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COMPUTER TRAINING AND COMPUTER ANXIETY IN THE EDUCATIONAL PROCESS: AN EXPERIMENTAL ANALYSIS

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ABSTRACT

The 1980s witnessed the widespread introduction of microcomputer technology into educational institutions and the workplace. Microcomputer software training has achieved mixed results due to both training methods and individual factors, such as computer anxiety. The present research addresses the topic of software training by presenting the results of two studies.

The first study validates a measure of computer anxiety, while the second study contrasts the effects of training method and computer anxiety on training outcomes. The training method demonstrated stronger relationships with training outcomes than did computer anxiety. In addition, the second study contrasted two training methods and found that training labelled as "play" resulted in enhanced training outcomes as compared with training labelled as "work."

1. INTRODUCTION

The importance of microcomputers in the educational process has received critical attention in recent years. Not surprisingly, only recently have academics acquired much of the needed computer facilities to teach microcomputer use and, therefore, have obtained only a limited knowledge of the role of microcomputers in the educational process. The majority of research to date has focused on implementation issues for instructors rather than on training students to use microcomputer technology (Borthick and Clark 1986). Similarly, the use of microcomputers in the workplace increased dramatically during the 1980s. However, the cost of training employees is exorbitant (Huber 1985) and organizations have become concerned with the effectiveness of these training programs (Brush and Licata 1983; Goldstein 1986). To date, there has been little research examining the effectiveness of training employees in the use of microcomputer technology.

The lack of effectiveness of training programs can be attributed, in part, to a lack of research and theoretical grounding (Baldwin and Ford 1988). However, past research points to the importance of both training design characteristics and individual characteristics (Noe 1986). Therefore, in line with past research, we explore the effects of a theoretically-grounded training approach (using the labels of work and play) and an individual characteristic (computer anxiety) on both performance and affective outcomes. In addition to establishing these relationships, we compare the relative effects of training method and computer anxiety on training outcomes.

2. RESEARCH MODEL AND HYPOTHESES

2.1 Training Approach

> Many given activities can, in principle, be approached as either toys or tools, and the manner in which we approach them may significantly affect our enjoyment of them (Malone and Lepper 1987, p. 235).

Our approach to training draws on the literature on social information processing and the literature on play. We propose that the labelling of training sessions as "work" or "play" affects the outcomes of training. More specifically, the research of Salancik and Pfeffer (1977; 1978) on social information processing (SIP) provides a method for enhancing microcomputer training. The Salancik and Pfeffer theory suggests that attitudes towards tasks may be influenced merely by the labelling of tasks by others (Staw 1984). The social context provides socially acceptable attitudes and it makes certain information more salient to the employee (Salancik and Pfeffer 1978). For example, in one study, managers used social information to change employees' perceptions of the job and the organization; for a control group of employees in the same job and organization, these perceptions were not changed (Griffin 1983).

Lieberman (1977) has extended this argument to play settings: she argues that social expectations will influence an individual's manifestation of play.

Organizational research confirms the influence of social information: Cellar and Barrett (1987), Glynn (1988), and Sandelands (1988) labelled the same task as either work or play. They found differences in such outcomes as intrinsic motivation and positive affect between the two conditions, favoring the play condition. Further, extrapolating from the literature on play, increased playfulness in computer interactions should result in individuals who (1) experience more positive affect, heightened concentration, and less awareness of the passage of time, (2) show more interest in these particular computer tasks, and (3) put more effort into learning new systems, learn more effectively, are more self-directed in their learning, and experience more control over the computer interaction.

The use of labels in SIP rests on the assumption that labels initiate cognitive categories. Cognitive categories are cognitive structures composed of fuzzy sets. These fuzzy sets consist of typical, or ideal, cases and fewer good examples: a robin may be the typical case of a bird, whereas a turkey represents a peripheral example (Fiske and Taylor 1984). Cognitive categories provide expectations that guide the understanding of new information (Fiske and Taylor 1984): they affect subsequent affect, attitudes, cognitions, motivations, and behaviors (Dutton and Jackson 1987; Glynn 1988). Since research has demonstrated that adults have separate cognitive categories for work and play (Glynn 1988), this paper proposes that labelling situations as play should encourage playfulness (and the resulting outcomes of playfulness, described below).

When would we expect this labelling to have an effect for microcomputer training? Glynn proposed that more ambiguous activities are more amenable to labelling as work or play. By labelling these ambiguous settings as play, we may encourage individuals to instantiate the cognitive category of play and therefore, we may encourage them to be more playful. For tasks or situations that are ambiguous, labelling them as play can influence individuals' interactions with them. Microcomputer training may represent one such ambiguous situation. To the extent that this training takes place outside of the normal classroom or workplace setting (for example, in training labs), trainers have the opportunity to label the training as either work or play.

By labelling these training sessions as play, positive outcomes should occur. The literature on play provides the basis for this assertion. Playfulness results in such immediate subjective experiences as involvement, positive affect (mood), and satisfaction, and longer-term consequences such as learning and the resulting productivity that can ensue from learning. Csikszentmihalyi's (1975) Theory of Flow provides the basis for understanding how playfulness influences these outcomes. This motivational theory is concerned with the subjective experiences of enjoyment during playful interactions with tasks. When in the flow state, individuals become absorbed in their activities, their focus of awareness is narrowed, and they experience a sense of control over their environments. This theory explains the occurrence of flow through the interaction of an individual's characteristics with the objective characteristics of the activity. The theory has found support in studies of diverse sets of individuals: rock climbers, composers, modern dancers, chess players, basketball players, surgeons, and managers.

Trainees who interact more playfully with a task should learn more than those who interact less playfully. Researchers studying play (e.g., Miller 1973) argue that, during more playful interactions with tasks, people exercise and develop skills through exploratory behaviors, resulting in enhanced task performance. For instance, Piaget (1962) argued that playfulness provides children with the opportunity to practice social, physical, cognitive, and emotional behaviors. Malone (1980) proposed that students will spend more time and effort in task performance when at play, will enjoy what they are doing more, will be more likely to use what they have learned, and will learn more effectively. Studies of children using computers have supported these results (e.g., Papert 1980; Turkle 1984).

We therefore propose the following hypothesis regarding training programs labelled as play versus work: trainees in the play training program will experience more positive outcomes than those in the work program. More specifically,

> **Hypothesis 1a**: Trainees in the play training program will be more satisfied than those in the work program.
>
> **Hypothesis 1b**: Trainees in the play training program will experience higher positive mood than those in the work program.
>
> **Hypothesis 1c**: Trainees in the play training program will experience higher involvement than those in the work program.
>
> **Hypothesis 1d**: Trainees in the play training program will learn more than those in the work program.
>
> **Hypothesis 1e**: Trainees in the play training program will perform better than those in the work program.

2.2 Computer Anxiety

As trainers develop innovative methods for integrating microcomputers into the workplace and the classroom, they also must recognize the relationship of the user's background to the learning process. For instance, despite the potential benefits of using microcomputers, such as enhanced individual performance and productivity, there is a significant literature base that deals with negative perceptions of computers, such as computer anxiety. In academic settings it is well known that stress and anxiety impair performance on intellectually-demanding tasks. These relationships suggest the importance of understanding the linkage between individual factors, such as computer anxiety, and training outcomes, such as satisfaction and performance.

Computer anxiety may be defined as "the tendency of individuals to be uneasy, apprehensive, or fearful about current or future use of computers" (Parasuraman and Igbaria 1990, p. 329). Some people exhibit anxieties around mechanical objects since these reflect competencies; computers may be even more challenging to these types of people (Turkle 1984). Hence, those low in computer anxiety are much more likely than those high in computer anxiety to perform better and to learn more when interacting with computer systems. For example, Heian and Michelman (1989) found a negative relationship between computer anxiety and both exam and course grades in an undergraduate accounting class requiring significant computer usage.

Although performance measures are key for understanding the relationships between training and learning, other outcomes such as satisfaction also may be important. A significant amount of management information systems research has examined user information satisfaction. For instance, in their examination of computer users, Howard and Smith (1986) found that anxiety influenced both satisfaction and performance. However, in contrast, in a class requiring significant computer usage, Heian and Michelman (1989) found no relationship between computer anxiety and satisfaction with the course.

We therefore propose the following hypotheses concerning computer anxiety and training outcomes:

Hypothesis 2a: There will be a negative relationship between computer anxiety and satisfaction.

Hypothesis 2b: There will be a negative relationship between computer anxiety and learning.

Hypothesis 2c: There will be a negative relationship between computer anxiety and performance.

2.3 A Comparison of the Effects of Training Approach and Computer Anxiety

As individuals become more familiar with computer systems, they become less anxious (Howard and Smith 1986; Igbaria and Chakrabarti 1990). Recent surveys on attitudes toward computers suggest that attitudes are shifting from the fearful and awesome aspects of computers to positive factors, probably due to increasing familiarity with computers. Similarly, Webster and Martocchio (1990) proposed that too much emphasis has been placed on the negative aspects of computers. Consequently, the play training approach emphasizes positive aspects of computers. We propose that such training approaches will have greater effects on training outcomes than will computer anxiety. More specifically:

Hypothesis 3a: Satisfaction will demonstrate a stronger relationship with the training approach than with computer anxiety.

Hypothesis 3b: Positive mood will demonstrate a stronger relationship with training approach than with computer anxiety.

Hypothesis 3c: Involvement will demonstrate a stronger relationship with training approach than with computer anxiety.

Hypothesis 3d: Learning will demonstrate a stronger relationship with the training approach than with computer anxiety.

Hypothesis 3e: Performance will demonstrate a stronger relationship with training approach than with computer anxiety.

3. STUDIES

Two studies address the hypotheses. First, even though a significant literature base on computer anxiety exists, recent surveys of the computer anxiety literature have demonstrated that much of the research is nonempirical (Glass, Knight and Baggett 1985) and that empirical studies developing scales to measure computer anxiety often are not theoretically grounded (Meier 1988). Furthermore, some studies have treated computer anxiety and computer attitudes as synonymous, while others have treated them as separate constructs (Parasuraman and Igbaria 1990). Therefore, our first study provides comparative validation information on computer anxiety measures.

Our second study investigates the role of computer anxiety and training approach in the learning process. More specifically, it compares the effects of two training methods (labelling training as play or work) on training outcomes and contrasts the relationships between computer anxiety and training outcomes with training approach and training outcomes.

Table 1 outlines the characteristics of these studies and the measures captured in each. Both studies took place in accounting classes in a large public university in the northeastern United States.

Table 1. Study Characteristics and Measures

Studies	1	2
Study Characteristics		
Study site	Classroom	Computer Training Lab
Sample Size (N)	158	49
Percent Male	53	51
Mean Age (Years)	23.1	21.7
Individual Difference Measures		
Computer Attitudes	X	
Computer Anxiety	X	X
Computer Experience	X	X
Outcome Measures		
Involvement		X
Positive Affect		X
Satisfaction		X
Learning		X
Performance		X

4. STUDY 1

The first study presents data on the validity of several computer anxiety scales. These data were collected as part of a larger study (Webster and Martocchio 1990) but not reported elsewhere. The results of this study provide a computer anxiety measure for the second study.

4.1 Participants

Participants from undergraduate accounting classes were asked to take part in this study. In total, 158 students volunteered.

4.2 Procedure

Undergraduate students in various accounting classes were surveyed in the classroom in the summer of 1989. Questionnaires were completed by participants during class time. Those students who volunteered received no course credit for participation and were guaranteed confidentiality. Although containing some common elements, the questionnaires varied in their content in order to keep questionnaire length short; consequently, sample sizes for the scales used were not equal.

4.3 Measures

4.3.1 Computer Anxiety

To assess construct validity, five measures of computer anxiety were utilized.

Computer Anxiety Diagnosis. Gardner, Render, Ruth, and Ross (1985) developed a self-report measure for diagnosing computer anxiety as part of a "Computer Interests/Concerns Questionnaire." Based on a series of diagnostic questions, individuals are classified as normal, anxious nonavoider, anxious avoider, or phobic (Elder, Gardner and Ruth 1987). For example, "A subject reporting panic, anxiety, avoidance and a particular combination of physical symptoms is diagnosed as phobic" (Elder et al. 1987, p. 18). Using the Elder classification scheme, we coded individuals as normal (1), anxious nonavoider (2), anxious avoider (3), or phobic (4). The Elder study found that females, older individuals, and clericals reported being more anxious than males, younger individuals, and professionals, respectively.

Computer Anxiety Rating Scale (CARS). Heinssen, Glass, and Knight (1987) developed a nineteen-item self-report inventory to measure computer anxiety. Participants respond on five-point scales (from strongly disagree to strongly agree) to nine positively-worded items and ten negatively-worded items, such as "I feel apprehensive about working at a computer terminal." Scores ranged from 19 (low computer anxiety) to 95 (high computer anxiety). The Heinssen study reported an internal consistency reliability of .87, and a test-retest reliability of .70 over four weeks. CARS correlated highly and positively with other anxiety measures, and negatively with computer attitudes, computer experience, SAT scores, mechanical interest, and expectations of performance on a computer task.

Personal Report of Computer Apprehension. Nykodym, Simonetti, and Christen (1988) developed a twenty-item self-report survey to measure computer anxiety. Subjects respond on five-point scales (from strongly agree to strongly disagree) to twelve negatively-worded and eight positively-worded items, such as "I would not like to do my work on a computer." Scores ranged from 20 (low computer anxiety) to 100 (high computer anxiety). The Nykodym study reported an internal consistency reliability of .89, and a negative correlation with computer experience.

Computer Aversion Scale (CAVS). Meier (1988) developed the thirty-one-item self-report CAVS based on Bandura's (1977) work on self-efficacy theory. The overall scale consists of three theoretical subscales, efficacy expectations, outcome expectations, and reinforcement expectations.

Meier developed the CAVS for use in the mental health area; consequently, the wording for several items was modified slightly and one of the thirty-one items was dropped. Participants indicate whether the items, such as "I'm afraid of computers," are true or false for twelve positively-worded and ten negatively-worded items. Based on a factor analysis, Meier identified a ten-item subscale called "Negative Feelings for Computers." This subscale was utilized here and is calculated by summing the ten items. Scores range from 0 (no negative feelings) to 10 (high negative feelings).

Meier reported an internal consistency reliability of .89 for the CAVS, a negative correlation with years of education, computer experience, computer attitudes, gender (female), and performance on a computer-based assessment test, and an insignificant correlation with social desirability.

One-item Computer Anxiety. We utilized a one-item measure for computer anxiety from Heian and Michelman (1989). It asked "Do you feel anxious about using the microcomputer?" on a seven-point scale (ranging from "not at all" to "to a great extent").

4.3.2 Computer Attitudes

Two measures of computer attitudes, Shaft's (1983) Computer Attitude Scale and Zoltan and Chapanis (1982) General Attitudes Scale were utilized.

Computer Attitude Scale. Shaft's seven-point semantic differential scale consists of eight pairs of adjectives, such as helpful-harmful. Scores range from 7 to 56, where high scores indicate positive attitudes and low scores indicate negative attitudes. Previous internal consistency reliabilities have ranged from .75 to .85. This scale relates to participant behaviors in managing an MRP system (Sharfman and Gleeson 1989) and to early adoption of an information system (Burkhardt and Brass 1990).

General Attitudes Scale. Zoltan and Chapanis developed thirty pairs of adjectives in a seven-point semantic differential format to measure general attitudes toward computers, such as efficient-inefficient. Their factor analysis of the scale resulted in six factors; here, we used the eleven pairs of adjectives making up the first factor. Scores, therefore, range from 11 to 77, where higher scores indicate positive attitudes. Zoltan and Chapanis found that experienced users were more likely to stress positive adjectives than were inexperienced users.

4.4 Computer Experience

Four items captured self-rated computer skills, computer experiences, and computer usage. For example, one measure of computer skills asked participants to rate their skill levels with personal computers on five-point scales ranging from very low to very high. These four items were summed to form a self-rated measure of computer experience.

4.4.1 Analysis

To shed light on the construct and content validity of the computer anxiety scales, we (a) calculated internal consistency reliabilities of the scales, (b) determined correlations of the scales with each other and with other related constructs, and (c) examined the appropriateness of the items making up the scales.

4.5 Results

Table 2 presents the Pearson correlations between the computer anxiety, attitude, and experience scales, and the internal consistency reliabilities for these scales.

Based on an examination of construct and content validity, we chose CARS as the most valid computer anxiety scale. Construct validity refers to the ability of the scale to measure the characteristic of interest (Ghiselli, Campbell and Zedeck 1981). Several methods exist to assess construct validity. One measure reflecting on construct validity is reliability. As Table 2 shows, those computer anxiety scales for which reliabilities could be calculated demonstrated high reliabilities. Another method of assessing construct validity is to ensure that the scale of interest correlates higher with scales measuring the same construct than with scales measuring different constructs (Ghiselli, Campbell and Zedeck 1981). Again, in general, the scales related strongly to each other and moderately to computer attitudes and experience.

More specifically, past research has demonstrated moderate correlations between computer anxiety and computer attitudes (e.g., Igbaria and Parasuraman 1989). Therefore, if correlations between anxiety and attitude scales are high, they may be measuring the same construct. Similarly, if the correlations are low, past research is contradicted. The correlation between CARS and general attitudes is moderate and in the expected direction (-.33). In contrast, some of the other anxiety scales showed low correlations with general attitudes (e.g., Computer Anxiety Diagnosis: $r = .02$) or stronger correlations (e.g., Computer Aversion Scale: $r = -.50$).

In addition, past research has demonstrated moderate correlations between computer anxiety and computer experience (e.g., Igbaria and Chakrabarti 1990). As individuals become more familiar with computer systems, they become less anxious (Howard and Smith 1986; Igbaria and Chakrabarti 1990). The correlation between CARS and computer experience is strong and in the expected direction ($r = -.56$) but smaller than its correlation with anxiety scales ($r = .70$ and .66 with two other anxiety scales). However, other anxiety scales demonstrate higher correlations with computer experience. For example, the Personal Report of Computer Apprehension relates more strongly to computer experience ($r = -.74$) than it does to other anxiety scales ($r = .58$ and .70 with two other anxiety scales).

Table 2. Study 1: Pearson Correlations between Computer Anxiety, Attitude, and Experience Measures

Measure	1	2	3	4	5	6	7	8
1. Computer Anxiety Diagnosis	N/A	–	.58***	.57***	.36+	-.29**	.02	-.38***
2. Computer Anxiety Rating Scale		.81	.70***	.66***	–	–	-.35**	-.56***
3. Personal Report of Computer Apprehension			.93	.80***	–	–	–	-.74***
4. Computer Aversion Scale				.80	.56**	-.52*	-.50*	-.67***
5. One-Item Computer Anxiety					N/A	-.48*	-.16	-.46*
6. Computer Attitude Scale						.82	.57***	.33**
7. General attitudes Scale							.88	.31**
8. Computer Experience								.68

Notes:
a. We used five different versions of the questionnaire, each containing different scales. Consequently, sample sizes were not constant across scales, nor were all combinations of scales present in each questionnaire. Therefore, some correlations are missing.

b. Reliabilities are on the diagonal

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

Content validity refers to the degree to which the scale's items measure what we want to them to measure. It is based on a subjective judgment of the appropriateness of the items (Ghiselli, Campbell and Zedeck 1981). For example, the scale should not confuse anxiety with attitudes. Whereas computer anxiety refers to apprehension about using computers, computer attitudes refers to affective or evaluative reactions toward using computers (Parasuraman and Igbaria 1990). When individual items making up the computer anxiety scales are examined, we concluded the CARS was content valid. In contrast, other scales contained items that referred to other constructs. For example, the CAVS contains the item "computers have no place in my profession," which taps an evaluative reaction rather than an apprehension.

5. STUDY 2

The second study compared the effects of two training approaches (labelling as play and work) and computer anxiety on training outcomes. In addition, it contrasted the relationships of training approach and training outcomes with computer anxiety and training outcomes.

5.1 Participants

Two sections of a managerial accounting course participated in this second study in the fall semester of 1989 [N=49]. Both sections of the course were taught by the same instructor; this instructor did not attend the training classes and was blind to the training approaches.

5.2 Procedure

Questionnaires encompassing individual-difference measures were completed by participants during class time. Those students who volunteered received no course credit for participation and were guaranteed confidentiality.

Subsequent to completing the questionnaire, students attended two hands-on training labs of two hours each on the use of Lotus 1-2-3. One section was randomly determined to be the play training condition and the other the work training condition. All training was conducted by one of the authors. (Although students were not randomly assigned to sections, we found no differences between the two sections: t-tests between the sections conducted on computer anxiety, computer experience, gender, age, grade point average, and a base-line Lotus 1-2-3 quiz were not significant.)

At the beginning of each training lab, we labelled the lab as play or work. We then taught identical concepts to each class, using the same numbers and calçulations in the examples. However, in the play labs, the example was called a Home-Entertainment Choice, whereas in the work labs, the example was called a Rent-Buy Decision. At the end of the second lab, students completed a questionnaire on such outcomes as satisfaction and mood and a quiz testing their learning. Again, those students completing questionnaires at the end of the lab received no course credit. The quiz did not count toward their course grade and was not made available to their instructor. Finally, students completed an individual Lotus 1-2-3 assignment on their own time.

5.3 Training Approach

How do we label training classes as work or play? As argued above, we can instantiate the appropriate cognitive category in trainees' minds by simply using these words (Glynn 1988). More specifically, both Sandelands (1988, p. 1036-1037) and Glynn (1988, p. 113) provide specific scripts for labelling situations as work or play. Drawing from their scripts, we designed a play script and a work script. For instance, we introduced the play training with the following script (changes for the work script are in brackets):

> In today's training **game** [exercise], we **would like** [expect] you to **think** of yourselves as **players of a game** [employees of an organization]. Please use this time **imaginatively** [efficiently] to **explore** [expand your knowledge of] Lotus 1-2-3. We **think** [fully expect] that you will **have fun with this game** [accomplish a lot in this exercise].
>
> Think of yourself as **playing with a puzzle** [solving a real problem for your employer]. Please **don't worry about making mistakes** [try to keep mistakes to a minimum].
>
> For those of you already familiar with Lotus 1-2-3, **we encourage you to** [it is important for you to] use the time today **freely** [productively] to **explore** [investigate] Lotus 1-2-3 further. Please **play around with** [work away at] the Lotus commands, while the rest of us **create** [produce] the following spreadsheet: **a home-entertainment choice** [a buy-rent decision].
>
> Please **be inventive** [set ambitious goals] during this **game** [exercise]. Be **flexible and relax** [purposeful and industrious]. **Enjoy yourself!** [Work hard!]

In addition, the trainer used condition-appropriate words throughout the training. Students were also given a two-page reference on Lotus commands. The reference was identical for the two conditions, except for the title. In the play condition, the reference was titled: "Quick Reference for Lotus 1-2-3 Training *Game*." In the work condition, the word exercise substituted for game.

Manipulation-Check of Training Approach. Glynn (1988, p. 205) presents a manipulation check to determine whether the labelling was successful. She developed a list of six items (three work-like and three play-like) to determine an individual's perception of an activity; the individual chooses the item most similar to the activity just completed (here, the training). Based on the choice, a dichotomous variable (0=work, 1=play) is created.

Computer Anxiety. We chose the CARS from Study 1. In the present study, a Cronbach's alpha of .90 was found.

Computer Competence. Two measures of computer competence were used. First, the self-rated computer experience measure developed in Study 1 was utilized. Second, as part of the initial questionnaire completed in the classroom, a fifteen-item base-line quiz measured knowledge of Lotus 1-2-3. For example, one item stated: "Which of the following symbols informs the software that a function is to be used? (a.) *, (b.) /, (c.) +, (d.) @." This multiple-choice quiz demonstrated a Cronbach's alpha of .84.

Involvement. Csikszentmihalyi (1975, p. 113) created an interview checklist to rate the "Intensity of Flow," or the incidence of individual experiences during playful activities (such as the loss of perception of surroundings, the reduction in thinking about other things, and so on). We used Webster's (1989) eleven-item self-rated "Intensity of Flow" scale developed from Csikszentmihalyi's checklist. Cronbach's alpha of .74 has been found for this scale (Webster 1989).

Positive Mood. Brief, Burke, George, Robinson, and Webster (1988) developed a Job Affect Scale (JAS) based on twenty markers of positive and negative affect described by Watson and Tellegen (1985). Participants indicate how they feel during the training session, by responding to such markers as "active," "calm," and "distressed" on five-point scales ranging from "very slightly" to "very much." The instructions for the scale were modified slightly to make them more appropriate for mood due to the activity of the training itself, rather than due to a pervasive mood state. In the present study, Cronbach's alpha was .71.

Satisfaction with Training. Ten items from the short form of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss et al. 1967) were modified to reflect satisfaction with training. For example, "the feeling of accomplishment I get from the job" was modified to "the feeling of accomplishment I get from learning Lotus 1-2-3," and "the way my boss handles his men" was changed to "the way the trainer handles his/her students." Items on the MSQ are rated using five-point scales ranging from very dissatisfied to very satisfied. For the present study, a Cronbach's alpha of .84 was found.

Learning. A fifteen-item multiple-choice quiz was designed for the end of the second training session to capture learning of the materials. For example, one item stated "If you copied the formula +$A$1*B1 from cell C1 to cell C2, the formula in C2 would be: (a.) +$A$1*B2, (b.) +$A$2*B2, (c.) +$A$1*B1, (d.) +$A1*B1, (e.) +$A1*B2."
The quiz had a Cronbach's alpha of .88.

Performance. To determine whether there was a carry-over effect from the training lab to actual performance with Lotus 1-2-3 outside the lab, students were given a take-home Lotus assignment. The class instructor designed this assignment that drew on the concepts taught in the training labs. The assignment required students to construct a twelve-month personal budget using absolute, mixed, and relative cell addressing where appropriate. Students were required to turn in their files, as well as a written assignment, so that the instructor could test the model's assumptions. Both the class instructor and the graders for this performance measure were blind to the conditions.

5.4 Analysis

To analyze hypothesis 1 exploring the relationship between training approach and training outcomes, we calculated an overall test using MANOVA. Given a significant overall test, we calculated individual ANOVA's for the outcomes in hypotheses 1a through 1e.

To analyze hypotheses 2a through 2c concerning the relationship between computer anxiety and training outcomes, we calculated simple correlations between computer anxiety and training outcomes.

To analyze hypotheses 3a through 3e that proposed a stronger effect for training approach than for computer anxiety on training outcomes, we compared the correlations of training approach and outcome variables with those of computer anxiety and outcome variables. However, these correlations are not independent. For example, the correlation between training approach and satisfaction is not independent of the correlation between computer anxiety and satisfaction because they both include the variable satisfaction. We therefore used Steiger's (1980) test for the equality of two dependent correlations, T_2, for the comparison.

5.5 Results

The manipulation check indicated that the training approaches were successful. More specifically, a Chi-square test of manipulation check by training approach was significant at the end of both the first and second training labs (Chi-square= 2.8 ($p < .10$) and 2.9 ($p < .10$), respectively).

Hypothesis 1 stated that trainees in the play training program would experience more positive outcomes than those in the work program. Because the outcome variables of involvement, positive affect, satisfaction, learning, and performance in hypotheses 1a through 1e are all hypothesized to be higher when playfulness is higher, they should be intercorrelated. Therefore, an omnibus test of these hypotheses was conducted. Because the MANOVA was significant (Wilk's $F (5, 34) = 3.10$, $p < .05$), individual ANOVA's could be conducted. Table 2 outlines the results of one-way ANOVA's conducted on training approach by outcome variable for hypotheses 1a through 1e. All hypotheses were supported. That is, those students in the play labs were more involved, reported higher positive mood, were more satisfied with the trainer, learned more, and performed better, than the students in the work labs.

Hypotheses 2a, b, and c proposed a negative relationship between computer anxiety and satisfaction, learning and performance. Consistent with Heian and Michelman (1989), the relationship between computer anxiety and learning was moderately supported ($r = -.28$, $p < .05$), but no relationships with either satisfaction ($r = .06$, n.s.) or performance ($r= -.09$, n.s.) were found.

Hypothesis 3 proposed that the training approach would have a larger effect on training outcomes than would computer anxiety. Using Steiger's (1980) T_2 test for dependent correlations, we found that the training approach demonstrated a stronger relationship than computer anxiety with satisfaction ($T_2 = 2.04$, $p < .05$), involvement ($T_2 = 3.58$, $p < .01$), positive affect ($T_2 = 2.44$, $p < .05$), learning ($T_2 = 3.41$, $p < .01$), and performance ($T_2 = 1.59$, $p < .10$). Therefore, hypotheses 3a through 3e were supported.

6. DISCUSSION AND CONCLUSIONS

This paper investigated the relationships of computer anxiety and training method with performance and affective outcomes. Study 1 validated a measure of computer anxiety, the Computer Anxiety Rating Scale (Heinssen, Glass and Knight 1987), while Study 2 contrasted the effects of training method with computer anxiety on training outcomes. The training method demonstrated stronger relationships than computer anxiety with training outcomes. In addition, Study 2 explored two training methods, and found that the training labelled as play resulted in enhanced training outcomes as compared with the training labelled as work.

6.1 Practical Implications

Although we conducted this research using accounting students, we believe that these findings have implications for organizations. We suggest that training approaches emphasizing the positive aspects of computers (such as the play training intervention) can result in enhanced productivity for organizations. More effective learning from such training approaches should lead to higher quality computer outputs or products. Further, this learning should translate into users who are better able to react to new situations or tasks. Consequently, Glynn (1988) and Starbuck et al. (1990) proposed that playfulness may result in individual and organizational creativity and flexibility. Therefore, organizations that encourage playfulness may be more adaptable to changing environments.

In addition, since playfulness results in higher positive mood, interest, and satisfaction, we propose that users will

Table 3. Study 2: Between-Group Differences on Responses to Training

		Training Approach					
		Work		Play			
Hypothesis	Training Response	Mean	SD	Mean	SD	d.f.	F
H1a	Involvement	24.5	3.6	26.9	3.6	(1,47)	5.4*
H1b	Positive Affect	28.8	6.9	32.4	4.3	(1,40)	4.3*
H1c	Satisfaction with Trainer	35.8	5.7	39.2	3.3	(1.41)	6.2*
H1d	Learning	8.6	2.2	10.1	2.0	(1,41)	5.4*
H1e	Performance: Assignment Grade	15.2	4.4	17.4	2.8	(1,46)	4.3*

* $p < .05$

want to interact with systems that encourage playfulness. Even though small positive relationships exist between satisfaction and such productivity measures as performance, turnover, and absenteeism, organizational researchers argue that effects do not have to be large in an absolute sense in order to produce meaningful economic consequences (Schneider 1985; Zedeck and Cascio 1984).

Finally, although a significant literature base exists on the negative aspects of computers, we propose that trainers focus on training approaches that emphasize the positive aspects of computers (such as the play training intervention), rather than on approaches that attempt to reduce anxieties. For example, some researchers suggest interventions in anxiety and stress management. However, an alternative explanation of the anxiety to learning linkage is that reported anxiety is simply a self-handicapping strategy that is used to mask effort and performance deficits (see Snyder and Smith 1982; Smith, Snyder and Handelsman 1982). In such circumstances, anxiety reduction might not improve performance as intended. Consequently, rather than focusing on anxiety-reduction techniques, we propose that trainers utilize training approaches that emphasize positive aspects of computers.

6.2 Research Implications

This research answers calls for the application of theoretical models to computer software training. More specifically, we respond to Kamouri, Kamouri and Smith (1986) for research in the area of exploration in computer-based learning, to Meier (1985) for research into interventions aimed at decreasing individuals' apprehensions about computers, and to Gist, Schwoerer and Rosen (1989) for studies addressing training in the use of computers.

This research extends previous research in several ways. First, most studies of the effects of labelling on ambiguous situations have used contrived, rather than real, phenomena (Dutton and Jackson 1987). Second, most studies of labelling situations as work or play have utilized experimental tasks, rather than real tasks. In contrast, this study examined students interacting with real tasks in ambiguous situations.

The implications for future research are threefold. First, we encourage the development of a more complete understanding of the role of individual background factors on the learning process. Other individual characteristics, such as computer efficacy (Gist, Schwoerer and Rosen 1989) or computer playfulness (Webster and Martocchio 1990), may have stronger relationships than computer anxiety with training outcomes.

Second, we suggest that empirical research on computer training using the play versus work approach be extended to employees. Support for this extension to adults in work situations comes from Lieberman's (1977) review of empirical studies of task performance in play situations. She concluded that play encourages task performance in all ages. Similarly, in the Carroll and Mack (1984) protocol analysis of naive users of computers, they concluded that the capacity to treat work as play characterizes successful adult learners and problem solvers. Finally, Schuck (1985) proposed that serious negative consequences for employee learning result when managers demand that their employees do not play.

Finally, future research should explore the influences of employees' expectations on training outcomes. That is, employees may have preconceived expectations of what to expect during training sessions. These expectations may have more powerful effects than the labelling of the training session. For example, Erikson (1972) suggested that the working adult views play as recreation and separate from work. Some argue that adults view play as hedonistic and decadent (Csikszentmihalyi 1975); that they repress childhood pursuits (Erikson 1972); that socializing agents such as schools have inhibited curiosity and play (Miller 1973; Voss 1987); or that our puritan society views play as inferior to work (Ellis 1973). Consequently, employees may have preconceived expectations about training sessions conducted at work that are less amenable to labelling than are students' expectations.

In conclusion, findings from the present research will enable educational institutions and organizations to design more effective computer training programs that will enhance learning. In organizations, enhanced employee learning, in turn, will support human resource management strategies necessary to maintain competitive advantage (Schuler 1989; Schuler and Jackson 1987).

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