

Use of Computer Technology by  
Teacher Education in Agriculture Programs:  
Student Experiences and Programmatic Applications

*Blannie E. Bowen*  
*Assistant Professor*

*Mississippi State University*

*Donald L. Mincemoyer*  
*Instructor*

*Pennsylvania State University*

*John D. Parmley*  
*Assistant Professor*

*Kansas State University*

The development of the first electronic computer closely paralleled the U.S. World War II effort since fast, accurate, and complex calculations had to be performed. Consequently, a project funded by the U.S. War Department led to the development of the Electronic Numerical Integrator and Computer (ENIAC) which became functional in December, 1945 (Baker, 1975, p. 15). Subsequent research on the ENIAC led to the development of the mini and microcomputers that became popular during the 1970's. The popularity of this technology has continued into the 1980's.

Prior to the late 1970's and the advent of the silicon chip, cost and size were two factors that limited the applications made of computers (Dean, 1981). Up to this period, most computer users were the federal government, large corporations, and institutions heavily involved in research and development activities. Low cost, small computers that required fewer instructions than earlier versions, meant that more individuals could begin using computers to perform various tasks. Many agricultural professionals who receive their undergraduate, graduate, and inservice education through agricultural education programs fall into this category.

Educators will increase their use of microcomputers because Dean believes "that even the poorest school districts will be able to afford a computer in every classroom" (1981). In fact, Sturdevant (1982) noted that 25% of the public schools now have some type of computer and that total will double during 1982. Computer literacy is being required for students to graduate in one school system, but Backer indicated that "a similar requirement is not being made of teachers who teach them" (1980, p. 54).

A survey cited by the Deputy Administrator of the Agriculture Extension Service - USDA revealed that in 1981, 700 county Extension offices had computer terminals or minicomputers (Beer, p. 14). Beer indicated that, "Extension should perform its usual role of helping farmers and others make down-to-earth evaluation of all relevant aspects on the use of this new technology" (p. 14). He explained that there is an urgent need to develop and disseminate publications that will help farmers evaluate whether they should purchase a microcomputer for use on the farm.

*Journal of the American Association of  
Teacher Educators in Agriculture  
Volume 24, Number 3, pp.14-21  
DOI: 10.5032/jaatea.1983.03014*

Radding (1981) noted that Extension has to better serve the microcomputer needs of its clientele. He quoted John Nevins, a computer researcher with the Tennessee Valley Authority, who believed that county Extension agents were "caught somewhat unprepared" when farmers started purchasing and using microcomputers. Nevins indicated that Extension and agricultural institutions that have persons with programming expertise "are rushing to fill the void and satisfy the demands by farmers, particularly for software." (Radding, 1981, p. 42)

### Objectives of the Study

In 1980, the American Association of Teacher Educators in Agriculture (AATEA) began investigating the level of computer use by agricultural education programs. Dr. Max Amberson, then AATEA president, appointed the Computer Technology in Agricultural Education Committee to study the state-of-the-art as it relates to computer usage by agricultural education programs. The committee then designed and conducted an investigation to:

1. Determine the types of computer experiences most undergraduate and graduate students in each program are receiving,
2. Determine how these experiences are being acquired, and
3. Investigate present and future uses for computers, especially microcomputers.

### Methodology

Two strategies were used to meet the stated objectives. First, existing research reports, computer literature, and related materials were reviewed to provide as much of the required information as possible. Second, a questionnaire was constructed to collect additional information from all 90 teacher education in agriculture programs listed in the 1981 Directory of Agricultural Teacher Educators. This strategy was adopted because the investigation focused upon the profession as a whole and so few units were in the population. The questionnaire sought three types of information from each program: (a) The computer experiences most undergraduates now receive, (b) The computer experiences most graduate students now receive, and (c) The uses being made of microcomputer technology in each program.

The questionnaire was mailed to the head of each agricultural education program on September 16, 1981. A follow-up mailing was made October 19, 1981 with instructions to return the questionnaire by October 30, 1981. A total of 63 of 90 programs returned the questionnaire, however, one program was just being formed and requested not to be included. Consequently, usable responses were returned by 62 programs.

## Findings

The findings of the study will be reported in three sections: (a) Computer Experiences for Undergraduate Students, (b) Computer Experiences for Graduate Students, and (c) Use of Microcomputer by Agricultural Education Programs.

### Computer Experiences for Undergraduate Students

Less than half of the teacher education programs provided computer experiences for most of their undergraduate majors. These experiences were provided through elective courses (23 programs), required courses (eight programs), and noncredit workshops and seminars (three programs).

Elective Courses. Although most undergraduate students in 23 agricultural education programs took elective courses about computers, none of these programs taught a course about computers for undergraduates. Primarily, departments such as agricultural economics or computer science were teaching most of the elective courses. Three hours of credit (semester and quarter) were earned through elective courses by most undergraduates in eight programs. Four other programs indicated that four or more hours were earned by most undergraduates. The other 11 programs did not report how many credit hours were earned through elective courses.

Required Courses. Eight programs required their undergraduates to take courses about computers. Of this number, one agricultural education program taught this course. Four programs had their undergraduates take required courses through agricultural economics departments, one program through a mathematics department, and one through a business computer systems department. One program did not indicate where the required course was taught. Three credit hours were granted for required courses by six programs, two hours by another program, and one program did not indicate the number of hours for the course(s).

Types of Experience. The most common type of computer experience provided to undergraduates involved nonprogramming, hands-on activities with microcomputers. This type of experience was provided by 17 programs. The second most common experience involved programming using BASIC language (11 programs) while programming in FORTRAN was the third most common experience (9 programs). Table 1 summarizes both the courses and experiences used by most undergraduates to acquire skills in using computers.

### Computer Experience for Graduate Students

Graduate students in agricultural education programs acquired more experiences with computers than did the undergraduates. Most graduate students in 31 programs took elective courses about computers, 13 programs required most of their graduate students to take

computer-related courses, and 14 programs indicated that noncredit workshops and seminars were used to provide computer experiences for most of their graduate students.

Elective Courses. Six programs indicated that most of their students took elective courses through computer science departments. Four programs reported that most of their graduate students chose elective courses through agricultural economics departments and another four programs used a department such as mathematics, business, or statistics to provide elective courses.

Table 1

*Computer Courses Taken and Experiences Received by Most Students as Reported by Agricultural Education Programs (n = 62 programs)*

Courses and experiences <sup>a</sup>	n of programs	
	Undergraduate	Graduate
<u>Elective courses</u>	<u>23</u>	<u>31</u>
Two credit hours	-	4
Three credit hours	8	9
Four or more credit hours	4	3
No information	11	15
<u>Required courses</u>	<u>8</u>	<u>13</u>
One credit hour	-	1
Two credit hours	1	-
Three credit hours	6	4
Four or more credit hours	-	4
No information	1	4
<u>Noncredit workshops and seminars</u>	<u>3</u>	<u>14</u>
<u>Experiences received<sup>b</sup></u>	-	-
Microcomputer nonprogramming activities	17	17
Programming in BASIC language	11	12
Programming in FORTRAN language	9	7
Using SAS statistical package	3	13
Using SPSS statistical package	4	23

<sup>a</sup> Each program reported the courses and experiences that most of their students were using to learn about computers.

<sup>b</sup> Most students in a program acquired more than one experience, thus, a total is not useful for this variable because of the overlap involved.

Three hours of credit (semester and quarter) were earned by most graduate students in nine programs. Four programs indicated that most of their graduate students received two hours of credit while three programs reported that four or more hours were earned through elective courses about computers. However, 15 programs did not indicate the number of hours that most of their graduate students received through elective courses.

Required Courses. The number of programs requiring that most of their graduate students take coursework about computers totaled 13. Four of these programs reported that this course was taught by the agricultural education program while three programs indicated that some type of education department provided the required course(s). Other departments teaching required courses included agricultural economics, computer science, and other departments such as mathematics, business, or statistics program.

Four of the 13 programs indicated that three hours were granted for the required course(s). Four other programs reported that most of their graduate students took four or more hours of required courses and one program required a one hour course. The other four programs did not indicate the hours they required.

Types of Experiences. The use of statistical packages was the most common computer experience most graduate students received (use of the Statistical Package for the Social Sciences - SPSS reported by 23 programs and the Statistical Analysis System - SAS by 13 programs). Nonprogramming experiences with microcomputers (17 programs), programming in BASIC language that is frequently used with microcomputers (12 programs), and programming in FORTRAN language (seven programs) were other common experiences. A summary of the courses and experiences most graduate students used to acquire skills in using computers is found in Table 1.

#### Use of Microcomputers by Agricultural Education Programs

Programs Now Using Microcomputers. There were 22 agricultural education programs using microcomputers for instruction and departmental management purposes. Eight programs were using one microcomputer and six programs two. Three programs were using three and five programs reported that four or more microcomputers were being used.

Only one of the 22 programs did not have a printer for the microcomputer(s). Telephone hook-ups were available for use with microcomputers in 13 programs. Twelve of the programs indicated they had purchased their microcomputer(s). Microcomputers had been loaned to four programs by some other unit in their universities, two programs shared microcomputers with other departments, and one program was leasing a microcomputer. Other programs used lease-purchase plans or received microcomputers through research grants.

The brands of microcomputers most frequently used by the programs included the Tandy Radio Shack Models I and III, Apple II and III, Commodore PET, and IBM.

The primary use being made of microcomputers involved inservice and similar educational activities. Another major use concerned farm management and agribusiness workshops and seminars. Research and data analysis as well as departmental recordkeeping were the other two major uses. A wide variety of additional applications was planned for the next 12 months. Table 2 lists the 1981 and the projected 1982 microcomputer applications as reported by 22 agricultural education programs using microcomputers in 1981.

Table 2

*Microcomputer Applications Made During 1981 and Projected 1982 Applications Reported by 22 Agricultural Education Programs Using Microcomputers in 1981*

Microcomputer application	n of programs	
	1981	1982
Departmental recordkeeping	9	15
Research, data analysis	10	15
Dissertation, thesis research	6	10
Farm mgt/agribusiness workshops or seminars	12	16
FFA contest scoring	4	9
Inservice, other educational activities	17	22
Registration for courses	3	3
Self-paced instruction	2	3
Clerical tasks	2	3
Preservice courses	2	3

Programs Not Currently Using Microcomputers. The 40 agricultural education programs not currently using microcomputers were dichotomized into two categories: (a) those planning to secure microcomputers during 1982 (16 programs) and (b) those not planning to secure microcomputers (24 programs).

Programs planning to secure microcomputers during 1982 will be described in this section. Seven of the 16 programs will purchase microcomputers. Four will share a microcomputer with other department(s) in the university, and two programs will receive microcomputers from their universities. The other three programs were not sure how microcomputers will be secured.

The uses planned for the microcomputers involved research and data analysis, farm management/agribusiness workshops and seminars, and departmental recordkeeping. FFA contest scoring, thesis and dissertation research, instruction, and clerical tasks were other planned uses.

### Conclusions and Recommendations

The findings of the study led to the following conclusions and recommendations:

1. Less than half of the agricultural education programs provided some means through which most undergraduate students obtained experiences with computers. Elective courses were the primary avenue used to provide the experiences since few programs required computer-related courses. Nonprogramming activities with microcomputers and programming in BASIC language were the primary focus of experiences undergraduates received.
2. Computer experiences provided graduate students focused on BASIC programming, nonprogramming experiences with microcomputers, and statistical packages, primarily SPSS and SAS. Required and elective computer-related courses used by most graduate students were taught by a wide variety of departments.
3. The computer experiences reported for graduate and undergraduate students are underestimated since the investigators requested information about the experiences most students in the programs received.
4. The use of microcomputers by agricultural education programs appears to be increasing since almost a third of the programs were using them in 1981 and 16 others were planning to secure at least one unit during 1982.
5. Additional research is needed to determine (a) whether computer technology enhances student learning and (b) what computer-related competencies are needed by undergraduate and graduate students preparing for professional careers in agricultural education/agribusiness.

### References

- Backer, C. (1980). Here comes a new literacy: The computer in our lives. *Infosystems*, January, 2.
- Baker, J. (1975). *The computer in the school*. Bloomington, IN: PDK Foundation Fastbook.

Beer, C. (1981). Computers and electronic communication. *The County Agent*, 42(3), 14.

Dean, J. W. (1981). Computers in education: Some helpful changes and challenges are on the way. *The Visitor*, 68(2), (St. Paul MN: Division of Agricultural Education, University of Minnesota).

Radding, A. (1981). Cultivating by computer. *Personal Computing*, 5(11), 39-45.

Sturdevant, R. (1982). Microcomputers and copyright in education. *Phi Delta Kappan*, 63(5), 316-317.

Trotter, G. (1981). *1981 Directory of agricultural teacher educators*. Michigan State University, East Lansing.

\*\*\*\*\*  
 \*  
 \* *The Journal of the American Association of Teacher Educators in* \*  
 \* *Agriculture* is currently using the *Publication Manual of the American* \*  
 \* *Psychological Association* 3rd edition for style. \*  
 \*  
 \*\*\*\*\*