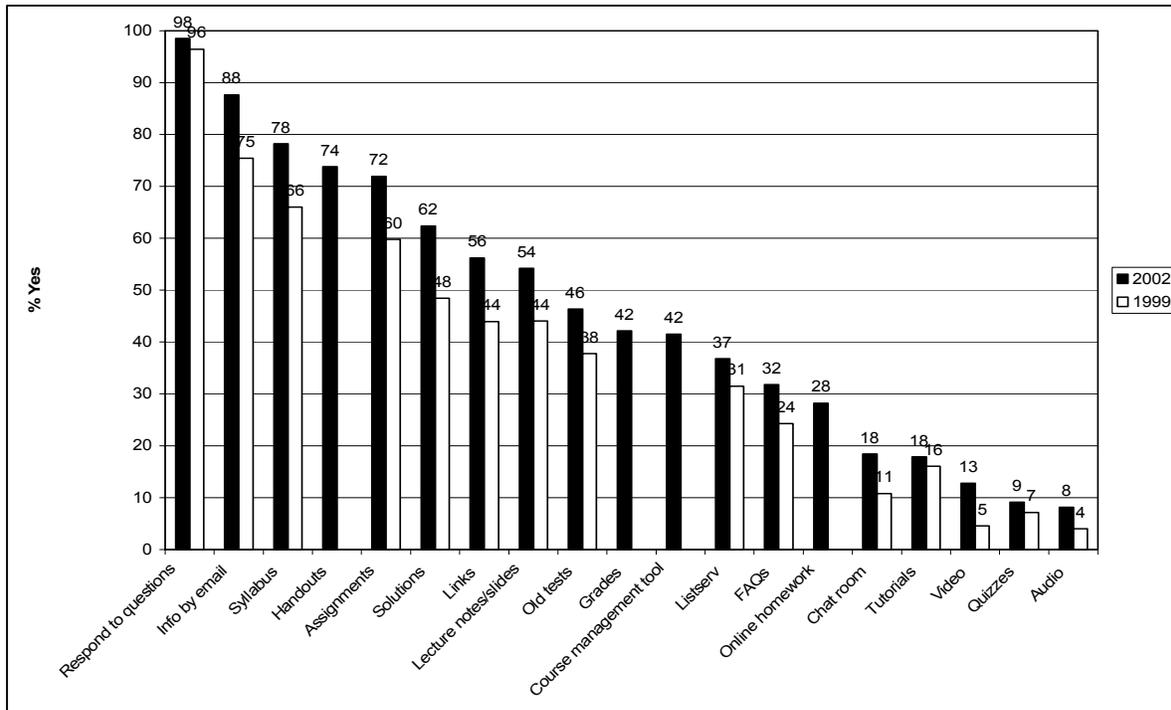


FIGURE 1.
USE OF ON-LINE RESOURCES

The paragraphs that follow summarize the greatest observed differences between subgroups in uses of on-line resources.

Women vs. Men

In 2002, women were more likely than men to post course syllabi (95% of the women respondents vs. 76% of the men, $p = .007$), assignments (90% vs. 70%, $p = .007$), handouts (85% vs. 72%, $p = .09$), solutions to problems (75% vs. 61%, $p = .09$), links to other web sites (75% vs. 53%, $p = .01$), and old tests (60% vs. 45%, $p = .07$), and to use a course management tool such as WebCT or Blackboard (60% vs. 39%, $p = .01$). The differences were less in 1999 but in the same direction. Women were more likely than men to provide a class listserv in 1999 (44% vs. 30%, $p = .05$), but in 2002 the percentage of women doing so decreased to 35% while the percentage of men increased to 38%. The difference is not significant. Some of these differences may be explained by the fact that relatively more women than men are assistant professors who also tend to

make more use of technology than more experienced professors (see below).

Differences by Rank.

In 2002, when significant differences in technology use between faculty members of different ranks existed, they were sometimes but not always in the predictable direction of greater use by newer professors. Differences were found for posting course syllabi (88% of the assistant professors, 80% of the associate professors, and 73% of the full professors, $p = .05$), handouts (85%, 75%, and 67%, $p = .02$), and assignments (81%, 76%, and 64%, $p = .02$). On the other hand, full professors made greater use of on-line video than either associate professors or assistant professors (17%, 15%, and 4% respectively) ($p = .04$). In 1999, no more than 6% of any rank used on-line video. Finally, associate professors were more likely than their more senior or more junior counterparts to use a course management tool or give on-line assignments. Thirty-six percent of assistant professors, 50% of associate professors, and 37% of full

professors ($p = .1$) used course management tools, and the percentages assigning on-line homework were 19% (assistant), 36% (associate), and 29% (full) ($p = .06$). The percentages for each technique and each rank generally rose by 5% to 20% from 1999 to 2002, except that almost no increases were observed for the percentages offering on-line tutorials and on-line quizzes.

Differences between Campuses

Not surprisingly, technology use varied considerably from one SUCCEED campus to another. The ranges in the 2002 survey are shown below. For all techniques that were asked about in both years except providing a class chat room, on-line video, and on-line audio, both the low and high percentages were greater in 2002 than they were in 1999.

- posting handouts: 56% – 87%
- posting course syllabi: 55% – 89%
- posting assignments: 45% – 87%
- posting solutions to problems: 42% – 70%
- posting lecture notes and slides: 34% – 73%
- posting grades on line: 32% – 53%
- use a course management tool: 20% – 73%
- posting responses to FAQs: 19% – 37%
- setting up listservs and mailing lists: 20% – 55%
- posting old tests: 23% – 68%
- assigning on-line homework: 10% – 43%
- providing a class chat room: 12% – 27%
- offering on-line tutorials: 6% – 27%
- on-line quizzes: 7% – 21%
- on-line video: 0% – 20%
- on-line audio: 0% – 27%

CONCLUSIONS

Engineering education is in a transitional state regarding the use of instructional technology, and the variations from one method to another and from one campus to another observed in the SUCCEED survey undoubtedly reflect the situation throughout the country. Some of the SUCCEED campuses have a fully networked computing environment, make extensive use of course management tools, and require all engineering students to purchase laptops. These are the schools that make the greatest use of technology for communication and instruction—where over 80% of the instructors post their syllabi on the Web, for example, and over half set up listservs for their classes. At other schools with fewer resources and/or more traditional and technology-resistant faculties, most professors tend to use only e-mail, programming, and word-processing. The full use of instructional technology for course delivery with such tools as on-line test administration and multimedia courseware is still in its early stages on all of the campuses. We anticipate dramatic changes in this situation in the coming years.

ACKNOWLEDGMENT

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REFERENCE

- [1] Brawner, C.E., R.M. Felder, R.H. Allen, and R. Brent, *2002 Succeed Faculty Survey of Teaching Practices and Perceptions of Institutional Attitudes toward Teaching*.
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