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AUTHOR Jones, Paul E.; Wall, Robert E.
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ABSTRACT

Two descriptive pilot studies employed a multi-group and pre- and post-design to analyze the relationship between students' exposure to computers and reductions in their computer anxiety scores and the relationship between the amount of computer exposure to computer anxiety scores. In the first study, standardized measures of computer anxiety and computer knowledge were administered to 21 graduate students in instructional technology and 22 graduate students in education; the Myers-Briggs Type Indicator was also administered to both groups to assess the relationship of personality type with computer anxiety and gain in computer knowledge. Results indicated that the group with continuous exposure to computers showed greater reduction of anxiety scores and higher than predicted scores on a standard measure of computer literacy. The second study measured 127 undergraduates who had little or no previous computer science coursework, all of whom were enrolled in a fundamental computing course (47% males and 53% females). The only measure administered to this group was the Computer Anxiety Index (CAIN). No significant relationships were found between gender and computer anxiety, although the results did lend support to the proposition that there is a significant relationship between computer anxiety and computer experiences/exposure. An 18-item bibliography is included. (DJR)

COMPUTER EXPERIENCE AND COMPUTER ANXIETY: TWO PILOT STUDIES

PAUL E. JONES
DEPARTMENT OF INSTRUCTIONAL TECHNOLOGY

ROBERT E. WALL
DEPARTMENT OF GENERAL EDUCATION

COLLEGE OF EDUCATION AND INSTRUCTIONAL TECHNOLOGY
TOWSON STATE UNIVERSITY
TOWSON, MARYLAND 21204

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INTRODUCTION

"The fear of the unknown" antedates computers by a few millinea. Yet it has been hypothesized that this ancient fear has an impact upon the acquisition and utilization of the most modern of technologies--computers. Many have observed that when the unknown loses its mystery, it is much less fearsome. This study attempts to assess the relationship between computer anxiety and computer knowledge or exposure.

BACKGROUND

Transitory anxiety is a common experience for individuals who encounte situations which are perceived as threatening. Anxiety is expressed physiologically with symptoms such as increased heart rate, elevated blood pressure and digestive disorders. Cognitive activity can also increase as students experience worry and fear concerning their performance (Eysenck, 1979). Worry is reported to have a negative impact upon performance becaus it can periodically divert a student's attention from the learning task to self-judging or self-relevant thoughts (Mandler and Watson, 1966, Marlett and Watson, 1968).

Although experts do not agree upon an exact definition of computer anxiety, a review of textbooks, professional journals, as well as papers in the "popular press", attests to its existence (Jordon and Stroup, 1982; Raub, 1981; Gressard and Lloyd, 1984; Cambre and Cook, 1984). The need to investigate computer anxiety is of paramount importance because of the ever increasing number of computer uses and applications. There is a concomitant increase in the need to provide computer literacy and skills to these users. It has been estimated that by 1990 seventy-five percent of workers in the United States will use a computer daily (Rodenstein, 1983).

Relationships between computer attitudes, math anxiety, sex and computer experience were investigated by Lloyd and Gressard (1984). They found math anxiety to be positively related to computer anxiety, computer confidence and positive attitudes toward computers. Sex and age were not found to be significantly related to computer attitudes. However, the issue of gender and computer anxiety is a significant one; concern has been expressed that males are at an advantage in terms of computer access, sterotyping and role models. (Starker, 1983). Sex differences in attitude feelings and behaviors toward computers were investigated by Vrendenburg and others (1984). A self-report questionnaire was administered to 157 male and 305 female undergraduate students. In this study, females reported greater fear and less experience with computers than males. Both males and females felt that computers were male sex-typed. Some investigators have looked for a possible relationship between math anxiety (which is generally reported to be higher among females) and computer anxiety. Bellano and Winter (1985) examined possible relationships between computer anxiety, math anxiety and Holland types. They reported a "moderate" relationship between computer anxiety (as measured by Oetting's Computer Anxiety Scale) and math anxiety (as measured by the Math Anxiety Scale). They also found that Holland types that were artistic and social reported higher computer anxiety than the four other Holland types. Payton and Lloyd (1984) also report positive correlations between attitudes toward computers and attitudes toward math.

An every increasing number of courses incorporate computer literacy and/or applications into the syllabus. If this study finds that computer anxiety is related to the acquisition of computer knowledge, then educators

need to find effective means of reducing computer anxiety. In addition to the teaching of computer programing, computers are often used to deliver computer-assisted and computer-managed instruction. Computer literacy, remediation, drill and practice as well as the administration of educational programs are all or often delivered or supported via computer (Zahniser, 1983; Seeber, 1983).

METHODOLOGY

Study 1: Standardized measures of computer anxiety and computer knowledge (Montag, et al., 1984) were administered to 21 graduate students in instructional technology and to 22 graduate students in education. In addition, the Meyers-Briggs Type Indicator was administered to both groups in order to assess the relationship of personality type with computer anxiety and knowledge. The MBTI assesses personality preferences along four dimensions (Briggs, Meyers, 1977).

DESIGN

This descriptive study employed a multi-group pre-post design. Analyses were performed to answer the following questions:

1. As a result of exposure to computers, are there reductions in computer anxiety scores?
2. Is level of computer knowledge related to computer anxiety scores?
3. Does amount of computer exposure relate to computer anxiety scores?
4. Is personality type related to anxiety and gain in computer knowledge?

RESULTS

Table 1 indicates that group membership was significantly related to computer literacy. In addition, the negative correlation between post anxiety and literacy scores indicate higher anxiety scores are related to lower literacy scores. There was a significant relationship between pre-anxiety and post-anxiety scores.

Table 1

Relationships among group membership, pre and post anxiety scores and computer literacy.

	Group	Pre-Anxiety	Post-Anxiety	Literacy
Group	1.0	.04	-.23	.64*
Pre-Anxiety		1.0	.69*	-.2
Post-Anxiety			1.0	-.43*
Literacy				1.0

*p. $\leq$ .05

Multiple regression analysis utilizing group membership, pre and post-anxiety scores as predictors of computer literacy revealed a different pattern of over and under-prediction for each group.

Table 2

Calculated versus actual computer literacy scores number over and under predicted in each group.

Group	Underpredicted	Overpredicted
Education	9	13
Instructional Technology	12	9

Two-way ANOVA were calculated with computer exposure and personality types as the main effects indicated no significant F-ratios on post-anxiety scales. However, as one might expect, a significant F-ratio was indicated for computer literacy.

Study 2: Unlike the first study, undergraduates were administered only the anxiety scale. The subjects were 127 undergraduate students enrolled in the same course, "Fundamentals of Computing". The group's mean age was 24.7; 47 percent were males and 53 percent were females. Fifty-five percent reported having no previous course or workshop dealing with computers, while 29 percent reported one semester or less. Thirteen percent reported to have taken two or more semesters of coursework in computer science.

The Computer Anxiety Index (CAIN) was administered at the beginning and at the end of the course. the CAIN utilizes a self-report Likert type inventory. the CAIN also provides normative data on age, sex, and computer experience. CAIN provides a score range of 26-156, with higher numbers indicating more computer anxiety. The mean score among college students is reported to be 70.2; a score of 60 falls within the 62 percentile. (Montag and Simonson, 1984).

DESIGN

This descriptive study also employed a multi-group pre-post design. Analyses were performed to answer the following questions:

1. As a result of exposure to computers, are there reductions in computer anxiety scores?
2. Does the amount of computer exposure relate to computer anxiety scores?

3. Does sex relate to computer anxiety scores?

RESULTS

Analysis of pre-anxiety scores indicated a mean of 60.2, with a standard deviation of 15.6, falling in the 62nd percentile. Post-anxiety scores' mean was 61.7 with a standard deviation of 19.2. Calculation of T-tests and ANOVA yielded no significant differences in the pre-anxiety and post-anxiety scores of the subjects.

Calculation of Pearson correlation coefficients for pre-post anxiety sex, age and experience were performed. This analysis revealed no significant relationships between pre or post anxiety and sex. Significant correlations were found between age and experience and between experience and post anxiety scores. Older students reported less computer experience than younger students. Students who were more highly anxious generally had less experience than those who were not as anxious.

Table 3

Relationships among pre and post computer anxiety scores, age, sex and experience.

	Age	Experience	Pre-Anxiety	Post-Anxiety
Sex	.03	-.06	.13	.20
Age		-.44*	.18	.45
Experience			-.16	-.50*

*p. .01

Results of this study should be guarded. Administrative failure of some instructors to secure identification numbers reduced the sample size considerably from pre to post anxiety measures. Further studies are needed

in order to determine what effect this may have had upon results.

SUMMARY AND CONCLUSIONS

These pilot studies examined computer anxiety in relationship to the amount of experience and exposure of students. While the second study did not demonstrate a reduction of computer anxiety at the end of the course, it did lend support to the proposition that there is a significant relationship between computer anxiety and computer experience or exposure. This, of course, is not to be interpreted as a cause and effect relationship. In Study 1, the group with continuous exposure and hands-on-practice with personal computers showed greater reduction of anxiety scores and higher than predicted scores on a standard measure of computer literacy. The second study indicated a significant relationship between prior experience and reduction of computer anxiety scores. Older students were found to have less experience with computer training than younger students. No significant relationship was found between gender and computer anxiety.

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