

Trends in Required Student Computer Use: Implications for a Computer Applications Service Course

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Abstract

To evaluate the content of a computer applications service course, faculty members in a land-grant college of agriculture were surveyed in 1999 and again in 2004 to determine the computer tasks they required of students enrolled in specific undergraduate courses. In both 1999 and 2004, three specific tasks were required in 50% or more of courses: (1) type a lab or project report, (2) receive email from the instructor, and (3) search the Internet for information on a specific topic. In 2004, one additional task, send email to the instructor, was required in a majority of courses. The required use of three email tasks significantly increased from 1999 to 2004. Less than 50% of courses in either year required any use of spreadsheets, databases, computer graphics, or specialized applications. These results indicated the content of the computer applications service course provides the necessary knowledge and skills required in other agriculture courses. Minor changes were made in course content based on these results.

Introduction

The uses of information technology for teaching and learning in colleges of agriculture are numerous, with many applications requiring students to have a relatively high degree of computer proficiency (Stout and Lee, 2004). However, Messineo and DeOllos (2005) concluded that undergraduates at Ball State University reported low levels of experience and confidence in their ability to perform intermediate and advanced computer tasks, especially those related to academics. Likewise, Johnson and Wardlow (2004) found that entering agriculture students at the University of Arkansas had fairly low levels of computer knowledge and computer self-efficacy.

Kuth and Vesper (2001) studied 125,000 recent graduates from 205 institutions and concluded that students making larger gains in computer skills during college scored higher on each of 27 academic and social outcome measures, when controlling for student socioeconomic status. Based on these results, Kuth and Vesper (2001) recommended that all entering students become proficient in computer use early in their college careers and that universities examine how students use computers in their courses.

The Department of Agricultural & Extension Education at the University of Arkansas offers five sections of AGME 2903, Computer Applications in Agriculture, each academic year, with a total enrollment of over 100 students. The major instructional units are: (i) hardware and operating systems, (ii) Internet and email, (iii) word processing, (iv) web page development, (v) spreadsheets, (vi) databases, and (vii) presentation graphics and CAD. The primary objective of AGME 2903 is to help students develop the basic computer understandings and skills they will need in other courses within the college, as well as skills they will need in their careers.

The content of AGME 2903 is continually reviewed to ensure that the course provides students with the computer knowledge and skills they will need in other courses in the college. In addition to informal discussions with faculty and students, the primary source of data for decisions about course content is a periodic survey of teaching faculty to determine the specific computer tasks required in their courses. The purpose of this study was to identify the computer tasks required in undergraduate agriculture courses in order to evaluate content of AGME 2903. Specific objectives were to:

1. Identify and compare the computer tasks required in selected undergraduate agriculture courses at the University of Arkansas in fall 1999 and fall 2004.
2. Determine instructors' course curriculum plans for required student computer use in selected undergraduate agriculture courses over the next two to three years.

Methods

The population consisted of all undergraduate agriculture courses taught at the University of Arkansas during the fall 1999 (N = 111) and fall 2004 (N = 107) semesters, with 63 and 55 courses selected for study in 1999 and 2004, respectively. Courses were identified using official records supplied by the dean's office. Data were collected in January and February of 2000 and 2005, with 92% and 86%, respectively, of surveyed faculty responding.

The instructor for each course received a cover letter and a three-part survey instrument with the name of the selected course printed both on the letter and in the instrument. In Part One, the respondents

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indicated whether or not students enrolled in the selected course were required to complete 34 specific computer tasks, grouped into eight areas, by circling either a "Yes" or a "No" to the left of each task. In addition to the specific tasks listed, each area of computer use also contained an "Other (please specify):" response option. In Part Two, the respondents were asked to indicate their plans for required student computer use in the course over the next two to three years. This section listed seven broad areas of computer use and with the response options of "Decrease use," "Maintain current use," or "Increase use." Part Three contained four demographic-type items concerning academic rank, teaching experience and appointment, and self-perceived level of computer skills.

A panel of nine faculty members (one from each department in the college) examined the instrument and judged it to possess face and content validity. Five faculty members at two different land-grant universities completed the instrument twice (at two to seven week intervals) to determine instrument stability. Part One had a test-retest agreement percentage of 95% and Part II had a test-retest agreement percentage of 86%.

Survey data were analyzed using descriptive and inferential statistics (Chi square and independent t-tests). An a priori alpha level of .05 was set for all tests of significance.

Results

In 1999, the largest percentage of faculty respondents were full professors (41%), had more than 20 years of university teaching experience (32%), and rated their computer skills as average when compared to other faculty in the college (59%). This was similar to respondents in 2004, where 48% were full professors, 43% had more than 20 years of university teaching experience, and 52% rated their computer skills as average when compared to other faculty in the college. The percentage of upper-division (junior- and

senior-level) courses in the responding samples were similar in 1999 (73%) and 2004 (69%). These numbers closely paralleled the percentage of upper-division courses offered within the college in fall 1999 and fall 2004.

There was no significant difference in the total number of unique computer tasks required per course in fall 1999 ($M = 6.18$, $SD = 4.72$) and fall 2004 ($M = 7.61$, $SD = 5.71$), $t(100) = 1.39$; $p = .17$. Over both years, there was no significant difference between the total number of unique computer tasks required per course between lower-division ($M = 6.03$, $SD = 5.47$) and upper-division ($M = 7.15$, $SD = 5.10$) courses, $t(100) = 0.99$; $p = .33$.

There was a significant increase in the percentage of courses requiring e-mail use between 1999 and 2004 (57.1% versus 85.4%), $\chi^2(1) = 9.88$; $p = .002$. There was no significant change in the percentage of courses

Table 1. Computer Tasks Required in Undergraduate Agriculture Courses, Fall 1999 and Fall 2004.

Area and Task	Semester				χ^2 ¹
	Fall 1999 (n = 56)		Fall 2004 (n = 48)		
	f	%	f	%	
Electronic mail	32	57.1	41	85.4	9.88**
Receive e-mail from instructor	31	55.4	40	83.3	9.34**
Send e-mail to instructor	23	41.1	33	68.8	7.97**
Submit assignments as attached files using e-mail	5	8.9	19	39.6	13.68***
Participate in an e-mail discussion group	3	5.4	1	2.1	0.75
Other e-mail tasks	4	7.1	1	2.1	1.45
Internet / WWW	39	69.6	38	79.2	1.22
Search for information on a specific topic	30	53.6	32	66.7	1.84
Access a homepage developed for the course	20	35.7	19	39.6	0.17
Download data from the Internet	15	26.8	16	33.3	0.53
Other Internet / WWW tasks	0	0.0	5	10.4	6.13**
Create a Web page	2	3.6	1	2.1	0.20
Participate in a threaded discussion group	2	3.6	0	0.0	1.75
Word processing	41	73.2	32	66.7	0.53
Type a lab or project report	35	62.5	26	54.7	0.74
Type a formal research paper	16	28.6	17	35.4	0.56
Other word processing tasks	8	14.3	8	16.7	0.11
Prepare a brochure or newsletter	2	3.6	2	4.2	0.02
Type a business letter	4	7.7	1	2.1	1.45
Miscellaneous	22	39.3	24	50.0	1.20
Conduct a literature search using on-line database	14	25.0	16	33.3	0.87
Use a computer simulation program	7	12.5	11	22.9	1.96
Write a computer program	1	1.8	4	8.3	2.42
Transfer files using file transfer software	4	7.1	2	4.2	0.42
Use a financial management program	2	3.6	2	4.2	0.88
Other miscellaneous tasks	2	3.6	1	2.1	0.20
Computer graphics	15	26.8	18	37.5	1.37
Create materials using presentation graphics	14	25.0	17	35.4	1.34
Make drawings using CAD	0	0.0	4	8.3	4.85***
Other graphics tasks	2	3.6	2	4.2	0.02
Spreadsheets	19	33.9	16	34.0	0.00
Create charts and / or graphs	15	26.8	14	29.2	0.07
Enter data into an existing spreadsheet	13	23.2	11	22.9	0.00
Create a new spreadsheet	13	23.2	11	22.9	0.00
Write a formula that performs a single calculation	12	21.4	11	22.9	0.03
Write a formula that performs multiple calculations	9	16.1	9	18.8	0.13
Use spreadsheet functions (e.g. IF, MAX, MIN, etc.)	5	8.9	7	14.0	0.88
Use spreadsheet database functions	5	8.9	3	6.2	0.26
Other spreadsheet tasks	1	1.8	3	6.2	1.39
Record spreadsheet macro	0	0.0	1	2.1	1.18
Databases	8	14.3	4	8.5	0.90
Create a new database	7	12.5	4	8.5	0.42
Sort or query a database	3	5.4	3	6.4	0.05
Create a database report	0	0.0	3	6.4	3.68
Do database programming	0	0.0	3	6.4	3.68
Enter data into an existing database	4	7.1	1	2.1	1.39
Other database tasks	0	0.0	1	2.1	1.20
Specialized applications	10	17.9	7	14.6	0.20

¹ **, *** significant at $P = .01$ or $.001$, respectively by the Chi Square test of independence.

requiring one or more tasks in any of the remaining seven areas of computer use (Table 1).

In both fall 1999 and 2004, 50% or more of courses required students to complete one or more tasks in word processing, Internet, and electronic mail. In fall 2004, 50% of courses also required students to complete at least one miscellaneous computer task, with the most frequent being to conduct a literature search using an on-line database. In both fall 1999 and 2004, three specific computer tasks were required in over 50% of all courses: (i) type a lab or project report, (ii) receive email from instructor, and (iii) search the Internet for information on a specific topic. In fall 2004, an additional task, send email to the instructor, was required in more than 50% of courses. Ten specific computer tasks were required in 25% or more of courses in 1999; these same 10 tasks, plus, submit assignments as attached files using email, were required in 25% or more of courses in 2004.

In both years, the same 20 computer tasks were required in less than 10% of courses. These 20 tasks were distributed throughout the seven areas of computer use (excluding specialized applications) and included such tasks as participate in an email discussion group, type a business letter, make drawings using CAD, use spreadsheet functions, and create a database report.

The required use of five specific computer tasks increased significantly from 1999 to 2004. Three of these were from the electronic mail area: (i) receive email from instructor, (ii) send email to instructor, and (iii) submit assignments as attached files using e-mail. The percentage of courses requiring students to complete 'other' Internet tasks (primarily WebCT) and to make CAD drawings also increased significantly from 1999 to 2004; however, these tasks were required in 10.6% or less of all courses in 2004.

In both 1999 and 2004, instructors were asked about their plans for required student computer use in the selected courses over the next two to three years. Only data from 2004 are presented in this article. As shown in Table 2, over 50% of instructors planned to increase required student use of the Internet. Approximately 40% planned to increase required email and word processing tasks. Less than 5% planned to increase required use of computer graphics. Over 90% of respondents planned to either maintain or increase required use of tasks in each of the seven computer areas.

Table 2. Instructors' Plans for Required Student Computer Use in Selected Undergraduate Agriculture Courses over the Next Two to Three Years.

Area	n	Decrease use		Maintain use		Increase use	
		%		%		%	
Internet or WWW	46	2.2		41.3		56.5	
Electronic mail	46	0.0		56.5		43.5	
Word processing	46	2.2		58.7		39.1	
Spreadsheets	43	4.6		65.1		30.2	
Databases	42	4.6		65.1		30.2	
Specialized applications	41	4.9		68.3		26.8	
Computer graphics	43	7.1		88.1		4.8	

Conclusions, Implications and Recommendations

The purpose of this study was to identify and compare the computer tasks required in selected undergraduate agriculture courses taught at the University of Arkansas in fall 1999 and fall 2004 in order to evaluate the content of a college computer applications service course (AGME 2903). The results indicated that, while changes in required computer tasks did occur over a five year period, these changes tended to be relatively minor. Despite rapid changes in computer hardware and software, required computer tasks within this college tend to be fairly constant.

Ten of the 11 tasks required in 25% or more of the courses in 1999 or 2004 were already taught in AGME 2903 in 2004. Conducting a literature search using an online database was not taught, but was added based on these results. Faculty members required significantly more communication via email in 2004 than in 1999; but, since these email competencies were already taught in AGME 2903, no change in course content was necessary.

Instructors plan to either maintain or increase required student computer use in each of seven areas over the next two to three years. The largest planned increases in required use are in the Internet, email, and word processing areas. These three areas were the most frequently required areas in both 1999 and 2004. Thus, it appears that instructors will increase required student computer use in the same areas where they already require the highest levels of use.

The content of AGME 2903 currently prepares students for the computer tasks required in undergraduate agriculture courses in the college. Given the instructors' plans for changes over the next two to three years, the current content of AGME 2903 should adequately prepare students for required computer use in agriculture courses over this period. AGME 2903 should continue to emphasize word processing, Internet and e-mail use, basic spreadsheets, and presentation graphics. Databases, advanced spreadsheets, web page development, and CAD could be somewhat de-emphasized if instructional time is limited. Curriculum development through periodic assessment of required computer tasks should continue.

Undergraduate agriculture courses in this college tend to require a fairly limited set of basic computer skills, such as email and word processing. Brown and Kester (1993) concluded that skills learned in computer applications courses decay if they are not subsequently used. Thus, students appear likely to at least partially lose many of the more advanced skills taught in AGME 2903. If these skills are needed in agricultural careers, systematic efforts should be made to

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incorporate their use into undergraduate agriculture courses.

Finally, while AGME 2903 adequately prepares students for the computer tasks they will encounter in other agriculture courses, a larger question remains unanswered. Namely, to what extent do the overall computing experiences provided in the undergraduate agriculture curriculum prepare students with the computer and information technology skills and understandings they will need in their careers? While beyond the scope of this study, further research should be conducted to answer this important question.

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