Computer Tasks Required in Selected Undergraduate Agriculture Courses

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Abstract

Faculty members in a land-grant college of agriculture were surveyed to determine the computer tasks required of students enrolled in selected undergraduate courses (n = 63). Over 50% of the courses required students to complete one or more tasks in the areas of word processing, Internet use and electronic mail. Less than 50% of the courses required any use of spreadsheets, databases, computer graphics, specialized software, or completion of miscellaneous computer tasks. The typical course required students to complete 5.0 (Mdn) computer tasks. The three individual computer tasks required in 50% or more of the courses were to: (a) type a lab or project report, (b) receive electronic mail from the instructor, and (c) search the Internet for information on a specific topic. Sophomore- and senior-level courses tended to require the most computer tasks (Mdn = 8.0), while junior-level courses required the least (Mdn = 3.0). Faculty members indicated plans to maintain or increase the number of required computer tasks over the next two to three years, especially in Internet and electronic mail use. Faculty demographics and course-related variables were not good predictors of either current or planned levels of required student computer use.

Introduction

Computers play an important and ever increasing role in modern agriculture. In follow-up studies, university agriculture graduates consistently rate computer skills as being important to career success (Andelt, Barrett, & Bosshamer, 1997; Graham, 1997; Radhakrishna & Bruening, 1994). Yet, Heyboer and Suvedi (1999) found that recent (1993 - 1998) graduates of the College of Agriculture and Natural Resources at Michigan State University felt they had received less than satisfactory preparation in computer use, rating computers as the area in which they were least prepared for employment.

Agricultural employers also place significant importance on computer skills, with more than 80% indicating that computer skills are either an 'important" or "very important" factor considered when making employment decisions (Monk, Davis, Peasley, Hillman, & Yarbrough, 1996). Thus, university agriculture programs must ensure that graduates are competent in computer use (Davis, 1997; Johnson, Von Bargen, & Schinstock, 1995; Langlinas, 1994).

In a Cornell University study, Monk et al. (1996) determined that agriculture graduates should be proficient in word processing, presentation graphics, spreadsheet analysis, database management, technical graphics, Internet use and electronic mail. Further, students should be sufficiently comfortable with computer and information technologies so they can develop new computer skills throughout their careers. Researchers at the University of Wisconsin-Stout also

found that abilities in these same areas are important for students in a wide variety of majors (Furst-Bowe et al., 1995).

Recognizing the importance of computers in agriculture, Bekkum and Miller (1994) surveyed deans at 71 land-grant colleges of agriculture to determine the strategies used to ensure that graduates were proficient in computer use. Of the 59 deans responding, less that one-half (44.1%) reported a college-wide computer education requirement. Further, 11 (18.6%) of the deans believed that, in the future, less time would be required for basic computer skill development, since students would have developed these skills prior to entering college. According to Kieffer (1995), many university faculty and administrators accept the premise that students enter college already possessing basic computer skills.

Johnson, Ferguson, and Lester (1999) tested this premise by assessing the computer experiences, self-efficacy and knowledge of students ($\underline{N}$ = 175) enrolled in three freshman-level agriculture courses at a land-grant university during the fall 1998 semester. The researchers concluded that the students did not have a common core of computer experiences, lacked confidence in their computer skills, and had a low level of computer knowledge (as indicated by a mean score of 38.8% correct on a 35-item multiple choice exam). In a similar study, Gordon and Chimi (1998) found that students entering a college of business lacked sufficient computer knowledge and recommended continuation of the introductory computer literacy course requirement.

Donaldson, Thomson, Whittington, and Nti (1999) recommended that colleges of agriculture include computer applications in all introductory courses so that students would be prepared to use computer technology throughout their undergraduate years. Johnson et al. (1999) noted a substantial positive correlation ($\underline{r}$ = .67) between computer self-efficacy and computer knowledge and hypothesized that, while students recognized their lack of computer skills, they were not motivated to improve because computer skills are not regularly required in undergraduate courses. A separate study of 169 upper-division agriculture students provided support for this hypothesis since, according to Johnson, Ferguson and Lester (2000), word processing was the only computer task students reported as being required "often or fairly often" in their college courses. Brown and Kester (1993) posited that students tended to forget many of the skills learned in introductory computer courses because they did not use these skills in subsequent courses. Given the importance that both graduates and employers place on computer skills, and the suggestion that computer skills decay because of disuse in subsequent courses, a clear need existed to examine the course-related computer tasks required of undergraduate agriculture majors. The results of this study would provide information necessary for enhancing the computer experiences and skills of undergraduate students.

Objectives

The purpose of this study was to describe required student computer use in undergraduate agriculture courses in a land-grant university. Specific objectives were to determine:

1. The computer tasks required in undergraduate agriculture courses, by course level and overall;

2. Instructors' plans for required computer use in undergraduate agriculture courses over the next two to three years; and
3. The relationship between selected faculty and course variables and levels of current and planned required student computer use.

Methods

The population for this descriptive study consisted of all undergraduate agriculture courses (excluding special problems, special topics, laboratory courses, and the College computer applications course) taught in a mid-south land-grant university during the 1999 calendar year ($N = 111$). The courses were identified using official records supplied by the dean's office. After deleting courses taught by instructors no longer employed by the university, an accessible population of 103 courses (taught by 63 individual faculty members) was identified. The sample of courses ($n = 63$) consisted of all 34 courses taught by faculty teaching only one course during the year, plus one randomly selected course for each of the 29 instructors teaching multiple courses during the year. The resulting sample closely approximated the accessible population of courses with regard to course level and department.

The data were collected using a survey instrument developed by the researchers, based, in part, on previous research that sought to identify essential computer skills (Davis, 1997; Furst-Bowe et al., 1995; Kieffer, 1995; Monk et al., 1996). In order to focus each respondent's attention on the specific course selected, the alpha code, number and title of the course were hand-printed once on each cover letter and in three places on each survey instrument.

In Part One, the respondents were instructed to indicate whether or not students enrolled in the identified course were required to complete 34 specific computer tasks (grouped into eight categories), by circling either a "Yes" or a "No" to the right of each task. In addition to the specific tasks listed, each category of computer use 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 identified course over the next two to three years. This section listed seven broad areas of computer use with the response options of: "Decrease use," "Maintain current use," or "Increase use." Part Three contained four demographic items related to academic rank, teaching experience and appointment, and self-perceived computer skills of the instructors. A blank section was provided for additional written comments from the respondents.

The survey instrument was examined for face and content validity by a panel of faculty consisting of representatives from each department within the College and judged to be valid. In order to establish instrument reliability, five agriculture faculty members at two land-grant universities completed the instrument twice (at two- to seven-week intervals) for specific, identified courses which they had recently taught. For Part One and Part Two, agreement percentages of 95% and 86%, respectively, were obtained. The reliability of Part Three was not assessed since, according to Salant and Dillman (1994), responses to non-sensitive, demographic items are subject to little measurement error.

The survey instruments and cover letters were hand delivered to departmental offices and placed in faculty mailboxes. After two follow-up contacts, usable responses were received from 58 of 63 faculty members, for a 92.1% response rate.

Results

The typical faculty respondent was a full professor (43.1%) with 10 or more years of university teaching experience (60.3%). A majority (76.8%) of the faculty reported that a third or less of their appointment was in resident instruction. When comparing themselves to other faculty in the College, a majority (60.3%) of respondents rated their computer skills as average, 24.1% rated their skills as above average, and 15.5% rated their skills as below average.

One or more tasks in word processing, Internet use, and electronic mail were required in more than one-half of all the undergraduate agriculture courses studied. Conversely, less than one-half of the courses required any use of spreadsheets, databases, computer graphics, specialized software, or completion of miscellaneous computer tasks. Only three individual computer tasks were required in more than 50% of courses: type a lab or project report (63.8%), receive electronic mail from the instructor (58.3%), and search the Internet for information on a specific topic (53.4%). Of the 34 identified computer tasks, 26 were required in less than 25% of courses, while 17 were required in less than 10%. None of the 58 courses included assignments requiring students to create a spreadsheet macro, do database programming, or use a computer-assisted drafting program.

In addition to the 34 specific computer tasks listed on the survey, a number of course instructors wrote in additional tasks in the "Other (please specify):" blanks. A majority of these were in the word processing area, with the most frequent (n = 4) being to type a memo. The most commonly identified special application software was for statistical analysis, either SAS® or JMP® (n = 3). Table 1 summarizes the computer tasks required in the 58 courses, by level and overall.

Table 1. Computer Tasks Required in Selected Undergraduate Agriculture Classes, by Level and Overall.

	Course level				
Computer area	Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
Computer task	Percent requiring area/task				
Word Processing	**71.4**	**87.5**	**47.4**	**91.7**	**74.1**
Type a lab or project report.	57.1	62.5	36.8	87.5	63.8
Type a formal research paper.	28.6	25.0	15.8	37.5	27.6
Type a business letter.	0.0	0.0	5.3	12.5	6.9

Table 1. (cont.)

Computer area / Computer task	Course level: Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
	Percent requiring area/task				
Prepare a brochure or newsletter.	0.0	0.0	10.5	0.0	3.4
Other	42.9	25.0	5.3	8.3	13.8
Electronic Mail	**57.1**	**75.0**	**47.4**	**58.3**	**56.9**
Receive electronic mail *from* you.	57.1	75.0	42.1	58.3	55.2
Send electronic mail *to* you.	57.1	50.0	31.6	41.7	41.4
Submit course assignments as "attached files" using e-mail.	14.3	12.5	5.3	8.3	8.6
Participate in an e-mail course discussion group or listserve.	0.0	0.0	10.5	4.2	6.9
Other	14.3	12.5	5.3	4.2	6.9
Internet and World Wide Web	**85.7**	**62.5**	**57.9**	**75.0**	**69.0**
Search the Internet for information on a specific topic.	57.1	50.0	36.8	66.7	53.4
Access a *homepage* developed for your course.	42.9	37.5	36.8	29.2	34.5
Download data to disk or hard-drive from the Internet.	0.0	25.0	36.8	25.0	25.9
Participate in a "threaded discussion group" for your course.	0.0	0.0	5.3	4.2	3.4
Create a Web page.	14.3	0.0	5.3	0.0	3.4
Other	0.0	0.0	0.0	0.0	0.0
Spreadsheets	**0.0**	**50.0**	**15.8**	**54.2**	**34.5**
Create charts and/or graphs.	0.0	37.5	5.3	50.0	27.6
Create a new spreadsheet.	0.0	25.0	5.3	45.8	24.1
Enter data into an existing spreadsheet.	0.0	25.0	10.5	37.5	22.4

Table 1. (cont.)

Computer area / Computer task	Course level: Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
	Percent requiring area/task				
Write a spreadsheet formula that performs a single mathematical operation.	0.0	25.0	5.3	37.5	20.7
Write a single spreadsheet formula that performs a series of mathematical operations.	0.0	12.5	5.3	29.2	15.5
Use spreadsheet functions (e.g. *IF*, *MAX*, *MIN*, etc.*).*	0.0	0.0	0.0	20.8	8.6
Use spreadsheet database functions (e.g. S*ort, Query).*	0.0	12.5	0.0	16.7	8.6
Create a spreadsheet macro.	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	4.2	1.7
Databases	**0.0**	**25.0**	**10.5**	**16.7**	**13.8**
Create a new database.	0.0	12.5	10.5	16.7	12.1
Enter data into an existing database.	0.0	12.5	5.3	8.3	6.9
Sort and/or query a database.	0.0	0.0	5.3	8.3	5.2
Create a database report.	0.0	12.5	5.3	4.2	5.2
Do database programming.	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Computer graphics	**14.3**	**12.5**	**21.0**	**37.5**	**25.9**
Create materials using presentation graphics software (for example, *Microsoft Powerpoint, Corel Presentations, Harvard Graphics*, etc.).	14.3	12.5	21.0	33.3	24.1
Make drawings using computer-assisted drafting program (for example, *AutoCAD, TurboCAD, AutoSketch*, etc.)	0.0	0.0	0.0	0.0	0.0

Table 1. (cont.)

Computer area / Computer task	Course level: Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
	Percent requiring area/task				
Other	0.0	0.0	0.0	8.3	3.4
Miscellaneous Tasks	**28.6**	**50.0**	**21.0**	**50.0**	**37.9**
Conduct a literature search using *Agricola, ERIC, FirstSearch* or similar database.	28.6	25.0	10.5	33.3	24.1
Use a computer simulation program.	0.0	25.0	5.3	16.7	12.1
Transfer files from a personal computer to a mainframe computer (or *vice versa*) using file transfer software (for example, *Telnet or Windows FTP*).	0.0	12.5	10.5	4.2	6.9
Use a financial management program such as *Quicken*.	0.0	0.0	0.0	8.3	3.4
Write a computer program.	0.0	0.0	0.0	4.2	1.7
Other	0.0	12.5	0.0	4.2	3.4
Specialized Applications	**0.0**	**25.0**	**10.5**	**25.0**	**17.2**

Overall, the typical undergraduate agriculture course required 5.0 (Mdn) computer tasks. Sophomore- and senior-level courses required the greatest number of computer tasks (Mdn = 8.0), while junior-level courses required the least (Mdn = 3.0). At all levels, the typical course required at least one Internet-related computer task. Courses at the freshman-, sophomore-, and senior-levels also typically required at least one task in both word processing and electronic mail. One-half of all sophomore- and senior-level courses required students to complete one or more spreadsheet tasks. Little use of databases, computer graphics, or specialized applications was required at any level (Table 2).

The instructors were asked about their plans for required student computer use in the selected courses over the next two to three years. The majority of instructors planned to either maintain or increase the level of required student use in each of the seven computer areas studied (instructors were not asked about future plans for "miscellaneous tasks"). Databases and specialized applications were the only areas where any faculty reported plans to decrease required use; however, this planned decrease was more than offset by instructors planning to increase required student use in these areas. Overall, the largest percentage of planned increase in

required student use was in two of the computer areas (Internet and electronic mail) where the highest level of current required use existed. A minority (<40%) of respondents planned to increase required student use of word processing, spreadsheets, computer graphics and specialized applications over the next two to three years.

The relationship between current and planned required student use in each area ranged from negligible to moderate (Davis, 1971), explaining less than 10% of the variance in planned use for any of the computer areas. Table 3 summarizes the data related to future plans for required student computer use.

Table 2. Number of Required Student Computer Tasks per Course by Area, Total, Level and Overall.

	Course level														
	Freshman (n=7)			Sophomore (n=8)			Junior (n=19)			Senior (n=24)			Overall (n=58)		
Area	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn
Word processing	1.29	.95	2.0	1.12	.64	1.0	0.74	1.05	0.0	1.46	.72	1.5	1.16	.89	1.0
Electronic mail	1.43	1.40	2.0	1.50	1.07	2.0	0.94	1.35	0.0	1.17	1.17	1.0	1.17	1.23	1.0
Internet	1.14	.90	1.0	1.12	.49	1.0	1.21	1.27	1.0	1.25	1.03	1.0	1.21	1.09	1.0
Spreadsheet	0.0	—	0.0	1.38	1.77	1.0	0.32	.95	0.0	2.42	2.72	1.5	1.29	2.17	0.0
Database	0.0	—	0.0	0.38	.74	0.0	0.26	.93	0.0	0.38	1.01	0.0	0.29	.88	0.0
Computer graphics	0.14	.38	0.0	0.12	.35	0.0	0.21	.42	0.0	0.42	.58	0.0	0.28	.49	0.0
Miscellaneous tasks	0.29	.49	0.0	0.75	.89	0.5	0.26	.56	0.0	0.71	.81	0.5	0.52	.73	0.0
Specialized applications	0.0	—	0.0	0.25	.46	0.0	0.11	.32	0.0	0.25	.44	0.0	0.17	.38	0.0
Total	**4.28**	**2.69**	**5.0**	**6.62**	**4.34**	**8.0**	**4.05**	**4.84**	**3.0**	**8.04**	**4.47**	**8.0**	**6.08**	**4.68**	**5.0**

Table 3. Instructors' Plans for Required Student Computer Use in Selected Undergraduate Agriculture Courses over the Next Two to Three Years.

		Level of Required Use			
Area of Computer Use	n	Decrease %	Maintain %	Increase %	r[a]
Word processing	57	0.0	61.4	38.6	-.23
Electronic mail (e-mail)	57	0.0	38.6	61.4	.06
Internet or World Wide Web	56	0.0	26.8	73.2	.22
Spreadsheets	56	0.0	69.6	30.4	.30
Databases	55	5.5	87.3	7.3	.14
Computer graphics	55	0.0	63.6	36.4	-.26
Specialized applications	55	1.8	69.1	29.1	-.10

[a]*Spearman rho correlation between plans for required use and level of current use.*

The final objective was to determine the relationship between selected faculty and course demographic characteristics and overall current and planned levels of required student computer use. For this objective, current use was calculated as the total number of computer tasks currently required in each course. Planned use was calculated by summing each individual's responses to the seven items related to planned student computer use over the next two to three years.

As shown in Table 4, both academic rank and years of university teaching experience had low, negative relationships with current level of required student computer use. Self-perceived computer skills and the level of the course both had low positive relationships with current level of required student use. Years of university teaching experience, percentage teaching appointment and level of course had low, negative correlations with planned required student computer use. Finally, the relationship between current level of required student computer use and planned use was negligible.

Table 4. Relationship Between Faculty and Course Characteristics and Current and Planned Levels of Required Computer Use.

Faculty/course characteristic	Current use (n= 58)	Planned use (n=52)
Academic rank[a]	-.25[b]	.06[b]
Years of university teaching experience	-.27[c]	-.12[b]
Annual FTE teaching appointment	.05[b]	-.13[b]
Self-perceived computer skills[d]	.21[b]	.07[b]
Level of course[e]	.29[b]	-.18[b]
Current level of required computer use		-.09[b]

[a]Coded as: 1 = assistant professor, 2 = associate professor, 3 = professor. [b]Spearman rho. [c]Pearson product-moment. [d]Coded as: 1 = below average, 2 = average, 3 = above average. [e]Coded as: 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior.

Conclusions

The typical undergraduate agriculture course in this study required a median of 5.0 different computer tasks, with three of these being to: (a) type a lab or project report, (b) receive electronic mail from the instructor and (c) search the Internet for information on a specific topic. Of the 34 computer tasks identified in the literature (Davis, 1997; Furst-Bowe et al., 1995; Kieffer, 1995; Monk et al., 1996) as being important for academic and career success, only eight were required in 25% or more of courses. In addition to the three previously listed, the remaining five tasks were to: (a) send electronic mail, (b) access a course homepage, (c) download data from the Internet, (d) create charts or graphs using a spreadsheet, and (e) type a formal research paper. Fewer than one-half of the courses studied required students to complete any activities involving spreadsheets, databases, computer graphics, specialized applications or miscellaneous computer tasks. Thus, it was concluded that the courses in this study tended to require limited student computer use with most required tasks being drawn from a narrow range of fairly low-level computer skills.

When required computer tasks were analyzed by course level, it was apparent that sophomore- and senior-level courses required the widest variety of computer tasks. Senior-level courses also tended to require more advanced tasks than did courses at lower levels. This trend was particularly true for the spreadsheet area where a significant minority of senior-level courses required students to create a new spreadsheet, write simple and nested spreadsheet formulas, and use spreadsheet functions. In contrast, junior-level courses required both the fewest and the lowest level of computer tasks. Courses at the freshman and sophomore levels tended to require tasks primarily from the word processing, electronic mail, and Internet areas, although a sizable

minority of sophomore-level courses did require some spreadsheet and database use, while no freshman-level courses did.

The instructors indicated that, over the next two to three years, they planned to either maintain or increase the current level of required student computer use in each of the seven computer areas studied . The areas of greatest planned increases were in Internet and electronic mail use, with over 60% of instructors planning increased course requirements. A minority (<40%) of instructors also planned to increase required student use of word processing, computer graphics, spreadsheets and specialized applications. The relationships between current and planned use for each of the seven computer areas as well as total current and total planned use were negligible to low. Thus, current required student use was not an especially good predictor of future plans for required student use.

The relationships between faculty and course characteristics and current and planned levels of required computer use were negligible to low, with no characteristic explaining as much as 10% of the variance. It appears that the faculty and course characteristics included in this study were not robust predictors of present or planned required student computer use.

Recommendations

The recommendations arising from this study are obvious – it is the implementation which may prove problematic. If students are to acquire the wide range of computer skills which employers and graduates consistently indicate are important, students must first learn these skills and then tasks requiring use of the skills must be incorporated into undergraduate agriculture courses. Thus, the major recommendation arising from this study (and supported by previous research by Johnson et al.,1999, 2000) is for the College to develop a plan for systematically integrating computer education activities into the fabric of the undergraduate agriculture curriculum.

Such a plan must begin with the implementation of a required computer-use course for students entering the College. In a focus group interview with undergraduate agriculture students at Cornell University, Davis (1999, p. 71) reported that, “There was unanimous agreement that professors assume students have specific software skills without presenting any support or training. This was a source of considerable frustration and stress for many students.” Based on the previous findings concerning the computer experiences, self-efficacy and knowledge of undergraduate agriculture students in this College (Johnson et al., 1999, 2000), a foundation of computer skills must be in place before increased computer course requirements can be implemented. Failure to do so would set many students up for failure.

Once students have learned a common core of computer skills, these skills should be used and expanded on in subsequent undergraduate agriculture courses. While all instructors should be encouraged and assisted in integrating computer requirements into their courses, establishment of a number of “computer-intensive” courses within the College should be considered. Assignments in these courses should be designed to require a variety of higher level computer skills that enhance the learning and application of course subject matter. In order to be effective, these courses would need to be implemented at each level (freshman through senior) and be required for graduation. This would prevent the students most in need from avoiding enrollment in these courses. The details of this or other plans should be determined by the

faculty, possibly through an *ad hoc* committee named for this purpose or by a standing committee, such as the College curriculum committee.

Finally, it appears that many instructors do plan to increase required student computer use in their courses on an individual basis. This trend should be encouraged; however, development of a systematic, college-wide plan would help ensure that such increases are not simply more required use of the same subset of lower level computer tasks presently emphasized. Rather, faculty should be encouraged and enabled to incorporate a variety of higher level computer tasks into their courses. In addition, development of a systematic plan for student computer use within the College would ensure that all students are required to learn and use the variety of computer skills identified as being important for career entry and advancement.

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Computer Tasks Required in Selected Undergraduate Agriculture Courses

A Critique

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This study is obviously highly related to the previous study. The purpose of the study focuses on helping to answer the questions raised in the recommendation of the other paper. We need to know what computer tasks are needed to succeed in undergraduate courses. Refer to the other critique for general comments about the literature review and methodology.

An aside from the actual content of this study B how often do faculty in any curriculum actually think about Awho teaches what@ or Ain what course(s) will students acquire the competencies we want them to gain?@ The procedures used in this study are applicable in many content areas. Agricultural education is not an exception, and agricultural education should give leadership to the entire college in this endeavor.

Specifically, the authors report the computer tasks that are required in 63 selected courses. One interesting phenomenon that was pointed out by the researchers is that the use of computer tasks across a four-year program may not be additive; Ajunior@ courses required fewer computer tasks than Asophomore@ courses. In addition, instructors= plans for increasing the required computer tasks in courses were in tasks that are already used frequently. The general conclusion could be that instructors are comfortable with certain tasks, and therefore will increase the use of those tasks rather than adding new areas of computer competence. The relationships between instructor/course characteristics and current and planned computer list provided no surprising results.

Only one major recommendation was posited, with variations on that theme. Faculty must systematically identify computer tasks that must be learned and taught, and then must systematically examine the curricula to determine in what courses and at what level those skills should be incorporated into the curricula. What role should agricultural education play in helping colleges implement that recommendation? How do college faculty outside of teaching/learning fields acquire the necessary skills to examine the curricula and plan for needed change? And then how do faculty acquire skill in effectively incorporating computer skills into their courses? Historically, faculty do what they know best and use skills that fall within their comfort zone. Likewise, others incorporate new skills and technology inappropriately (converting boring transparencies into boring PowerPoint presentations). How can agricultural education help faculty colleagues avoid both of those pitfalls?