

## COMPUTER EXPERIENCES, SELF-EFFICACY, AND KNOWLEDGE OF UNDERGRADUATE STUDENTS ENTERING A LAND-GRANT COLLEGE OF AGRICULTURE BY YEAR AND GENDER

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### Abstract

*The purpose of this five-year study was to describe the computer experiences, self-efficacy, and knowledge of students (N = 336) entering a college of agriculture, and determine if significant differences existed by year of entry, gender, or the interaction of year and gender. There were few significant differences in computer experiences by year or gender. While there were significant year x gender interactions in some computer-related experiences, no trends were noted. Overall, students had a slightly below average level of computer self-efficacy. The mean self-efficacy of students in the 2002 group was significantly higher than for the 1999 group, although the effect size for year was small. There were no significant differences in computer self-efficacy by gender or by the interaction of year and gender. Students had a fairly low level of computer knowledge. Both overall and by all sub-groupings, mean student scores were below the 50% correct level. Exam scores for students in the 2002 and 2003 student groups were significantly higher than were the scores for the 1999 student group; however, again, the effect size for year was small. There were no significant differences in exam scores by gender or by the interaction of year and gender.*

### Introduction

The empirical rationale for this study was grounded in three areas of research: (a) the computer experiences and skills of college agriculture students; (b) gender differences in computer experiences, attitudes, and achievement; and (c) self-efficacy effects on computer experiences and achievement. Each of these areas is briefly reviewed.

#### *Computer Experiences and Skills*

Computer technology is integral to modern society, including the agricultural industry. A report by the United States Department of Education (USDE, 1996) noted that computers and information technologies are transforming nearly every aspect of American life and that every major U.S. industry relies on computers. Kirkpatrick and Cuban (1998) stated that, in the 21<sup>st</sup> century, "computers are certain to dominate work lives and home lives" (p. 58). More recently, Levy and

Murnane (2004) argued that computers "have become the infrastructure of the global economy" (p. 2) and are largely responsible for "raising the cognitive bar" (p. 9) required for entry into high-demand, well-paid occupations.

University agriculture programs must ensure that their graduates are competent in computer use (Langlinas, 1994). A study conducted for the College of Agriculture and Life Sciences at Cornell University (Monk, Davis, Peasley, Hillman, & Yarbrough, 1996) concluded that agricultural employers, "have a high expectation of computer literacy in recent college graduates" (p. 12). More than 80% of the employers rated computer skills as either an "important" or "very important" factor considered in making employment decisions. The employers rated skills in using word processors, spreadsheets, databases, presentation graphics, e-mail, and the Internet as the most important computer abilities needed by prospective employees. In a similar vein, Thornburg (2002)

concluded that all “students need to know how to use technology effectively to create documents, locate information, collaborate with remote groups, perform calculations, and make dynamic presentations” (p.63).

According to Kieffer (1995), many university faculty members and administrators accept the premise that students entering college are already competent in basic computer applications and tasks because of their use of these skills in elementary and secondary schools. However, some scholars disagree with this assessment. According to Tyack and Cuban (1995, p.126),

The overall picture that emerges after a decade of advocates’ claims and public urgency is that computers play a marginal role in regular instruction in public schools. A one-line summary of the situation to date might be: computers meet classroom; classroom wins.

More recent research by Cuban (2001) indicated that this conclusion was still valid.

Johnson, Ferguson, and Lester’s (2000) findings support Tyack and Cuban (1995) and Cuban (2001) in that, among upper-division students in a land-grant college of agriculture, only about 50% reported ever having completed a class (other than a computer applications class) where computer use was required.

In addition, university courses may not require a wide range of computer tasks. Johnson, Ferguson, and Lester (2000) found that word processing was the only application that upper-division agriculture students reported using often or fairly often in courses university-wide. Johnson, Ferguson, Vokins, and Lester (2000) surveyed agriculture professors in the same land-grant university to determine the computer tasks required of undergraduate students enrolled in 63 specific courses. The researchers determined that the typical course required a median of 5.0 computer tasks. The three specific computer tasks required in 50% or more of the classes were to: (a) type a lab or project report, (b) receive e-mail from the instructor, and (c) search the Internet for information

on a specific topic. The researchers concluded that, “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” (p. 33).

Research also suggests that students graduating from colleges of agriculture may not have adequate computer skills and knowledge. In a Michigan State University study, Heyboer and Suvedi (1999) found that agriculture graduates from 1993 to 1998 rated computer skills as being the area in which they were least well prepared for employment. Employers also rated the graduates’ computer skills as lower than six of the nine areas evaluated.

#### *Gender differences*

Researchers have established a relationship between gender and student computer experiences and attitudes. Young (2000) studied 462 middle and high school students in eight schools and found that, although males and females had equal home-access to computers, males spent significantly more hours per week using the home computer than did females. Young also found that males had a higher level of confidence in their computer abilities than did females. Similar results have been reported by Colley and Comber (2003), Comber, Colley, Hargreaves, and Dorn (1997), Houtz and Gupta (2001), Kirkpatrick and Cuban (1998), Olsen (2000), and Volman and van Eck (2001).

According to Lauman (2001), students who use a computer at home “demonstrate an increased level of comfort and tenacity when using computers at school” (p. 200). Given males’ higher levels of home computer use, one might assume that this factor accounts for gender differences in computer confidence. However, in their review article, Volman and van Eck (2001) concluded that, “Even when experience is taken into account, girls appear to be less self-confident than boys regarding their computer skills” (p. 624).

Kirkpatrick and Cuban (1998) summarized the research on gender and computer experiences and attitudes by stating:

The facts are quite simple. In comparison with males, females do not take as many computer courses at school; they do not spend as many hours on computers at home, at computer camps, or in after-school computer centers; and they do not select undergraduate or graduate computer majors as often. (p.56)

Little research was found concerning possible gender effects on computer knowledge or ability. A study by Rienen and Plomp (1997), based on data from the International Association for the Evaluation of Educational Achievement (IEA), concluded that females in the United States scored as well as their male counterparts on the *Functional Information Technology Test* at all grade levels (elementary, lower secondary, and upper secondary). Smith, Villareal, Akers, and Haygood (2003) found no relationship between gender and computer knowledge for undergraduate agriculture majors at Texas Tech University. Stumpf and Stanley (1997) compared the performance of females and males who had taken the *Advanced Placement Computer Science Exam* between 1984 and 1996. The researchers found that while males scored significantly higher than females each year, the gap in achievement was gradually decreasing. Thus, the little research existing on the relationship between gender and computer achievement is inconclusive.

#### *Self-Efficacy*

Efficacy theory suggests that task involvement and persistence are greater when individuals are confident (have a high level of self-efficacy) of their ability to successfully complete a task (Bandura, 1982). Thus, individuals having a high level of computer self-efficacy should be more likely to engage in computer tasks and to show persistence in completing computer tasks despite possible difficulties. Individuals with a low level of computer self-efficacy should be more likely to avoid computer tasks or to give up on a computer task in

face of performance obstacles (Collins, 1982; Lent, Brown, & Larkin, 1984, 1986).

In a 1996 review article on self-efficacy, Pajares stated that most individuals are overconfident about their academic capabilities, however, this bias toward overconfidence is most pronounced in males. According to Kinzie, Delecourt, and Powers (1994), "Self-efficacy is predictive of future engagement with computer technologies, and . . . experiences with computers affect future use only through their effects on self-efficacy" (p. 747). Thus, even if males and females have the same level of computer skills (Rienen and Plomp, 1997), this differential overconfidence bias (Pajares, 1996) may encourage males to interact with computers more frequently than females.

Given the positive relationship between gender, self-efficacy, task involvement and persistence, a need clearly exists to explore the relationships between gender, computer self-efficacy, and measures of computer experience and knowledge among students entering this college of agriculture. Such research would add to the knowledge base in computer education, as well as provide important information for local decision-making.

#### **Purpose and Objectives**

The purpose of this study was to examine the computer experiences, self-efficacy, and knowledge of agriculture students entering the University of Arkansas in fall semesters 1999 – 2003. Three specific objectives were formulated to guide this study:

1. Describe students' computer-related experiences and determine if significant differences existed by the main effects of year and gender, or by the interaction of year and gender.
2. Describe students' level of computer self-efficacy and determine if significant differences existed by the main effects of year and gender, or by the interaction of year and gender.
3. Describe students' computer knowledge and determine if significant differences existed

between students for the main effect of year and gender, or by the interaction of year and gender.

### Methods

This was a descriptive study. The subjects consisted of students enrolled in college-wide agriculture student orientation courses during the fall semesters of 1999 ( $N = 84$ ), 2000 ( $N = 73$ ), 2001 ( $N = 52$ ), 2002 ( $N = 74$ ), and 2003 ( $N = 57$ ). The 2002 and 2003 groups included students enrolled in a new orientation course for those interested in the college honors program ( $n = 33$  in 2002;  $n = 27$  in 2003), as well as students enrolled in the traditional orientation course ( $n = 41$  in 2002;  $n = 29$  in 2003). Useable response rates were 100% in 1999, 2001, 2002, and 2003; in 2000, 69 of 73 students participated for a 94.5% response rate.

Data were collected by student responses to the "Computer Experiences and Knowledge Inventory" (CEKI). The CEKI, developed by the researchers and used in previous studies (Johnson, Ferguson, and Lester, 2000; Johnson and Wardlow, 2002), consisted of three parts. Part One contained 21 items related to respondent demographics and previous computer experiences. Part Two was composed of eight Likert-type items requiring respondents to assess their self-perceived level of skill (1 = "no skill"; 5 = "high skill") in specific areas of computer use. Part Three consisted of 35 multiple choice items (with 5 response options, including a "Do not know" option) designed to measure computer knowledge in the areas of general computer knowledge (six items), Internet use (five items), word processing (eight items), file management (five items), spreadsheets (six items), databases (three items), and computer programming (two items). All items in Part Three were written so as to be answerable by persons familiar with common operating systems and application programs.

The CEKI was evaluated by a panel of five experts with experience in teaching introductory computer applications courses to college agriculture students and was judged to possess face and content validity. The instrument was

pilot-tested with six college-bound high school seniors and graduates participating in an on-campus agricultural internship program during summer 1998. The participants reported no difficulty in interpreting the instructions or items contained in the CEKI. Pilot-test reliability estimates were .90 (coefficient alpha) for Part 2 (computer self-efficacy), and .79 (KR-20) for Part Three (computer knowledge) of the instrument.

For this study, coefficient alpha reliability estimates of .89 (1999 group), .86 (2000 group), .91 (2001 group), .87 (2002 group), .84 (2003 group) and .88 (combined) were obtained for Part 2 of the CEKI. The KR-20 reliability estimates for Part 3 were: .78 (1999 group), .72 (2000 group), .85 (2001 group), .86 (2002 group), .84 (2003 group), and .82 (combined). The reliability of Part One of the CEKI was not assessed, since, according to Salant and Dillman (1994, p. 87), responses to non-sensitive, demographic items are subject to "very little measurement error."

The data were analyzed using descriptive, nonparametric, and inferential statistics. An *a priori* alpha level of .05 was established for all tests of statistical significance. The use of inferential statistics was based on the assumption that the students included in this study were a time and place sample representative of past, present, and future undergraduate students entering this college of agriculture. According to Oliver and Hinkle (1982, p. 200), "Such an assumption permits the use of inferential statistics, and, if made, must be defended by the researcher as being reasonable." Based on the consistent findings of previous research (Johnson, Ferguson, and Lester, 2000; Johnson and Wardlow, 2002) concerning the computer experiences, self-efficacy, and knowledge of students enrolled in this college, the researchers felt such an assumption was warranted.

### Results

Prior to the main analyses, the data were examined to determine if inclusion of the new honors orientation sections in 2002 and 2003 had caused an increase

in the average academic achievement of students in these two years as compared to the three previous years. If such an increase had occurred, any differences in computer experiences, computer self-efficacy, or computer knowledge might logically be attributed to increased academic achievement and associated experiences rather than to year of enrollment. The results of a one-way analysis of variance (ANOVA) indicated that there was no significant difference in self-reported high school grade average by year [ $F(4, 331) = 0.70, p = .59$ ], with grade averages ranging from 3.44 in 2000 to 3.61 in 2002. Based on these results, data for both orientation sections were combined for analyses for the 2002 and 2003 groups.

Of the 336 students participating in this study, the typical respondent was an 18 year old ( $M = 18.6; SD = 2.8; Mdn = 18.0$ ), freshman (91.7%), with a high school grade point average of 3.54 ( $SD = 0.64; Mdn = 4.0$ ), majoring in agricultural education (20.5%), animal science / pre-veterinary medicine (18.4%), or poultry science (15.5%). A slightly higher percentage of females (53.9%) than males (46.1%) participated in the study. When analyzed by year, no significant differences were found on the variables of age [ $F(4, 330) = 1.08, p = .37$ ], or gender [ $\chi^2(4) = 6.26, p = .18$ ].

The first objective was to describe students' computer-related experiences and to determine if significant differences existed by the main effects of year and gender, or by the interaction of year and gender. As shown in Table 1, the percentages of students reporting selected computer experiences remained relatively constant between 1999 and 2003. There were no significant differences by year or gender in the percentages of students completing computer course(s), owning a computer, or completing course(s) requiring computer use.

The percentage of students reporting having studied seven of eight specific computer topics was not significantly different by year. The only significant difference by year was in the percentage of students having studied the

computer topic "electronic mail;" however, no uniform trend was identified here, as the percentage studying this topic increased each year from 1999 to 2001, decreased in 2002, and then increased again in 2003. The only difference by gender was that a higher percentage of males (54.2%) than females (43.1%) reported having received instruction about the Internet.

Overall, 80% or more of the respondents had completed a computer course (81.0%) and owned a computer (80.4%). Yet, only about one-half (53.0%) reported ever having completed a course (other than a computer course) where computer use was required. The only computer topics studied by more than 50% of the respondents were word processing (77.1%), file management (62.5%), and presentation graphics (50.3%); less than 50% of the students had studied spreadsheets (49.4%), Internet use (48.2%), electronic mail (43.4%), databases (34.5%), or programming (15.8%).

The data were next examined to determine if significant differences existed by year between males and females for any of the computer-related experience variables. No significant differences were found for the 2000 or the 2003 student groups. For the 1999 student group, there was a significant gender difference in computer ownership, with a higher percentage of males (84.2%) owning computers than females (60.0%) [ $\chi^2(1) = 5.88, p = .02, \phi = .26$ ]. For the 2001 student group, a significantly higher percentage of males had completed a computer course than had females (96.7% vs. 68.2%, respectively) [ $\chi^2(1) = 7.91, p = .01, \phi = .39$ ], and a significantly higher percentage of males had studied file management (73.3% vs. 40.9%) [ $\chi^2(1) = 5.54, p = .02, \phi = .33$ ], word processing (86.7% vs. 59.1%) [ $\chi^2(1) = 5.15, p = .02, \phi = .31$ ], Internet use (70.0% vs. 31.8%) [ $\chi^2(1) = 7.45, p = .01, \phi = .39$ ], and electronic mail (60.0 vs. 31.8%) [ $\chi^2(1) = 4.04, p \leq .04, \phi = .29$ ]. For the 2002 student group, the only significant difference by gender was that a higher percentage

Table 1  
Computer Experiences By Year, Gender, And Overall

	Year					$\chi^2$	Gender		$\chi^2$	% Yes (N = 336)
	1999 (n = 84)	2000 (n = 69)	2001 (n = 52)	2002 (n = 74)	2003 (n = 57)		Female (n = 144)	Male (n = 135)		
Computer Experience	% Yes	% Yes	% Yes	% Yes	% Yes		% Yes	% Yes		
Completed computer course	77.4	78.3	84.6	86.5	79.0	3.09	79.6	82.6	0.49	81.0
Studied this computer topic:										
File management	59.5	63.8	59.6	62.4	63.2	1.00	61.3	63.9	0.23	62.5
Word processing	76.2	78.3	75.0	77.4	75.4	0.60	76.8	77.4	0.02	77.1
Internet use	40.5	42.0	53.8	47.6	50.9	6.06	43.1	54.2	4.12*	48.2
Electronic mail	31.0	39.1	48.1	41.9	50.9	10.2*	40.3	47.1	1.56	43.4
Spreadsheets	51.2	47.8	50.0	49.8	47.4	0.29	49.2	49.7	0.01	49.4
Presentation graphics	45.2	42.0	51.9	49.5	54.4	5.67	51.9	48.4	0.42	50.3
Databases	38.1	42.0	36.5	36.9	22.8	6.14	32.0	37.4	1.07	34.5
Programming	19.0	13.0	13.5	16.8	10.5	3.58	15.5	16.1	0.03	15.8
Completed course(s) requiring computer use	47.6	56.5	50.0	50.7	62.5	3.69	51.1	55.2	0.55	53.0
Own a computer	71.1	80.6	84.6	87.8	80.4	7.76	78.2	83.1	1.20	80.4

\*  $p \leq .05$

of females (73.0%) than males (46.0%) had studied presentation graphics [ $\chi^2(1) = 5.61, p \leq .02, \phi = .27$ ]. Using descriptors proposed by Rea and Parker (1992), all differences represented moderate effect sizes.

The final computer-related experience variable investigated was the number of computer courses completed. Across all years, females had completed a mean of 1.67 courses ( $SD = 1.32$ ) and males had completed a mean of 1.62 courses ( $SD = 1.21$ ), for an overall mean of 1.65 courses ( $SD = 1.27$ ). The results of a 2 x 5 factorial ANOVA indicated there were no significant differences for the main effect of year [ $F(4, 326) = 2.32, p = .06$ ] or gender [ $F(1, 326) = 0.14, p = .71$ ]; however, there was a significant year x gender interaction [ $F(4, 326) = 4.25; p = .03, R^2 = .05$ ]. Using the descriptors suggested by Cohen (1988), the effect size for the interaction of year and gender was small. Subsequent analysis, following the procedures described by Hatcher and Stepanski (1994), indicated there was a simple effect for gender in only the 2001 group, where males reported completing a significantly higher mean number of computer courses than did females (2.13 vs. 1.23 courses, respectively) [ $F(1, 326) = 6.64, p < .05, R^2 = .13$ ]. Within the 2001 group, the effect for gender was medium (Cohen, 1988).

The second objective was to describe students' level of computer self-efficacy and determine if significant differences existed by the main effects of year and gender, or by the interaction of year and gender. To accomplish this objective, respondents rated their self-perceived level of skill in each of eight areas of computer use (file management, word processing, Internet use, electronic mail, spreadsheets, databases, presentation graphics, and programming) using a 1-5 Likert-type scale (1 = "no skill"; 5 = "high skill"). The responses to these eight items were summed and averaged to create a composite measure of computer self-efficacy.

As shown in Table 2, overall, students tended to have a slightly below average level of computer self-efficacy (grand mean = 2.90;  $SD = 0.74$ ). A 2 x 5 factorial ANOVA indicated that there was a significant difference in computer self-efficacy by the main effect of year [ $F(4, 324) = 2.75, p = .03, R^2 = .03$ ]. Students in the 2002 group had a significantly higher level of computer self-efficacy than did students in the 2000 group. Using Cohen's (1988) descriptors, the effect size for year was considered small. There were no significant differences in computer self-efficacy by the main effect of gender [ $F(1, 324) = 0.32, p = .32$ ] or by the interaction of year and gender [ $F(4, 324) = 0.90, p = .46$ ].

Table 2  
Computer Self-Efficacy By Year, Gender, and Year X Gender

Year	Gender						Combined		
	Females			Males			<i>N</i>	<i>Mean</i>	<i>S.D.</i>
	<i>n</i>	<i>Mean</i>	<i>S.D.</i>	<i>n</i>	<i>Mean</i>	<i>S.D.</i>			
1999	46	2.82 <sub>a</sub>	.76	37	2.73 <sub>a</sub>	.80	83	2.78 <sub>ab</sub>	.78
2000	39	2.79 <sub>a</sub>	.68	30	2.70 <sub>a</sub>	.77	69	2.75 <sub>a</sub>	.72
2001	21	2.79 <sub>a</sub>	.74	30	3.02 <sub>a</sub>	.88	51	2.92 <sub>ab</sub>	.83
2002	37	3.21 <sub>a</sub>	.67	37	3.00 <sub>a</sub>	.73	74	3.10 <sub>b</sub>	.70
2003	37	3.06 <sub>a</sub>	.66	20	2.81 <sub>a</sub>	.61	57	2.98 <sub>ab</sub>	.65
Total	180	2.94	.71	154	2.86	.78	334	2.90	.74

Note: Scale = 1-5. Means above the dashed line and in the same column that do not share subscripts differ at  $p \leq .05$  by the Tukey post-hoc test.

The final objective was to describe students' computer knowledge, and to determine if significant differences existed for the main effects of year and gender, or by the interaction of year and gender. Overall, students had a fairly low level of computer knowledge, as indicated by a grand mean of 15.38 ( $SD = 5.70$ ) (43.9% correct) on the 35-item multiple choice exam. As shown in Table 3, the mean exam scores for all subgroups were less than 50% correct.

The results of a 2 x 5 factorial ANOVA

indicated that there was a statistically significant difference in CEKI exam scores based on the main effect of year [ $F(4, 326) = 3.63, p = .006, R^2 = .05$ ]. Students in 2002 and 2003 scored significantly higher than did students in 1999; there were no other significant differences by year. The effect size for year was small (Cohen, 1988). There were no significant differences in CEKI exam scores for the main effect of gender [ $F(1, 326) = 0.82, p = .37$ ], or the interaction of year and gender [ $F(3, 326) = 0.39, p = .81$ ].

Table 3  
CEKI Scores By Year, Gender, and Year X Gender

Year	Gender								
	Females			Males			Combined		
	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>
1999	46	14.30 <sub>a</sub>	4.96	38	13.39 <sub>a</sub>	5.32	84	13.89 <sub>a</sub>	5.11
2000	39	14.23 <sub>a</sub>	5.03	30	15.10 <sub>a</sub>	4.20	69	14.61 <sub>ab</sub>	4.68
2001	22	16.09 <sub>a</sub>	6.06	30	14.60 <sub>a</sub>	6.20	52	15.23 <sub>ab</sub>	6.12
2002	37	16.86 <sub>a</sub>	6.12	37	16.38 <sub>a</sub>	6.50	74	16.62 <sub>b</sub>	6.27
2003	37	17.30 <sub>a</sub>	5.82	20	16.45 <sub>a</sub>	6.09	57	17.00 <sub>b</sub>	5.88
Total	181	15.64	5.64	155	15.06	5.76	336	15.38	5.70

Note: Possible range of scores = 1-35. Means above the dashed line and in the same column that do not share subscripts differ at  $p \leq .05$  by the Tukey post-hoc test.

### Conclusions and Discussion

Undergraduate agriculture majors entering the University of Arkansas vary greatly in respect to the computer-related experiences that they bring to campus. While approximately 80% own a computer and have completed at least one computer course, a majority of the students have not studied Internet use, electronic mail, spreadsheets, databases, or programming. The only computer topics studied by a majority of the respondents were presentation graphics, file management and word processing. Additionally, only about one-half of the students had completed a non-computer course that required computer use.

There were no substantive differences in student computer experiences by year. Regardless of year, the typical student

could be described as one who had completed fewer than two computer courses, and had studied word processing, file management, and possibly presentation graphics. The typical student owned a computer, but was only slightly more likely than not to have ever completed a course where computer use was required. Despite well-publicized, rapid changes in computer technologies (Thornburg, 2002), these results indicate that students entering this college vary little in computer experiences from year to year.

Overall, there were no substantive differences between females and males in their computer-related experiences. Both genders enter the college with similar computer backgrounds and experiences. This is contrary to the findings of Kirkpatrick and Cuban (1998) and

Young (2000), who found that males had more computer-related experiences than did females. While the available data do not answer the question, it is reasonable to ask whether females entering this college of agriculture have more computer-related experiences than their female peers in other majors or at other universities, or do males entering agriculture at this institution simply have fewer computer-related experiences than do their male peers in other majors or institutions. Further research is needed to answer this important question.

While there were significant interactions between year and gender and computer-related experiences, no clear trends were identified. All but two of the significant year x gender interactions were related to computer course taking within the 2001 student group. For undetermined reasons females in the 2001 student group completed significantly fewer computer courses than did males (68.2% vs. 96.7%, respectively). Since females entering the college in 2001 were less likely to have completed a computer course, it is reasonable that smaller percentage of females had studied selected computer topics (file management, word processing, Internet use, and electronic mail). In 1999, a significantly higher percentage of males reported owning a computer than did females (84.2% vs. 60.0%, respectively). However, no significant differences in computer ownership by gender were found in any other year.

Overall, students tended to have a slightly below average level of computer self-efficacy. Students in 2002 had a significantly higher level of computer self-efficacy than did students in 2000. The effect size for year was small ( $R^2 = .03$ ), indicating that year of enrollment was not a particularly robust predictor of computer self-efficacy. There were no significant differences in computer self-efficacy by gender or by the interaction of year and gender. Again, the results of this study do not support the findings of Kirkpatrick and Cuban (1998), Pajares (1996), or Young (2000) in that, for these students, there was no gender difference in computer

self-efficacy. Further research is needed to determine if female and/or male students entering this college differ in significant ways from the general student population.

The final objective was to describe students' level of computer knowledge, and to determine if significant differences existed between students for the main effects of year and gender, or by the interaction of year and gender. Across all subgroups students scored less than 50% correct on the exam portion of the CEKI. Thus, it was concluded that students entering this college have a fairly low level of computer knowledge.

Students entering the college in 2002 and 2003 had significantly higher CEKI exam scores than did students entering the college in 1999. However, again, the effect size for year was small ( $R^2 = .05$ ), indicating that year was not a particularly robust predictor of computer knowledge (as measured by the exam portion of the CEKI). There were no significant differences in CEKI exam scores by gender or by the interaction of year and gender. This finding is congruent with the findings of Rienen and Plomp (1997) and Smith, Villareal, Akers, and Haygood (2003). Both males and females entering the college are performing slightly better on the CEKI exam, indicating a somewhat higher level of computer knowledge.

Overall, the results of this study indicate that, regardless of year or gender, and despite some minor differences, undergraduate students entering this land-grant college of agriculture tend to be very similar from year to year with regards to their computer experiences, computer self-efficacy, and computer knowledge. Faculty and administrators in this college who expect students to begin their undergraduate careers already possessing basic computer knowledge and skills must question that assumption.

### Recommendations

A computer applications course should

be required for agriculture students entering the University of Arkansas. However, because some students do appear to enter this college with satisfactory computer skills, a mechanism should be made available whereby students can “test-out” of the computer applications requirement. In such cases, students should be encouraged to consider enrolling in a higher level computer course.

This study provided information about the computer-related characteristics of agriculture students entering the University of Arkansas over a five-year period. Longitudinal research should be continued to assess and identify trends in students’ computer-related experiences, attitudes, and knowledge. Similar studies should be conducted with graduating seniors to determine the computer skills of those completing undergraduate degrees, and with faculty to determine what computer skills and tasks are incorporated into the curriculum. Additionally, graduates and employers should be surveyed periodically to determine specific computer skills required by agricultural professionals. Such studies will provide administrators and faculty with the information necessary to make informed, data-based decisions concerning computer-related curricular and instructional matters. Finally, this study should be replicated in other colleges of agriculture for both local decision making and comparative purposes.

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