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Abstract
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Successful integration of CAI (computer-assisted instruction) into Cooperative Extension in-service training programs requires acceptance of CAI by staff. This study examined Extension agent attitudes toward paired/cooperative CAI. Subjects were thirty Pennsylvania Extension agents. A one-group pretest-posttest design was used. Subjects completed attitude surveys before and after using a CAI tutorial with a partner on "proper water well location and construction." Although subjects' overall attitudes toward CAI became more favorable following CAI use in pairs, the difference was not significant. However, on the two subscales measuring comfort and creativity, subjects attitudes toward CAI became significantly more favorable.

Introduction

The potential benefits of computer-assisted instruction (CAI) include accommodating individual learning differences and time schedules, simulating work experiences, giving immediate feedback, making training supervisors more available, and incorporating interaction and multisensory communication with the learner (Kamouri, 1984). The corporate sector is taking advantage of these benefits. A survey by *Training* magazine of companies with 100 or

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more employees found that 58 percent used CAI in their training programs (Froiland, 1993). However, the use of computers as isolated teaching machines—and not as part of a group-oriented learning strategy—is often criticized because computers cannot provide the warmth and social interaction possible when groups of people work together (Sheckley, 1986).

This perceived lack of warmth may explain why Bergsrud, Casey, and Krueger (1989), in a national needs assessment of water quality training for Cooperative Extension, found that agents did not name computer-assisted instruction as a preferred method of receiving in-service training. When asked to describe successful in-service training, agents indicated that they liked interaction with other agents, that training in group meetings was more productive than independent study, and that group sessions created motivation and inspired enthusiasm that is difficult to acquire in self study. Given this assessment, how can Cooperative Extension reap the benefits of CAI while still providing in-service training that meets the expectations of agents?

Naisbitt (1982) advised that whenever organizations introduce new technology, they should build in a high-touch component, that is, a means of satisfying people's desire for human interaction. If the high-touch element is lacking, people will either develop their own mechanism for meeting this interaction need, or they will reject the technology. This strategy of balancing high-tech components with high-touch ones has applicability to instructional settings.

Using microcomputers in high-tech/high-touch combinations addresses many of the criticisms levied against them and markedly enhances their use in continuing education programs (Sheckley, 1986). A high-tech/high-touch approach to instruction combines the use of electronic technology such as computers with a high-touch setting that provides opportunities for students to meet their affective needs. One high-touch arrangement that may produce synergistic effects when combined with the computer is cooperative learning. The cooperative learning setting can be distinguished from other learning settings by the type of interaction among students. In cooperative group settings students interact with each other while working together to complete tasks. This type of interaction is in contrast to the usual instructional setting where students receive instruction in large groups. In this situation most interaction is between the teacher and students (Webb, 1982).

Cooperative CAI involves the instructional use of the computer combined with cooperative learning groups (Johnson & Johnson, 1986). In highly structured cooperative learning settings, instructors select activities that lend themselves to collaboration, students are

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instructed how to work cooperatively, and rewards are based on group accomplishments. In less structured settings, students may simply work together with one or more other students while using CAI. When students work in pairs or small groups, CAI is at least as effective and often more effective than when used individually (Carrier & Sales, 1987; Dalton, Hannafin & Hooper, 1989; Johnson, Johnson & Stanne, 1985, 1986; Justen, Adams, & Waldrop, 1988; Justen, Waldrop, & Adams, 1990; Mevarech, Silber, & Fine, 1991; Mevarech, Stern, & Levita, 1987; Shlechter, 1990).

Research results regarding learner attitudes toward cooperative CAI are mixed. Johnson et al. (1986) showed that students who worked in groups, either cooperatively or competitively, had more positive feelings about computers than did those who worked individually. Mevarech et al. (1987) demonstrated that cooperative CAI students had more positive attitudes toward cooperative learning than did individual CAI students. However, cooperative CAI students did not have greater positive attitudes toward CAI. Dalton et al. (1989) found no significant difference in attitude toward instruction and lesson content between students using CAI cooperatively and those using it individually. Justen et al. (1988) found that students preferred using drill and practice CAI individually rather than with other students. In that study, students who used CAI both individually and in groups showed a significant increase in their favorable attitude toward CAI. The influence of cooperative CAI on learners' attitudes toward CAI needs to be clarified, especially from the perspective of adult learners. The above studies focused on students in formal educational settings, not adult learners in nonformal settings.

Purpose

The purpose of this study was to determine what effect using paired/cooperative CAI had on Cooperative Extension agents' attitudes toward CAI. Agents' attitudes toward CAI were examined before and after their use of paired/cooperative CAI.

Methods and Procedures

The study used a one-group pretest-posttest design. The dependent variable was agents' attitudes toward CAI and the treatment variable was agents' use of CAI in a paired/cooperative mode. Attitude toward CAI was measured by a 14-item, 7-point semantic differential scale developed by Allen (1986). The instrument contains 14 bipolar adjective pairs (Table 1). Scores for each bipolar scale range from 1 to 7, with 1 representing the most negative attitude and 7 the most positive. Allen provided evidence of content validity and reliability as well as a description of the instrument's

development. The instrument also contains subscales measuring comfort, creativity, and function. In the present study the reliability coefficient alpha for the instrument was .90. Subscale reliabilities were: comfort =.88, creativity=.58, and function=.81.

TABLE 1: Bipolar Adjectives Used in the Semantic Differential Attitude Scale
(Adapted from Allen, 1986)

Subscales		
Comfort	Creativity	Function
Pleasant-Unpleasant	Flexible-Rigid	Useful-Useless
Comfortable-Uncomfortable	Stimulating-Boring	Valuable-Worthless
Nonthreatening-Threatening	Creative-Unimaginative	Efficient-Inefficient
Easy to control-Overpowering	Personal-Impersonal	Time saving-Time consuming
		Meaningful-Meaningless
		Appropriate-Inappropriate

Thirty Penn State Cooperative Extension agents—26 males and 4 females—who attended a week-long in-service training program on basic water quality principles were subjects in the investigation. Years of Extension experience ranged from 1 year to 34 years with a mean of 12.6 years. Agents' ages ranged from 27 years to 60 years, with a mean age of 42. Twenty-four percent of the agents had no previous experience using CAI. Ninety-three percent of the agents had used CAI five or less times.

The day preceding the study agents completed and returned the CAI attitude measure and a brief questionnaire soliciting demographic and background data. Individuals who indicated that they had low or high familiarity with the topic were assigned to heterogeneous pairs. Individuals with a moderate level of familiarity with the topic worked in homogeneous pairs.

The investigation was conducted as an evening activity on the second day of the in-service week. A large computer lab was used. The CAI courseware was a tutorial unit designed by the investigators covering bacterial contamination of water supplies. The unit contained several modules that agents could select from a menu after completing the introductory module. Before beginning, reasearchers gave subjects brief instructions on how to work cooperatively. Subjects were advised to work as a team and help each other learn. Specifically, they were encouraged to summarize the content appearing on the screens for each other's benefit, discuss practice questions fully and agree on answers before responding, and ask

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their partners to explain items they did not understand. The session was scheduled for one and a half hours, but subjects were free to leave after completing the unit. Before leaving, subjects were asked to complete the attitude survey again. Data were analyzed using paired t-tests (two tailed).

Findings

Following agents' experience with paired/cooperative CAI, agents' rating of CAI became more favorable (from a mean of 4.8 to mean of 5.1), but the difference was not significant at the *a priori* level of .05 ($t = 1.77$, $df = 29$). On the function subscale, there was no difference between pre-study ratings of CAI and ratings following use of CAI in a paired/cooperative mode. However, ratings on both the comfort and creativity subscales became significantly more favorable following the paired/cooperative CAI experience. Table 2 summarizes these results.

TABLE 2: Results of t-Tests Comparing Attitude Toward CAI Before and After Using CAI in a Paired/ Cooperative Mode

	Pre-Use $N = 30$		Post-Use $N = 30$		
	Mean	SD	Mean	SD	t
Complete Scale	4.8	0.93	5.1	1.04	1.77
Subscales					
Comfort	4.9	1.28	5.5	1.15	2.82*
Creativity	4.4	0.94	5.0	1.04	2.73*
Function	4.9	1.03	4.9	1.88	- 0.15

Note: A 14-item, 7-point semantic differential scale was used to measure attitude with 7 representing the most favorable attitude and 1 the least favorable attitude.

Conclusions and Discussion

In general, agents in this study held a favorable attitude toward CAI both before and after a paired/cooperative CAI session. Subscale measures of comfort, creativity, and function also revealed favorable attitudes toward CAI. Although there was no significant change in agents' general attitude toward CAI or in agents' ratings of CAI on the function subscale following paired/cooperative use of CAI, agents' attitudes toward CAI on the comfort and creativity subscales became significantly more favorable.

Because a control group that worked individually on CAI is not available for comparison, it is not clear to what extent the post-CAI attitudes were influenced by the fact that agents worked cooperatively in pairs. Other factors, such as the characteristics of the courseware, may have affected the attitude ratings. Nevertheless, agents held positive views about CAI following their experience with paired/cooperative CAI.

CAI should be considered when choosing methods of providing in-service training to Cooperative Extension agents. Although agents entering in-service training may hold attitudes that are already favorable toward CAI, agent's acceptance of CAI may be further enhanced by using CAI in a paired/cooperative mode. An additional benefit of paired/cooperative CAI over individual CAI is that twice as many learners can be accommodated with a given number of computers. Paired/cooperative CAI is a high-tech, high-touch combination that permits Cooperative Extension to take advantage of the capabilities of CAI and provide in-service education that is consistent with agents' affective desires.

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