BSN STUDENTS’ COMPUTER ANXIETY PREVALENCE AND
TEST SCORE OUTCOMES

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the research project of MICHELE ROSE DEAN find it satisfactory and recommend that it be accepted.

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Abstract
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The purpose of this study was to describe the prevalence of computer anxiety among Junior year, first-semester, Bachelor of Science in Nursing students and to look for possible relationships between computer anxiety levels and students’ online learning test scores. Data from a convenience sample of 95 beginning BSN students were analyzed utilizing SPSS 10.1. Findings demonstrated high levels of computer anxiety in 10% of the students. No statistically significant correlations were found between students’ on-line test scores and computer anxiety levels. Study results also demonstrated that students are able to self-identify their computer anxiety levels. Nurse educators are encouraged to evaluate students’ self-rated computer anxiety levels at the beginning of the semester. Vulnerable students can then be given the technological assistance necessary to decrease their anxiety related to computer use throughout their nursing program.
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BSN Students’ Computer Anxiety Prevalence and Test Score Outcomes

In 2002, 2.2 million college students were estimated as participating in online courses, an increase over the 710,000 enrolled in 1998, and this number is predicted to rise by 30% annually (Cuellar, 2002). Nursing programs across the country feel pressured to meet the demands of students requesting online courses (Cuellar, 2002). Most nursing schools are now incorporating some sort of computer related learning into their courses. Students new to this type of learning may not know what to expect, so anxiety levels related to computer use can be heightened. Computer anxiety has been defined as a reaction caused by the fear of failure when utilizing a computer (Hopson, 2001). Henry and Stone (1997) define computer anxiety as a condition that may lead to the resistance of information technology. Poor student performance and resistance to learning have been linked to computer anxiety (Desai, 2001). Students entering into nursing programs are already experiencing a great amount of pressure, and with the added possibility of computer anxiety their learning and experiences could be negatively affected (Sawatzky, 1998).

Computer Anxiety Background

State-Trait Theory and Computer Anxiety

The theoretical framework used for this study was developed from Spielberger’s (1970) theory of state-trait anxiety as applied to computer anxiety. The theory originally developed in the psychology arena, helped explain the anxiety process. Spielberger later applied his theory to areas such as test anxiety. State anxiety is defined as an emotional reaction related to the presence of a stressor. Trait anxiety refers to an individual’s predisposition for anxiety. State anxiety examines how anxious a person is at this
moment, while trait anxiety can be explained as how anxious one is generally (Jacobson et al., 1989). State and trait anxiety have been used throughout the literature to help explain computer anxiety (Desai, & Richards, 1998; & Howard, & Smith, 1986). Desai (2001) defines the two types of anxiety as: state anxiety, “which is caused by a current situation, and trait anxiety, which is the disposition to react with worry, tension and fear of failure in an evaluative situation” (p.2). The combination of a person’s predisposition to be anxious (trait) and their appraisal or fear of a stressor, such as using a computer to successfully complete an assignment (state) may lead to an individual’s increase in computer anxiety.

Gender Issues

Nursing students are particularly at high risk for computer anxiety because as a group they are predominantly female while the computer culture is still predominantly male (Jacobson et al., 1989). This is a concern when computer skills are becoming a necessity for all individuals to function successfully in their personal and professional lives (Vincent, Meche, & Ross, 2002). A 1991 study of computer anxiety levels in nursing students found 21% of the subjects demonstrating high levels of computer anxiety (Wilson). Of the 276 participants, 10% of the males and 24.7% of the females demonstrated high computer anxiety scores. Additional studies related to computer anxiety and gender include the study by Sternberger (1998) who found that female nursing students had more negative computer attitudes, higher levels of computer anxiety, and poorer on-line test scores in comparison to their male counterparts. Although the relationship between gender and computer anxiety is fairly complex, there is adequate
evidence to demonstrate that women have less confidence and increased anxiety when it comes to using computers (Hemby, 1999).

Contrary to the findings mentioned above, Otomo (1998) found no significant correlations between gender and computer anxiety for 153 community college students. Additional studies by Dyck and Smither (1994) examined older and younger adults to determine if relationships existed between gender, computer anxiety, and computer experience. With the effects of prior computer experience controlled, no gender differences in computer anxiety levels were found (Dyck & Smither, 1994).

Age Issues

The age of the computer user has also been examined as a predictor in assessing computer anxiety levels. The theory is that younger students have more exposure to computers and technology leading to lower levels of anxiety when using computers (Vincent et al., 2002). Additional studies have also suggested that younger students may feel more comfortable with computerized testing situations (Wingenbach, 2000; & Hemby, 1999). Dyck and Smither (1994) found that older students reported less computer experience when compared to younger students, but findings did not reveal higher levels of computer anxiety in the older student population. The research is inclusive with regards to age as a computer anxiety factor (Hemby, 1998; & Vincent et al., 2002).

Experience Issues

Experience with computers and computer confidence correlated with decreased anxiety levels in several studies (Bachman, & Panzarine, 1998; Jacobson, et al., 1989; Rovai, & Childres, 2002/2003; & Wilson, 1991). Butchko’s study of older verses
younger workers and their computer anxiety also demonstrated that computer experience, not age, predicts computer anxiety (2001). The research demonstrated a strong connection between increased computer use and lower levels of anxiety related to utilizing computers.

Student Performance Issues

Previous research findings have indicated a negative relationship exists between computer anxiety and performance (Bohlin, 2000; Desai, 2001; Dupin-Bryant, 2002; & Wingenbach, 2000). In a study of agriculture students’ computer skills and electronic exams, those who took a quiz using paper and pencil methods scored significantly higher than did those students who took the quiz in an electronic version only (Wingenbach, 2000). Additional research demonstrated increased computer anxiety and fear is associated with decreases in skill performance (Speir et al., 1995). Much of the research also correlated negative attitudes or opinions about computers with increased computer anxiety levels leading to decreased student performance (Bohlin, 2000; Desai, 2001; Lynch et al., 2000; Speier et al., 1995; & Wingenbach, 2000).

Nursing students experiencing computer anxiety may have trouble keeping up with the demands of their courses if they are computer or online based. According to Brod (as cited in Wilson, 1991), computer anxiety may be manifested as resistance to learning about and using computers or even complete rejection of computer technology. This finding supports other research that has demonstrated higher levels of computer anxiety negatively effect individual’s ability to use a computer and their computerized test scores (Anderson, 1996). With the trend in computer technology on the rise, nursing
students need to feel comfortable utilizing the computer to successfully progress through their program and function once they enter into the workforce.

**Summary**

No current nursing research was found that described the Bachelor of Science in Nursing students' computer anxiety levels. Nursing research in the general area of computer anxiety has been minimal over the last 10 years. The two dated articles found included a 1991 study titled Computer Anxiety in Nursing Students, located in the Journal of Nursing Education. The second article published in 1989, titled Computer Anxiety Among Nursing Students, Educators, Staff, and Administrators, was published in Computers in Nursing. Both the lack of current nursing research and the increase use of technology and computerized courses in nursing programs today strengthened the need for this study.

**Purpose**

The purpose of this descriptive correlational study was to describe the prevalence of computer anxiety among junior year, first-semester BSN students and to investigate possible relationships between student test scores and computer anxiety level. The following two research questions were proposed:

- What is the prevalence of computer anxiety among junior year, first-semester BSN students?
- What is the relationship, if any, between computer anxiety and student test scores?
Operational Definitions

Computer anxiety was measured using the Computer Anxiety Rating Scale (CARS). Heinssen, Glass, and Knight (1987) developed the scale in hopes of creating and validating a self-report measure of computer anxiety. The scale consists of 19, self-rating questions that assess an individual’s level of computer anxiety (Hopson, 2001). For each statement the participant must decide whether to disagree or agree using a 5-point scale. Higher scores indicate elevated levels of computer anxiety (Heinssen, Glass, & Knight, 1987).

Junior year, first-semester BSN students were those newly enrolled in a baccalaureate program, participating in an online research project as part of their informatics course in the fall of 2003. Semester one students were juniors beginning their nursing program.

Student test score refers to points earned from completion of a 10-question exam focusing on Microsoft Access skills. After studying an online learning module, students completed the Blackboard based quiz. Each question was worth one point, for a total possible score of ten.

Method

Design

A descriptive correlational approach was used. This design examines relationships and interrelationships in a particular situation in a short amount of time (Burns & Grove, 2001).
Sample

Participants included students from a Professional Development: Research and Informatics course offered in the fall of 2003, at a large baccalaureate program in the Pacific Northwest. In a required course, 5% extra credit was offered to volunteers for participating. Demographic data were completed by 93 of the 95 student participants. The 2 students who did not complete the demographic data survey did continue to participate in the study. The convenience sample consisted of 85 females (91.6%) and 8 males (8.4%). Eight-five percent of the sample were Caucasian (n=81), 5% Hispanic (n=5), 2% Asian American (n=2), 1 Native American, 1 West Indian, and the remaining 3% with mixed decent. Most participants were between 19-29 years of age (n=85). The rest of the sample fell between the ages of 30-39 (n=4), and 40-49 (n=4).

Approval for conducting the study was obtained through Washington State University's Institutional Review Board by the primary investigator. Written consent explained the study, assured participant' confidentiality, and provided students with information to contact faculty with any questions or concerns. Consent completion with student signature was required to begin study participation.

Measures

The Computer Anxiety Rating Scale (CARS) was the instrument used to measure anxiety levels related to computers. Heinssen, Glass, and Knight developed CARS in 1987, in hopes of creating a self-report measure of computer anxiety levels. The scale consists of 19, self-rating questions that assess an individual's level of computer anxiety (Hopson, 2001). For each statement the participant must decide whether to
disagree or agree using a 5-point Likert-type scale ranging from strongly disagree to strongly agree. Nine of the questions are positively worded and the remaining 10 items are negatively worded. Scores could range from 19-95. Higher scores indicate higher levels of computer anxiety, with scores above 55 or below 32 correlating with high and low computer anxiety levels (Heinssen et al., 1987).

Heinssen, Glass, and Knight’s initial trial of the Computer Anxiety Rating Scale resulted in high internal consistency with a Cronbach Alpha level of .87 (1987). The scale also demonstrated reliability (r= .70, p< .001) and stability (t= -1.06, p< .30) utilizing a test-retest interval of four weeks (Heinssen et al., 1987).

Demographic background information was obtained by completion of the online personal information survey. The primary researcher developed the 18-question survey. Age, gender, self-rated computer anxiety, general anxiety, and computer experience questions were included as part of the student demographic information questionnaire.

*Procedures*

Each student completed the Computer Anxiety Rating Scale, the database learning module, the test, and the personal information survey, on-line at a pre-arranged time at the college campus. Students signed up for 3-hour blocks during the first two weeks of the semester. All research data were collected on-line through the use of a Blackboard courseware. Students were instructed to access all surveys by entering the Blackboard web page and then the on-line directions.
Data Analysis

Data were analyzed using bivariate, Pearson Correlations and descriptive statistics on SPSS 10.1 for windows. The Cronbach Alpha level for the Computer anxiety rating scale was statistically calculated. The possible relationship between computer anxiety levels and student test scores were explored utilizing Pearson Correlations. Computer anxiety prevalence was calculated using descriptive statistics. Personal information including: age, gender, computer experience, general computer anxiety rating, and self-reported anxiety levels, were also analyzed against CARS scores by running Pearson Correlations (Burns, & Grove, 2001).

Findings

The Cronbach Alpha level for the CARS when utilized with this BSN student population was adequate at .8155. Descriptive statistics demonstrated that 10% (n=10) of the sample scored 55 or higher on the Computer Anxiety Rating Scale, indicating high computer anxiety levels. Results also demonstrated that 11 students scored below 32, demonstrating low computer anxiety levels. Scores ranged from 22-65, with a mean of 42.58, mode of 42, and a median of 42.

There was a strong correlation between students’ self report of computer anxiety and their scores on the Computer Anxiety Rating Scale (r=.510, p=.000). Pearson’s correlations demonstrated computer experience negatively correlated to CARS scores (r=-.379, p=.000). Students’ self reported anxiety ratings obtained from the demographic survey were found to correlate with CARS scores (r=.209, p=.045). Pearson’s correlations showed no significant relationships between the Computer
Anxiety Rating Scale and student test scores. No relationships were found between age or gender when compared to the CARS scores.

Discussion

The primary purpose of this study was to discover computer anxiety levels among junior year, first-semester BSN students, and to investigate possible relationships between student test scores and computer anxiety levels. High computer anxiety was present in 10% of the study sample. In a similar study of computer anxiety amongst nursing students, Wilson (1991) found high computer anxiety levels in 19% of the BSN students studied. Results of this study suggest that computer anxiety levels may have decreased over time in the BSN student population. Further support is demonstrated in this study by the 11% of participants scoring at the low end of the Computer Anxiety Rating Scale. This may be due to an increase in computer experience in this student sample. Other findings in this study support this observation by demonstrating a negative correlation between computer experience and computer anxiety levels \( r = -.379, p = .000 \). As students’ computer experience increased their computer anxiety levels decreased. This finding is consistent with that of Wilson (1991) who found that students who had increased hands on experience with computers had significantly lower computer anxiety levels. Students with more computer experience and exposure are more prepared and demonstrate better performance of computer tasks (Lynch et al., 2000).

These findings discredit the stereotype of the female nursing student having higher computer anxiety levels than her male counterpart. Previous research of the BSN population resulted in females having higher computer anxiety scores than the
males (Wilson, 1991; & Sternberger, 1998). Findings also support the idea that age does not necessarily indicate differences in computer anxiety levels. Age categories had no significant correlation with CARS scores. These findings suggest that gender and age have no predictive or correlational relationship with computer anxiety levels among BSN students, but that experience may make a difference.

Results demonstrated students’ ability to self-identify their computer anxiety levels. The 19-question CARS scores strongly correlated with the students’ self-rated computer anxiety levels taken from one question on the personal information survey (r= .510, p= .000). Students are able to rate their computer anxiety levels without taking the time required to fill out the Computer Anxiety Rating Scale. Findings suggest that nurse educators could ask students to answer the simple self-rated question related to computer anxiety at the beginning of a course rather than filling out a longer and more time consuming survey.

In contrast with much of the previous research, this study did not show statistically significant correlations between student test scores and computer anxiety levels. Computer anxiety levels may not have affected student performance in this study sample. One limitation of the study was that student performance was only measured once throughout the semester by the scores of the on-line exam. The test consisted of only 10 questions, which may have decreased the likelihood of the calculation of a significant correlation. This may not adequately measure student performance. Periodic measurement throughout an entire semester, or the utilization of an exam with a larger number of questions may produce different results.
Other study limitations include possible sample bias that would decrease generalizeability to other junior year, first-semester BSN student populations due to age, gender, and race differences that may not be covered through convenience sampling. Different institutions may have differing student bodies in terms of demographic characteristics. Students’ stress and anxiety levels may possibly have been elevated due to starting in the BSN program and this too could have altered their computer anxiety scores. Although the CARS has been used frequently with studies looking at undergraduate students it was not identified through a review of the literature in studies specific to nursing students. The undergraduate, junior year, first-semester BSN students at this institution, may possibly have differences from students previously studied utilizing this tool. The CARS dates back to 1987 and includes a question that discusses typewriters. The scale may not adequately measure computer anxiety levels of the twenty first century.

Summary and Recommendations

The findings of this study indicate that computer anxiety levels may have decreased over time in the BSN student population. Study results also suggest that computer experience may indeed decrease students’ levels of anxiety related to computer use. Nurse educators can ask students to self-identify their computer anxiety at the beginning of the semester to assist in identifying those at need for further technological assistance. Appropriate referrals for technological assistance can be made. Short seminars incorporating computer skills expected throughout the nursing program could be offered to these vulnerable students to increase their computer expertise. Encouragement of increasing hands on computer use should be
emphasized before entering into nursing programs to aid in decreasing students’
computer anxiety levels. Further research needs to be performed to broaden nursing’s
understanding of this topic, particularly because these study findings suggest that
student nurses’ anxiety levels related to computer use may be decreasing. Nurse
educators need to be able to develop appropriate interventions and curricular changes
for first semester BSN students that may also reduce the possibility of loss of students
from nursing programs due to computer use anxiety.
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