

Hardware Requirements

The simulation was developed on the Apple IIe. This widely used computer utilizes DOS 3.3 for its disk operating system. The program was written in Applesoft BASIC and due to its short length utilizes very little storage. The only hardware requirements are an apple computer and a monitor.

Availability

The program is available to anyone at no charge. It contains less than 200 lines so the program can be easily typed in to an Apple or modified or other systems. For a listing of the program statements and instruction notes, please send a self-addressed stamped envelope.

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ILLINOIS SURVEY

Microcomputer Usage and Needs In Community College Ag Programs

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Introduction

Economics, technology, and competition have helped make computers a part of reality. An increase in computers, available at the elementary and secondary level, will provide students at the post-secondary level with a wider range of computer literacy. The post-secondary educator should expect that present and potential students will have varying backgrounds in microcomputer usage.

Purpose of the Study

With the reality of microcomputer acceptance and usage in all areas of agriculture business and education, it has become essential to provide community college agriculture students with microcomputing knowledge and skills. High school graduates have a wide variety of backgrounds and experiences in agriculture microcomputing. Therefore, a vast array of skills and levels of competencies need to be realized by community college agriculture instructors for effective

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teaching. The community college agriculture instructors need microcomputing competencies, teaching materials, and inservice training (Mottaz, 1982; Leising, 1982; Dickerson and Pritchard, 1981.)

The purposes of the study were to determine the level of microcomputer usage within the Illinois community college agriculture program and competencies needed by community college agriculture instructors.

Research Questions

1. To what extent were Illinois community college agriculture instructors currently using microcomputers in agriculture programs?
2. What types of instructional materials should be developed to aid Illinois community college agriculture instructors in teaching microcomputer usage in agriculture?
3. What microcomputing competencies were perceived as necessary by Illinois community college agriculture instructors?

Instrument Design

The instrument used in this study was a questionnaire that was designed to determine the extent and methods with which microcomputers were used as teaching aids; the microcomputer instructional

needs of the community college agriculture instructors; and the microcomputer competencies needed by the community college agriculture instructors. One hundred and six competencies were identified. Instructors were asked to rate each competency on a scale of zero to ten, with zero indicating "not needed," one indicating "strongly disagree," and ten indicating "strongly agree" that a competency was essential. Competencies rated less than 5.50 were considered not essential. This cut-off score was also used in Bowen's (1984) and Hahn's (1984) studies.

Study Population and Procedures

The study population was 137 Illinois community college agriculture instructors representing twenty-three colleges offering agriculture during the 1984-1985 school term. The 1983 Illinois Association of Community College Agriculture Instructors Directory was used to identify the instructors.

A packet was developed and sent to community college agriculture program instructors who taught agriculture at the community college level the 1984-1985 school term. Each community college agriculture program chairperson was contacted by telephone. The packet included a cover letter, questionnaires, and a pre-addressed, stamped return envelope. The packet was mailed to twenty-three community college agriculture programs (137 instructors). A follow-up telephone call was made to non-respondents.

Of the 137 questionnaires distributed to Illinois community college agriculture instructors, 61 questionnaires were returned, representing 21 community college agriculture programs (91 percent of the agriculture programs and 44.5 percent of the agriculture instructors).

The data were analyzed using percentage and mean rank. Mean rankings of 5.50 or less were not considered essential competencies.

Results

Research Question 1. To what extent were Illinois community college agriculture instructors currently using microcomputers in agriculture programs?

Table 1. Current and Anticipated Microcomputer Availability in Community College Agriculture Programs, Illinois, Fall 1984 N=61

Factors	Number Responding	Percent Responding
Instructors having access to microcomputers	55	90.2
Instructors currently using microcomputers	55	90.2
Instructors anticipating use of microcomputers by 1985	56	91.8
Instructors anticipating use of microcomputers by 1986	57	93.4
Instructors not anticipating the future use of microcomputers	4	6.6

Fifty-five community college agriculture instructors (90.2 percent) had access to microcomputers,

were currently using the computer in their agriculture programs, and anticipated future use of microcomputers. Fifty-seven of the instructors (93.4 percent) anticipated future microcomputer usage in their community college agriculture programs.

Research Question 2: What types of instructional materials should be developed to aid Illinois community college agriculture instructors in teaching microcomputer usage in agriculture?

Forty-four instructors (72.1 percent) wanted to learn to run canned programs. Forty-five instructors (73.8 percent) wanted to learn the basics of microcomputer operation (i.e. language, simple programming), but rely mainly on canned programs. Seventeen instructors (27.9 percent) indicated they desired to learn as much as possible about operation, language, programming, graphics, and maintenance. Instructors were allowed to select as many choices as appropriate (Table 2).

Table 2. Microcomputing Training Needed by Community College Agriculture Instructors and Their Students, Illinois, Fall 1984 N=61

Skill	Percent of Rank* Responses		Percent of Rank* Responses	
	Instructors' Needs		Students' Needs	
Run Canned Programs	72.1	2	86.9	1
Basic Machine Operation	73.8	1	77.1	2
Write Computer Programs	27.9	4	11.5	4
Learn as much as possible	42.6	3	24.6	3

* Rank was determined by percentage, with the largest percentage being one and the smallest being four.

Six topic areas lack adequate instructional materials. The community college agriculture instructors indicated they would prefer to have more microcomputer instructional materials developed in agriculture mechanics, as well as agriculture business and economics (Table 3).

Table 3. Ranking of Areas Lacking Microcomputer Instructional Materials as Determined by Community College Agriculture Instructors in Illinois, Fall 1984 N=56

Agriculture Topic Area	Number of Responses	Percentage of Responses	Rank
Agriculture Mechanics	28	20.1	1
Agriculture Business and Economics	24	17.3	2
Animal Industries	21	15.1	3
Plant and Soil Science	20	14.4	4
Horticulture	16	11.5	5
Conservation	15	10.8	6
Forestry	13	9.4	7

Community college agriculture instructors preferred to use canned (N=55, 90.2 percent). Twenty-seven instructors (44.3 percent) preferred informational tests, 33 (54.1 percent) preferred lesson plans, and 32 (52.4 percent) preferred visual aids. Instructors were allowed to choose one or more responses to indicate their preference. Canned

programs were the most popular form of instructional materials.

Research Question 3: What microcomputing competencies were perceived as necessary by Illinois community college agriculture instructors?

The competency categories investigated were: Awareness/Literacy Competencies, Hardware Competencies, General Software Competencies, Instructional Applications Competencies, Agricultural Applications Competencies and Programming Competencies (Table 4). Eighty-four microcomputing competencies (89 percent) were identified as needed by community college agriculture instructors. The two categories of programming and agricultural applications were less important to the instructors.

Table 4. Mean Ranking of Microcomputer Competencies According to Community College Agriculture Instructors Illinois, Fall 1984 N=61

Competencies	Mean*
Awareness/Literacy Competencies	
Explain the need for useful organization of data and relate this to application to computers	7.95
Define various terms relating to microcomputers	7.77
Identify common agricultural or extension tasks which are suited for microcomputers	7.66
List the advantages of using microcomputers.	7.59
Identify characteristics of tasks which make them suitable for computers	7.34
List values of possessing computer skills for future employment	7.33
Describe the effect computers are having on the agriculture/extension fields	7.33
Explain that a computer needs instructions to operate	7.26
List limiting considerations for using computers	7.16
List the disadvantages of using microcomputers	7.08
Identify the advantages and disadvantages of databases	7.07
Identify tasks which are not suited for microcomputer usage	7.00
Define input and output and give examples of each	6.92
Explain the statement "Computer mistakes are mistakes by people"	6.87
Identify the major components of any computer.	6.57
Describe the basic operational processes of computers.	6.56
Describe how computers process data	6.36
List several ways that computers are used everyday	6.29
Identify and read computer-related books, magazines, etc.	6.26
Explain how a computer gets its instruction from a program	5.98
Differentiate between micro-, mini-, and mainframe computers	5.85
Understand the implications of copyright laws relating to computers	5.59
Explain ways computers affect people's lives.	5.44
Describe the historical development of microcomputers.	2.88
Hardware Competencies	
Demonstrate how to insert disk, turn the system on and run a program.	8.80
Demonstrate the ability to stop, escape from, and continue a program as needed	8.62
Locate a program using a catalog or diskette directory.	8.54
Run a program from a catalog, menu or diskette directory	8.41
Use an operator's manual	8.39
Understand simple error messages relating to the operation of the system	8.31
Identify criteria or characteristics to consider when selecting/evaluating hardware	8.26
Demonstrate the proper operation of microcomputers and peripherals	8.23
Distinguish between hardware and software	7.75
Identify criteria or characteristics to consider for determining size/capabilities of a system	7.70
Demonstrate the proper care and/or simple maintenance skills necessary for various types of hardware.	7.57
Arrange microcomputers and related equipment in an educational setting	7.52
List different types of peripherals available and uses and characteristics.	7.51
Calculate the costs of microcomputer ownership.	7.43
Define the term hardware.	7.38
Be familiar with different brands and models of microcomputers and general characteristics	6.82
Communicate with other computers or networks	6.79
General Software Competencies	
Demonstrate the ability to use software and software documentation	8.48
Demonstrate proper care for software	8.38
Make backup copies of software for protection.	8.33
Relate software needs to evaluation and selection of appropriate hardware.	8.25
Identify criteria for evaluating software.	8.13
Identify the major types of software available	7.98
Demonstrate software needs.	7.93
Identify sources of software	7.93
Define the term software	7.69
Understand copyright laws relating to software	7.26
Organize a software library.	7.03
Instructional Applications Competencies	
Be familiar and be able to use instructional software	7.93
Identify sources of instructional software	7.80
Identify specific uses for computers in particular agriculture education situations	7.70
Identify uses of computers in instruction	7.59
Use software to produce instructional materials	7.48
Use computers as a resource information file	7.36
Use computers as a resource information file	7.36
Identify criteria for evaluating instructional materials.	7.25
Identify the values of and goals for using computers.	7.25
Use software for test construction, administration, scoring, and evaluation/analysis	7.10
Use software to maintain student records	6.77
Define computer related instructional terms	6.51
Agriculture Applications Competencies	
Identify computer uses which students or clients need to be familiar with or capable of using	7.55
Use budgeting programs	7.54
Use decision making programs	7.52
Use financial record keeping programs	7.48
Use an accounting program	7.30
Use an inventory program	7.16
Identify sources of agriculture software	7.16
Identify uses of computers in agriculture subject areas.	7.14
Identify criteria for evaluating agriculture software.	6.96
Evaluate agriculture software.	6.88
Use a data base program	6.88
Identify and use agriculture data bases or information services	6.76
Use project record keeping programs	6.73
Use a mailing list program	6.43
Identify sources of Extension software.	6.30
Programming Competencies	
Perform a simple procedure using DOS commands to copy, save, or delete programs	6.68
Apply problem solving strategies using computer programs	6.00
State what will happen if instructions are not properly stated in the precise language needed.	5.95
Design a series of microcomputer applications that are relevant to a course of study or situation	5.82
Structure problems in a logical form	5.78
Define as well as explain fundamental BASIC statements or commands.	5.78

Follow and give the correct output for simple formulas	5.64
Explain the concept of programming	5.50
Evaluate individually developed programs	5.39
Express ideas or problems as formulas	5.28
Describe the use of control statements	5.26
Define terms related to programming	5.18
Program mathematical functions	5.18
Read a flowchart	5.11
Use editing procedures to correct programs	4.98
Link programs together	4.96
Describe standard flowchart symbols	4.95
Identify variations of BASIC language	4.89
Explain simple error messages related to programming	4.86
Translate a formula into a flowchart	4.73
Write a flowchart to represent a solution	4.73
Design assignments requiring progressively greater programming skills	4.53
Develop and apply strategies for debugging programs	4.48
Translate a simple flowchart into a computer program	4.46
Write a program using a structured format	4.25
Predict computer output given a program list	4.14
Translate programs from one language to another	3.48
Program in a language other than BASIC	3.43

* Mean was based on a scale of 0 to 10 with 0 indicating "not needed," 1 indicating "strongly disagree" and 10 indicating "strongly agree."

Conclusions

The data collected and analyzed resulted in the following conclusions:

1. Illinois community college agriculture instructors having access were using microcomputers in their community college agriculture programs.
2. Community college agriculture instructors were using microcomputers to aid classroom instruction, SOEP record keeping, classroom record keeping, agriculture club activities, resource for local agriculturists, independent study, extra credit work and adult education.
3. Community college agriculture instructors desired to learn the basics of microcomputer operation, but they rely mainly on canned programs. Community college agriculture instructors wanted canned programs and basic microcomputer training.
4. Community college agriculture instructors lack adequate instructional materials to teach microcomputer usage in agriculturally related topics, such as agriculture mechanics, agriculture business and economics, and animal science.
5. Eighty-four essential microcomputer competencies were identified as needed by Illinois community college agriculture instructors.

Recommendations

1. Community colleges should continue to develop and update their college classes and inservice training techniques in microcomputer usage in agriculture.
2. Educational and application software should be developed for agriculturally related topics.
3. The 84 microcomputer competencies identified should be incorporated into the training of community college agriculture instructors.

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Computerized Testing of Agriculture Students

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Much of the research about using computers in testing and grading is descriptive in design. Doying, Matheny, and Minnick (1983) discussed a computerized test generation package used with a Principles of Entomology course. Tice (1981) wrote that an interactive grade recording package was effective for his agricultural economics course, but a written grade book was still needed. Meanwhile, students who voluntarily took make-up quizzes on videoscopes or typewriter consoles during a Principles of Micro-Economics course had significantly higher averages for all quizzes taken and higher final grades in the course. (Thatch, 1983).

Few researchers have studied the effect that computerized testing has on the cognitive, affective, and psychomotor development of agriculture students. Two related studies were located about this type of testing. Minnesota Multiphasic Personality Inventory (MMPI) scores made by students taking an introductory psychology course were not influenced by three methods Biskin and Kolotkin (1977) used to give the MMPI: (1) paper and pencil, (2) cathode ray tube terminals linked to a mainframe computer, or (3) teletype machines hooked to a mainframe computer. However, a study at the Naval Training Center in San Diego, Cory (1977) concluded that computerized testing will be more effective than paper and pencil methods in predicting job performance in some specialized occupations.

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