An Assessment of Microcomputer Competencies Needed by Vocational Agriculture Instructors in Nebraska and Iowa

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The use of microcomputers in education and agriculture has not only come of age, but changes almost daily. Being a part of both the education profession and agricultural industry, vocational agriculture instructors could easily find themselves behind in both areas in the use of computer technology. Steps should be taken to help teachers upgrade their microcomputer skills and integrate microcomputer related instruction into their vocational program.

To address this increased need for microcomputer competency in vocational agriculture, teacher education programs must assume an active role in preparing teachers to use all forms of computer instruction (Hallworth & Brebner, 1980). Cantrell and Byler (1983) recommended that teacher educators assume a more active role in providing agricultural educators with microcomputer training opportunities. Using computer instruction in preservice methods courses and providing inservice workshops and demonstrations are two effective methods for helping teachers implement microcomputer related instruction in their programs. When teachers become involved with computers, they often become enthusiastic about the possibilities in their curriculum (Loop & Christensen, 1980).

Hudson (1983) identified microcomputer related competencies for vocational agriculture instructors in four broad areas: general competencies, programming competencies, hardware competencies, and software competencies. Hudson found competencies related to actual software and hardware were more likely to be considered highly important than those related to programming..

Objectives of the Study

In order to provide effective preservice and inservice instruction to vocational agriculture teachers, certain baseline data are necessary. It was the intent of this study to: a) identify specific microcomputer competencies needed by vocational agriculture instructors and to make comparisons by state, size of vocational agriculture department, and years of teaching experience; b) identify barriers that may impede the use of microcomputers; and c) assess the current status of microcomputer usage in Nebraska and Iowa vocational agriculture programs.

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Methods and Procedures

A mailed survey instrument was used to collect data for this study. The instrument was designed to assess selected microcomputer software and hardware usage as well as to identify specific microcomputer related competencies needed by secondary vocational agriculture instructors. The instrument was reviewed by vocational agriculture instructors and university personnel in Nebraska and Iowa to provide suggestions related to its completeness and accuracy, as well as understanding and clarity of survey items.

The sample for the study included vocational agriculture instructors who had completed an agricultural education sponsored workshop in the use of the microcomputer. Approximately 45% of all Nebraska teachers (61) and 43% of all Iowa teachers (119) were included in the sample. Usable responses were obtained from 54 Nebraska teachers (88.5%) and 115 Iowa teachers (96.6%) for a total response rate of 93.9%.

Respondents were asked to provide demographic data describing their vocational agriculture program and the status of microcomputer usage within the program. They were also asked to rate the importance of possessing 50 specific microcomputer competencies that may be beneficial in integrating microcomputer technology into vocational agriculture programs. A Likert-type scale was used to rate the competencies. A "1" indicated the competency was of no importance; a "5" indicated the competency was of average importance; and a "9" was used to indicate the competency was of utmost importance for instructors to possess in integrating the microcomputer into the vocational agriculture program.

A copy of the instrument and an introductory letter were sent to each member of the sample. Two follow-ups were conducted to encourage participating in the study. A survey of nonrespondents was made to compare results from the initial respondents group. Using a t-Test, no significant differences were found between initial respondents and those included in the follow-up; therefore, all responses were pooled to constitute the sample used for this study.

The data were analyzed to obtain frequencies, means, and standard deviations for all survey items. A one-way analysis of variance (ANOVA) test, followed by the Scheffe' post hoc test, was used to compare respondent groups by size of vocational agriculture department and years of teaching experience. A t-Test was used to compare items by state.

Findings

The findings of this study are summarized in Tables 1 through 4. Interpretation of the findings should be made with the understanding that all respondents must have had previous microcomputer training to be included in the sample.

Importance ratings of microcomputer competencies were compared by size of vocational agriculture department. Vocational agriculture program sizes were compared using 4 intervals (15 to 30 students, 31 to 41 students, 42 to 52 students, and over 52 students). Using the ANOVA procedure, only one difference in mean ratings was observed based on the size of vocational agriculture department. However, the Scheffe' post hoc test (p=.05) failed to substantiate the difference in means.

Importance ratings of microcomputer competencies were also compared by teaching experience of the sample. Three intervals were used to make comparisons: 0 to 4 years, 5 to 8 years, and 9 years and above. Two differences were observed and substantiated by the Scheffe' post hoc test at the p=.05 level. Teachers with 5 to 8 years of experience regarded the microcomputer competency of "listing a program" to be higher in importance (7.24) than teachers with 0 to 4 years of experience (6.16). Although both groups regarded the competency as being relatively unimportant, it was observed that teachers with 0 to 4 years of experience rated "altering the permanent memory of the computer" higher (3.63) than teachers with 9 years or more experience (2.50).

Table 1 lists the 24 microcomputer competencies perceived as highly important (mean rating of 7.0 or above) by vocational agriculture instructors. Significant t-values were observed on three of the 24 competencies, indicating statistically different mean ratings by state. However, composite mean ratings were all above 7.0 (on a nine-point scale), indicating little or no practical difference in relation to the objectives of this study. Only one item had a significant difference measured at the p=.01 level: the use of "VisiCalc or other spread sheet program." Iowa teachers regarded that competency to be higher in importance.

The majority of the highly important competencies were in the areas of specific skills needed in operating hardware and software and in using the microcomputer in the classroom. Only one of the nine competencies in the study relating to programming, "make small editing changes in a program," was considered highly important by the respondents.

Data describing barriers perceived as prohibiting additional use of the microcomputer in vocational agriculture programs are presented in Table 2. Expensive software was the barrier most often reported as preventing more extensive use of the microcomputer (55.6%). Other major barriers were: lack of computer teaching materials (49.1%), location of the computer (46.7%), and lack of operational knowledge (34.3%).

Table 3 provides data indicating the areas of most common usage of microcomputers in Nebraska and Iowa vocational agriculture programs. It was observed that 76.3% of the respondents used the microcomputer for "group and/or classroom instruction", 62.7% used it for "independent study", and 39.6% used it within a "unit on microcomputers in vocational agriculture." Less than 25% used the microcomputer for departmental information processing.

Table 1

Means, Standard Deviations, and T-values for Microcomputer Related Competencies Rated Highly Important for Use in Secondary Vocational Agriculture Programs by Nebraska and Iowa Vocational Agriculture Instructors (Mean Ratings of 7.0 or greater)

Composite items	Nebraska (n = 54)	Iowa (n = 115)	Composite (n = 169)	*t*-value
1 Run a program from a diskette	8.59 0.94	8.43 1.12	8.49 1.07	0.89
2 Select effective micro-computer software	8.46 0.99	8.35 1.11	8.39 1.07	0.65
3 Load a program from a diskette	8.35 1.32	8.20 1.50	8.25 1.45	0.60
4 Properly store a diskette	8.19 1.48	8.22 1.27	8.21 1.34	-0.15
5 Boot a diskette	8.11 1.57	8.23 1.48	8.20 1.51	-0.50
6 Use the microcomputer in the vo ag program	8.22 1.18	8.18 1.04	8.20 1.08	0.22
7 Use the printer to print output	8.28 1.09	7.98 1.45	8.08 1.36	1.32
8 Properly store microcomputer hardware	8.19 1.33	8.02 1.51	8.07 1.45	0.72
9 Correct errors using the arrow keys	7.96 1.54	8.03 1.42	8.01 1.45	-0.26
10 Interpret keys on the keyboard	7.70 1.71	7.89 1.47	7.83 1.55	-0.72
11 Save a program to a diskette	8.00 1.44	7.69 1.65	7.79 1.59	1.02
12 Copy a program to another diskette	8.13 1.43	7.57 1.56	7.75 1.54	2.25*
13 Copy an entire diskette	8.02 1.52	7.43 1.79	7.62 1.73	2.10*
14 Select appropriate microcomputer hardware	7.78 1.57	7.50 1.80	7.59 1.73	1.31

Table 1 (continued)

Composite items	Nebraska (n = 54)	Iowa (n = 115)	Composite (n = 169)	t-value
15 Supervise student activities on computer	7.54 1.76	7.61 1.67	7.59 1.70	-0.26
16 Provide instruction on using the microcomputer	7.43 1.90	7.44 1.74	7.44 1.79	-0.06
17 Supervise independent study on microcomputer	7.46 1.48	7.37 1.58	7.40 1.54	0.38
18 Use VisiCalc or other spread sheet program	6.70 1.57	7.58 1.56	7.30 1.61	-3.41**
19 Properly label a diskette	7.31 1.64	7.23 2.02	7.26 1.90	0.26
20 Identify software-related problems	6.87 1.88	7.33 1.39	7.18 1.57	-1.79
21 Interpret documentation of a program	6.93 2.26	7.30 2.04	7.18 2.12	-1.08
22 Properly transport microcomputer hardware	7.19 1.85	7.15 2.04	7.16 1.98	0.11
23 Use "simulation" program in the classroom	6.91 2.29	7.18 1.60	7.10 1.85	-0.90
24 Make small editing changes in a program	7.11 1.84	7.08 1.77	7.09 1.79	0.11

Note. Scale used: 1 = not important; 5 = average importance;
                   9 = utmost importance.

* $p < .05$, ** $p < .01$

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Table 2

Barriers Perceived as Prohibiting More Extensive Use of Microcomputers by Nebraska and Iowa Vocational Agriculture Instructors as Indicated by Number and Percentage

Barriers	Nebraska (n = 54)	Iowa (n = 115)	Composite (n = 169)
Software is too expensive	29 53.7	65 56.5	94 55.6
Lack of microcomputer teaching materials available	31 57.4	52 45.2	83 49.1
Present location of computer is not handy	31 57.4	48 41.7	79 46.7
Lack of operational knowledge	14 25.9	44 38.3	58 34.3
Microcomputer is used excessively by others	15 27.8	36 31.3	51 30.2
Good software not available	10 18.5	30 26.1	40 23.7
No access to microcomputer	8 14.8	19 16.5	27 16.0

Data in Table 4 indicates that the majority (71.6%) of the respondents use "VisiCalc or another electronic spread sheet" in their vocational agriculture programs. The next two most commonly used utility programs were "teaching materials generating programs" (43.8%) and "word processing programs" (31.4%).

Recommendations

The following recommendations in the areas of preservice education, inservice education, and software development are based on the findings of this study.

Preservice

1. Undergraduate majors should learn to use software packages such as VisiCalc, generators of teaching materials, and word processing.

Table 3

Areas of Current Microcomputer Use by Nebraska and Iowa Vocational Agriculture Instructors as Indicated by Number and Percentage

Current use	Nebraska (n = 54)	Iowa (n = 115)	Composite (n = 169)
For group and/or classroom instruction	42 77.8	87 75.7	129 76.3
For independent study	33 61.1	73 63.5	106 62.7
For use in a microcomputer unit in vocational agriculture	27 50.0	40 34.8	67 39.6
For departmental filing	14 25.9	28 24.3	42 24.9
To record student grades	12 22.2	24 20.9	36 21.3
To maintain departmental inventories	9 16.7	16 13.9	25 14.8
Not used at all	2 3.7	8 7.0	10 5.9

Table 4

Software Utility Programs Currently Used by Nebraska and Iowa Vocational Agriculture Instructors as Indicated by Number and Percentage

Software utility programs	Nebraska (n = 54)	Iowa (n = 115)	Composite (n = 169)
VisiCalc or other electronic spread sheet program	32 59.3	89 77.4	121 71.6
Teaching materials generating programs	25 46.3	49 42.6	74 43.8
Word processing program	11 20.4	42 36.5	53 31.4
Data base management program	12 22.2	23 20.0	35 20.7
Graphics program	1 1.9	4 3.4	5 3.0

2. Competencies identified as being highly important should be included in preservice coursework.

3. Undergraduates should be provided instruction on methods of utilizing the microcomputer for group and/or classroom instruction and for independent study.

4. Undergraduates should be provided instruction in how to utilize the microcomputer as a tool for information storage and retrieval as well as general office management.

Inservice

1. Possible topics for future inservice may include utilizing the full potential of software packages such as VisiCalc, teaching materials generators, and word processing.

2. Competencies identified as highly important should be included in all microcomputer related inservice education offerings to provide a basic, uniform knowledge level.

3. Inservice offerings should address the comprehensive use of the microcomputer as an instructional tool as well as an office management aid.

Software Development

1. Programs should be developed to complement the use of VisiCalc and generators of teaching materials.

2. Efforts should be made to attain and/or develop inexpensive instructional software for use in vocational agriculture programs.

3. Efforts should be made to identify both a software development strategy and a dissemination procedure to insure high quality, inexpensive software for vocational agriculture.

4. Curriculum materials which include software programs, should be considered to assist further implementation of microcomputer technology into the comprehensive vocational agriculture program.

Additional Areas of Research

The following areas of research may provide additional information to enhance the use of microcomputers within vocational agriculture programs.

1. Determination of actual microcomputer applications by instructional area, administrative function, and/or program activity.

2. Examination of computer assisted instruction methods and their usefulness in vocational agriculture programs.

3. Determination of the effect on student learning when computer assisted instruction methods are used in vocational agriculture programs.

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