Computer Anxiety Levels of Vocational Agriculture Teachers

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The introduction of microcomputers (hereafter referred to as computers) into vocational agriculture and other vocational programs has created mixed reactions among teachers. Some believe that the computer is an indispensable tool while others continue to resist its incorporation into their programs.

Several researchers have addressed the computer competencies needed by students and their teachers, and attitudes towards computers (Birkenholz & Harbstreit, 1987; Bowen, Mincemoyer & Parmley, 1983; Henderson, 1985; Miller & Kotrlik, 1987; Neason & Miller, 1982; Newman & Henderson, 1987; Trede, Russell & Miller, 1985; Zidon & Luft, 1987). Other writers have addressed the educational uses of the computer (Hudson, 1980; Taylor, 1980). However, the problem of computer anxiety and computer anxiety related integration problems has not been addressed in vocational education research.

Several studies of computer anxiety have been conducted in other disciplines. Baub (1982) found five variables to be significantly correlated to computer anxiety among college students. These variables were gender, college major, computer experience, math anxiety, and trait anxiety. Rankin (1984) studied the interaction of anxiety, gender, and age using computer assisted instruction with community college students. Females had a higher anxiety score than males even though they did significantly better in both the conventional and computer assisted instructional setting. Rankin concluded that anxiety had no effect on performance.

Johassen (1985) used Spielberger's State-Trait Anxiety Inventory, Form Y, to study whether increased levels of computer anxiety in participants who used computers to input their responses were associated with computers. This study provided some evidence that computer anxiety increases when participants are exposed to computers.

Johnson (1987) examined the effects of training on levels of writing apprehension and computer anxiety in elementary school teachers. Computer anxiety was assessed using Maurer and Simonson's Computer Anxiety Index. The study found that training may contribute to reductions in computer anxiety for elementary school teachers. Johnson also found that age correlated positively with computer anxiety and that gender was found to be unrelated. Johnson recommended further study of selected variables and their effect on writing apprehension and computer anxiety in classroom teachers.

Bellando and Winer (1985) reported that Holland's Artistic and Social types reported a significantly greater amount of computer anxiety as measured by the Computer Anxiety Scale than the other four Holland types - Realistic, Investigative, Conventional, and Enterprising. They determined that there is some validity to classifying people according to Holland types to determine levels of computer anxiety.

Jones and Wall (1987) used the Computer Anxiety Index (CAIN) to analyze the relationship between amount of computer exposure and computer anxiety scores for graduate and undergraduate students. The results suggested that graduate students with continuous exposure to computers showed greater reduction of anxiety scores and higher than predicted scores on a standard measure of computer literacy. No significant relationships were found between gender and computer anxiety for undergraduate students, although the results did lend support to the proposition that there is a significant relationship between computer anxiety and computer experiences/exposure.

Several similar definitions for computer anxiety exist. Johassen (1985) defined computer anxiety as "the state that results when people fear using computers or are faced with the prospect of using computers" and Maurer and Simonson (1984) portrayed computer anxiety as "the irrational fear or apprehension felt by an individual when using computers or when considering the possibility of computer utilization." Oetting (1983) defined computer anxiety as "the anxiety that people feel they will experience when they are interacting with computers--the anxiety associated with the concept of computers." (p. 1) Cantrell (1982) termed the fear and anxiety associated with use of a computer as "computerphobia."

A review of previous research reveals that computer anxiety in varying degrees is being experienced. Bertz (1978) and Fennema and Sherman (1976) have shown that just as the learning of mathematics has been affected by math anxiety, it is very likely that computer anxiety affects both choosing to learn about computers and the mastery of computer skills.

Rationale

Computer anxiety levels of vocational agriculture and other vocational teachers may be an important consideration in the process of incorporating computers into vocational agriculture programs. If the level of computer anxiety being experienced by vocational educators and the factors related to computer anxiety can be identified, then steps can be taken during the planning of pre and inservice education to alleviate these problems.

The findings from previous research show that there is a lack of substantive research on computer anxiety in general, and on computer anxiety of vocational teachers (including vocational agriculture teachers) specifically. No record was found where computer anxiety levels of vocational teachers were studied, even though several authors touch on the computer anxiety issue in their research. This study measured computer anxiety levels of vocational teachers and determined which predetermined variables were capable of explaining practically significant proportions of the variance in computer anxiety. Because of limited research in this area, no hypotheses were formulated. This study was designed as a descriptive study.

Purpose and Objectives

The purpose of this study was to determine the factors related to the computer anxiety levels of vocational agriculture and other vocational teachers. The objectives were:

1. To determine the computer anxiety levels being experienced by vocational teachers.

2. To determine if a difference exists between the levels of computer anxiety experienced by vocational agriculture teachers and other vocational teachers.

3. To determine if a difference exists between the levels of computer anxiety experienced by male and female vocational teachers.

4. To determine the variance in the vocational teachers computer anxiety levels that can be explained by selected variables. The variable used in this analysis were: Computer skills, principal's support, computer availability, math ability, formal computer training, age, and sex.

<div align="center">Procedure</div>

The population consisted of all secondary vocational teachers in Louisiana in four programs: agriculture, home economics, business and office, and industrial arts education ($\underline{N}$ = 2,362). The sample was drawn from a database maintained by the researcher. Cochran's sample size formula (Snedecor & Cochran, 1980) was used to select a stratified random sample of 367.

Oetting's (1983) Computer Anxiety Scale (COMPAS) was selected to measure computer anxiety in this study because of stability in measurement, demonstrated content and discriminant validity, and high reliability. The long form consists of 48 Likert-type items for which respondents report their subjective feelings of anxiety. The COMPAS has seven subscales (hand calculator, trust, general attitude, data entry, word processing, business operations, computer science). The general computer anxiety scale range is from 40 to 200. The range for the computer anxiety subscales is from 4 to 20.

Oetting (1983) maintains there are three types of anxieties. Two, trait and state anxieties, "are commonly referred to by psychologists. Trait anxiety is the general pervasive anxiety experienced by a person over the entire range of life experiences. State anxiety, on the other hand, is the anxiety that a person is experiencing right now, at this moment in time" (p. 1). Oetting's COMPAS "is based on a third type of anxiety, concept-specific anxiety. Concept-specific anxieties fill the gigantic range between general trait anxiety and state anxiety. They are the anxieties that people associate with specific situations" (p. 1).

Oetting's studies using the COMPAS instrument revealed that computer anxiety was highly related to computer test anxiety ($\underline{r}$ = .70), which is a measure of taking examinations where you had to use a computer, and moderately related to Suinn's Math Anxiety Rating Scale ($\underline{r}$ = .40). Computer anxiety had a low correlation with the Theme or Term Paper Anxiety measure ($\underline{r}$ = .19). Oetting concluded that even though computer and math anxiety seems to be related, the COMPAS is not measuring math anxiety. Psychologists Kleirmuntz and Steven Wise (Mental Measurements Yearbook, 1985) reviewed the COMPAS. Although Kleinmuntz questioned the importance of predicting computer anxiety, both concluded that the COMPAS was a well designed instrument.

A second instrument was used to collect demographic and computer related information. Both instruments were field tested using 15 vocational teachers who were not a part of the sample. Minor changes in the demographic and computer related information instrument suggested by the field test were incorporated into the final version of the instrument.

Reliability was assessed using Cronbach's Alpha and found to match the reliability claimed by Oetting (1983): Overall; .96 in previous studies, .96 in this study: Subscales; .72 to .86 in previous studies, .72 to .84 in this study.

After two mailings, two post-card follow-ups, and a telephone follow-up, a response of 294 (80%) was achieved. Comparisons using a t-test between those who responded by mail and those who responded by phone yielded no differences and data were combined for data analysis. The data were analyzed using descriptive statistics, inferential t-tests (using pooled variance estimates) and step-wise multiple regression. The alpha level was established a priori at .05. For the regression analysis, a variable had to explain at least one percent of additional variance besides the variance already explained by the other variables to be declared as a significant explanatory variable.

Findings

Objective 1: The COMPAS score for the sample was 104.4 (sd = 32.7) on a scale that ranged from 40 to 200. This score is lower than the 109.8 reported for college students by Bellando and Winer (1985) and higher than the 92.6 reported by Worden (1984) in a national study of cooperative extension agents. The distribution of scores suggest that some vocational teachers may be experiencing computer anxiety. The COMPAS manual indicates "some mild anxiety present" beginning at scores of 105 for college students.

Objective 2: Table 1 displays a comparison of the computer anxiety levels of vocational agriculture teachers and other vocational teachers. No differences existed between these two groups on their overall scores or on their subscale scores.

Table 1
Comparison of Computer Anxiety Levels of Vocational Agriculture And Other Vocational Teachers

| Scale | Vo Teach (N = 223) | | Vo Ag Teach (N = 71) | | |
	Mean	SD	Mean	SD	t
General computer anxiety	102.6	34.4	110.1	26.1	1.67
Subscales: Hand calculator	6.7	2.7	6.9	1.8	0.48
Trust	6.2	2.5	6.7	2.8	1.50
General attitude	7.1	3.0	7.7	2.9	1.40
Data entry	8.8	3.6	9.6	3.1	1.82
Word processing	8.9	4.2	9.6	3.8	1.19
Business operations	9.4	4.3	10.0	3.5	1.12
Computer science	12.4	4.4	12.9	3.6	0.81

Note: Pooled variance estimates were used in these analyses. The general computer anxiety scale range is from 40 to 200. The range for the computer anxiety subscales is from 4 to 20.

Objective 3: Table 2 displays a comparison of the computer anxiety levels by gender. Female vocational teachers had significantly higher anxiety levels than male teachers in the areas of trust, data entry, and word

processing. No differences existed between these two groups on their overall scores or on the other subscale scores.

Table 2
Comparison of Computer Anxiety Levels of Vocational Teachers by Sex

Scale	Male (N = 223)		Female (N = 71)		t
	Mean	SD	Mean	SD	
General computer anxiety	101.2	33.0	107.6	32.1	1.67
Subscales: Hand calculator	6.6	2.6	6.9	2.4	0.88
Trust	6.0	2.4	6.7	2.77	2.28*
General attitude	6.9	2.9	7.6	3.0	1.84
Data entry	8.6	3.5	9.4	3.4	2.12*
Word processing	8.4	4.0	9.7	4.1	2.79*
Business operations	9.2	4.1	10.0	4.2	1.65
Computer science	12.6	4.3	12.5	4.2	0.23

Note: Pooled variance estimates were used in these analyses. The general computer anxiety scale range is from 40 to 200. The range for the computer anxiety subscales is from 4 to 20.
*p < .05

Table 3
Multiple Regression Analyses of COMPAS Scores (N = 283)

Source of Variation	SS	df	MS	F-ratio	Prob.
Regression	141135	6	23523	46.2	.0000
Residual	162817	276	590		
Total	303952	282	24103		

_____Variables in the equation_____

Variables	R^2	Cum R^2	F	Prob.
Teacher's level of computer skills	.360	.360	159.7	.0000
Principal's support of computer use	.034	.394	92.7	.0000
Computer availability at school	.026	.420	69.1	.0000
Perceived mathematical ability	.013	.433	54.9	.0000
Received formal computer training	.012	.445	46.2	.0000

_____Variables not in the equation_____

Variables	t	Sign. t
Age	1.40	.16
Sex	.81	.42

Objective 4: Table 3 displays the results of the multiple regression analysis. Five variables explained 45% of the variance in the COMPAS score. Teachers with no or low levels of computer skills, teachers who perceived they did not have their principal's support in the use of computers, teachers who had computers available at school, teachers who perceived they had low math ability, and teachers without formal computer training were more likely to have higher levels of computer anxiety. Although all variables used in this analysis were selected based on previous research, two variables (age and gender) that had been related to computer anxiety in other research did not explain a significant percentage of the variance in this study.

Conclusions and Recommendations

No differences exist between the computer anxiety being experienced by vocational agriculture teachers and other vocational teachers. It does not appear that vocational teachers are experiencing higher than normal computer anxiety levels. The distribution of scores suggest that some vocational teachers are experiencing anxiety ranging from mild to intense. Differences do exist between the computer anxiety levels of male and female teachers for three of the seven COMPAS scales. The three scales for which differences existed were trust, data entry, and word processing. A higher level of anxiety was recorded for females on all three scales.

The regression analysis revealed five significant explanatory variables. The five variables were teacher's level of computer skills, principal's support of computer use, computer availability at school, perceived mathematical ability, and whether the teacher had received formal computer training.

The variables that explained significant amounts of variance in computer anxiety should be considered by teacher educators and state supervisors when planning computer related preservice and inservice activities and when advising teachers on the purchase of computers and related equipment. State supervisors and teacher educators should take appropriate steps to provide computer training to upgrade vocational teachers' computer skills. This action by itself holds the most realistic promise for reducing computer anxiety levels of vocational teachers.

Additional research should be conducted to identify other variables that may contribute to the computer anxiety levels of vocational teachers. The variables identified in this study may be adequate to initiate activities to lower computer anxiety. As additional variables are found, an improved understanding of computer anxiety will enable teacher educators and state staff to provide additional remedies for computer anxiety. Further research is also needed to determine the extent to which computer anxiety of vocational teachers is related to their trait and state anxiety levels.

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