A study of end user anxiety and attitude in computer conferencing

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ABSTRACT

The purpose of this study was to assess the impact of Computer Conferencing (CC) train-ing and use on end users' computer anxiety level and general attitudes toward computers. The study was conducted for a four-month semester. Forty students from two sections of introduc-tory level Management Information Systems course participated in the study. Participants took the Computer Anxiety Rating Scale (CARS) at the beginning and at the end of the semester. Reactions to a Computer Conferencing survey was given at the end of the semester. Participants in each of the two sections were randomly assigned to small groups to do cases and problem-solving exercises using a closed computer conference. The results revealed that training and use of Computer Conferencing improved the anxiety level among participants who reacted posi-tively to the medium.

INTRODUCTION

Advances in software and hardware technologies are making it possible for researchers and managers to explore new ways to use the computer to promote collaboration, interaction, communication and group decision making. One computer tool which has emerged as a viable medium is Computer Conferencing. Despite the proliferation of computers, many people are anxious about using them (Glass & Knight, 1988; Heinssen et al., 1987). The recent rapid pro-liferation of computer technology has been accompanied by an increasing number of computerphobic individuals who are intimidated by or anxious about computers (Glass & Knight, 1988). Thirty-two percent of undergraduate students and 55% of an adult education sample reported that they have feelings of computer anxiety. Fifty percent of those undergraduate stu-dents were interested in a workshop to reduce computer anxiety (Heinssen et al., 1987). Com-puter anxiety is defined as changes in physiological measures, such as blood pressure and heart rate, which occur while working on a computer. "Computer anxiety involves a more effective response, such that resistance to and avoidance of computer technology are a function of fear and apprehension, intimidation, hostility, and worries that one will be embarrassed, look stupid, or even damage the equipment" (Heinssen, et al., 1987).

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COMPUTER ANXIETY RATING SCALE (CARS)

Computer Anxiety Rating Scale (CARS) is a popular instrument in assessing computer anxiety. It was developed and validated by Heinssen, Glass, and Knight in 1987. CARS is a 19-item self-report inventory, with nine positively-worded and ten negatively-worded items. Subjects respond to items on a 5-point scale (1 = strongly disagree; 5 = strongly agree), and responses to nonanxious items are later reversed before obtaining total scores. Scores can range from 19 to 95. The developers found CARS to have a mean of 43.58. The CARS items are:

1. I feel insecure about my ability to interpret a computer printout.

2. I look forward to using a computer on my job.

3. I do not think I would be able to learn a computer programming language.

4. The challenge of learning about computers is exciting.

5. I am confident that I can learn computer skills.

6. Anyone can learn to use a computer if they are patient and motivated.

7. Learning to operate computers is like learning any new skill--the more you practice, the better you become.

8. I am afraid that if I begin to use computers, I will become dependent upon them and lose some of my reasoning skills.

9. I am sure with time and practice I will be as comfortable working with computers as I am in working with a typewriter.

10. I feel that I will be able to keep up with the advances happening in the computer field.

11. I dislike working with machines that are smarter than I am.

12. I feel apprehensive about using computers.

13. I have difficulty in understanding the technical aspects of the computers.

14. It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.

15. I hesitate to use a computer for fear of making mistakes that I cannot correct.

16. You have to be a genius to understand all the special keys contained on most computer terminals.

17. If given the opportunity, I would like to learn about and use computers.

18. I have avoided computers because they are unfamiliar and somewhat intimidating to me.

19. I feel computers are necessary tools in both educational and work settings.

Experimental Design: A controlled quasi-experimental design (Campbell & Stanley, 1968) was used. In this design two experimental treatments are applied in a counterbalanced fashion in turn to two naturally assembled groups as depicted in Table 1.

Table 1. The Experimental Design

Case	Section 1	Section 2
1	Face-To-Face	Face-To-Face
2	Conferencing	Face-To-Face
3	Face-To-Face	Conferencing
4	Conferencing	Face-to-Face
5	Face-To-Face	Conferencing
6	Conferencing	Face-To-Face
7	Face-To-Face	Conferencing
8	Conferencing	Face-To-Face
9	Face-To-Face	Conferencing
10	Conferencing/Face-To-Face	Conferencing/Face-To-Face

Research Participants: At the beginning of the semester a total of forty-five under-graduate students enrolled in Section 1 and Section 2 of the Information Systems Concepts as a requirement of their degree programs. Five students dropped out leaving a total of forty partici-pants, twelve females and twenty-eight males with an average age of 20.25 years. Twenty-five of the participants were majoring in Business Administration, fifteen were majoring in Ac-counting. Eighteen of the participants enrolled in Section 1 and twenty-two enrolled in Section 2. Twenty-one juniors, fourteen seniors, and five sophomores participated and completed the experiment.

MUSIC Communications: The system provides several ways for groups and individuals to exchange information electronically using computer conferencing, electronic mail or elec-tronic bulletin boards. MUSIC/SP Conferencing Facility is an educational text-based synchro-nous computer conference that allows a group of users to discuss topics of mutual interest. The conferees can immediately start inputting comments and solutions to the issue under discussion. Every participant has a chance to view or add insights at his or her convenience. Each confer-ence is assigned a name by the owner of the conference who can designate the conference as either open (to any user) or closed (for a selected group of users). An electronic mail facility is available for sending and receiving mail for inside or outside the system. The facility provides tools to manage the user's incoming and outgoing mail. In addition the mail facility connects to the international academic electronic mail networks (BITNET and INTERNET). (MUSIC/SP Mail and Office Application Guide, 1992).

Experimental Setting: The study was conducted during the Fall 1993 Semester on two sections of Information Systems Concepts course. To avoid experimental contamination from environmental change (Kirlinger, 1975) the two participating sections were taught in the same room by the same instructor and used the same equipment.

Experimental Procedure: At the beginning of the semester participants were briefed about the nature of the study and its format, and were assured that any information they provided would be used for research purposes and that their identity would remain confidential. Feedback about the results was available to students late in the semester. Participants received credits for the class. In the first week each student signed a consent form, filed a demographic data form, and took the Computer Anxiety Rating Scale (CARS). Permission to use the CARS was earlier granted by Dr. R. K. Heinssen. In the second week participants were randomly assigned to small groups three to four members each. Participants stayed in the same group for the entire semester. They were given instructions on how to do the cases. In order to give group members an opportunity to socialize, the first case was assigned and done manually in the class without computer support, where group members used the traditional face-to-face discussion. The following week, participants were given handouts and hands-on training on how to use MUSIC communications. On-line help and laboratory consultants were also available for technical assistance. Several cases and problem-solving exercises were assigned during the semester. All groups were assigned the same case or exercise, and were given the same amount of time. Members of the same group received the same grade. Cases were done by groups using the traditional face-to-face method or a closed computer conference in a predetermined order. Access to the conference was limited to group members and the instructor who monitored the group discussions which resembled the nominal group technique. For the final case participants had to decide on what method to use and to explain the reason for their choice. Toward the end of the semester, participants took the Computer Anxiety Rating Scale (CARS) and the reactions to Computer Conferencing questionnaire.

RESULTS AND DISCUSSION

Computer Anxiety: Before the experiment students received a CARS mean score of 40.35, and 37.92 after the experiment. This represents an improvement (a decrease) in students' computer anxiety level and their attitudes toward computers and the medium. This improvement could be attributed to the hands-on training and use of Computer Conferencing through the experiment. Section 2 received a mean CARS score of 39 before the experiment, and a mean case score of 85.5% using Conferencing compared to 42 mean CARS score and 82.5% mean case score received by Section 1. This better performance by students in Section 2 could be attributable to their initial lower computer anxiety level.

The Final Case: The final case was used to assess student reactions to the medium. The method was optional--students had to decide whether to use Conferencing or the traditional face-to-face method and to explain why they chose one method over the other. Sixteen out of forty students used Conferencing and received a mean score of 95%. The rest used face-to-face method scoring 90%. Those who used Conferencing cited the following reasons for their choice: 1) using a nickname, 2) more participation, 3) it is fun, 4) it is user friendly, and 5) less domination.

Those who used face-to-face method cited the following reasons for their choice: 1) it is easier to talk than to type, 2) it is faster, 3) it is easy, 4) hard to think online, 5) easier to express ideas, and 6) more personal.

Survey Responses: The survey was given at the end of the experiment to determine participants' reactions to the medium. The survey used a Likert (1932) type questionnaire with scale answers. Respondents were asked to read the twenty-four statements and then decide their personal agreement or disagreement with the statement using a 1 to 5 scale where:

> 1 = Strongly Disagree
> 2 = Disagree
> 3 = Neither Agree Nor Disagree
> 4 = Agree
> 5 = Strongly Agree

Table 2 gives tabulated survey responses. When asked to list the most favorite part of the system, the students mentioned the following: 1) user friendly, 2) using a nickname, 3) easier instructor access, 4) ideas exchange, 5) its real life implications, 6) more participation, and 7) learning how to use the system.

For the least favorite part students listed the following: 1) hard to communicate feelings, 2) cannot work online, 3) slow, 4) impersonal, 5) typing, 6) domination, and 7) information overload.

An overwhelming majority of the respondents reacted positively to the medium. The majority of the students viewed the system as productive as evidenced by the mean response of 4 (agree) to the statement, "CC is productive." The respondents viewed the system as stimulating giving the statement "CC is stimulating" a mean response of 4.1 (agree). The statement "CC is fun" received a mean response of 4.5 and "CC is user friendly" received a mean score of 4.5, where 4 means agree and 5 means strongly agree. The majority of the respondents thought the system gave them more access to the instructor, giving the statement "CC gave me more access to the instructor" a mean response of 4.5. They also thought the system was appropriate for the course, giving the statement "CC is appropriate for this course" a mean response of 4.8. The statement "CC helped me participate more" received a mean score of 4.6. The majority of the respondents agreed or strongly agreed that the system is useful for information and opinion exchange. The majority agreed that the system enriched the quality of the course.

Table 2. Survey of User Reactions to Computer Conferencing (CC)

Statement	Response	
	Variance	Mean
1. CC is productive	.15	4.0
2. I do not like using the system because I cannot think on-line.	.25	3.0
3. CC is stimulating.	.15	4.1
4. I do not like the system because I do not like typing.	.75	2.0
5. CC is fun.	.20	4.5
6. I do not like using the system because it is slow.	.75	4.0
7. CC is time saving.	.50	3.0
8. I do not like using the system because I feel overloaded with information.	.75	3.0
9. CC is user friendly.	.25	4.5
10. CC is frustrating.	.75	2.0
11. I prefer CC to face-to-face communications.	.80	3.5
12. CC gave me more access to the instructor.	.20	4.6
13. CC is appropriate for this course.	.19	4.8
14. I would consider taking another course that uses CC.	.75	3.8
15. CC helped me participate more.	.75	4.5
16. CC is useful for information exchange.	.50	4.5
17. I do not like using the system because it is so hard to use.	.75	2.0
18. CC is useful for problem solving.	.10	4.0
19. CC is useful for opinion exchange.	.50	4.4
20. CC enriched the quality of the course.	.20	4.2
21. CC is useful for getting to know someone.	.75	2.2
22. CC is useful for getting feedback from the instructor.	.50	4.0
23. In CC the opportunity for someone to dominate discussion is limited.	.25	3.0
24. CC is useful for communication with others.	.25	4.5

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