Effects of Cooperative Learning and Need for Affiliation on Performance, Time on Task, and Satisfaction

☐ James D. Klein
Doris R. Pridemore

The purpose of this study was to investigate the effect of cooperative learning and the need for affiliation on performance, time on task, and satisfaction. Subjects used either a cooperative or individual learning strategy while receiving information, examples, practice, and feedback from an instructional television lesson. Results indicated that subjects who worked cooperatively spent more time working on practice exercises and reported greater satisfaction than those who worked individually. In addition, results revealed an interaction between instructional method and the need for affiliation. Performance of subjects with a high need for affiliation who worked alone was lower than that of all other groups when subjects were asked to apply what they had learned from the lesson. Implications for employing cooperative groups in settings that were originally designed for individual learning are provided.

☐ Over the past several years, a number of researchers have examined the effect of cooperative learning on student performance and motivation. These studies often compare cooperative learning with individual learning. In cooperative settings, students work together to increase performance and achieve shared goals; in individual settings, students work by themselves to accomplish their own goals (Johnson & Johnson, 1989). Reviews of research suggest that cooperative learning positively affects student achievement, productivity, transfer of learning, time on task, and attitude (Johnson & Johnson, 1989; Rysavy & Sales, 1991; Sharan, 1980; Slavin, 1990).

The success of cooperative learning has prompted instructional technologists to examine the effect of employing cooperative groups in settings originally designed for individual learning. Several studies have been conducted recently to examine cooperative learning and computer-assisted instruction (CAI). Results of these studies are mixed. Some researchers report that cooperative learning positively affected performance in CAI lessons (Dalton, Hannafin, & Hooper, 1989; Johnson, Johnson, & Stanne, 1985). Others have not found a significant effect for performance when learners used cooperative CAI (Carrier & Sales, 1987). These differences in findings could be due to the types of learners who participated in each study.

Researchers have reported that student characteristics impact performance and motivation in cooperative CAI studies. Factors such as gender and ability have affected outcomes in some of these studies (Dalton et al., 1989; Hooper & Hannafin, 1991; Johnson et al., 1985; Webb, 1982, 1989). Other studies suggest that individuals' motivational characteristics may influence how they perform in cooperative settings. Using the California Psychological Inventory, Sutter and Reid (1969) found that cooperative CAI is better for students with high levels of sociability (i.e., those who are outgoing, sociable, and have a participative temperament), while individual CAI is better for students who are introverts.

One characteristic that may influence outcomes in a cooperative learning setting is the need for affiliation. According to Johnson and Johnson (1989), some individuals are more predisposed to act cooperatively; such people prefer cooperative settings over individual settings. The need for affiliation is represented by a desire to participate in cooperative, noncompetitive activities and by a desire for close, friendly relationships with others (McClelland, 1965, 1976). Individuals with a high need for affiliation are more friendly, sociable, and cooperative than those with a low need for affiliation (Jackson, 1974). Motivational design theory suggests that students should be provided with opportunities for cooperative interaction to satisfy the need for affiliation (Keller, 1983).

The purpose of the current study was to examine the effect of cooperative learning and the need for affiliation on performance, time on task, and satisfaction. Studies have been conducted to investigate cooperative learning in the computer medium. However, little work has been conducted to examine the effect of using cooperative learning with other media originally developed for individuals. Adams, Carson, and Hamm (1990) suggest that cooperative learning can influence attention, motivation, and achievement when students use the medium of television. These authors indicate that "cooperative strategies which engage students in examining, comparing, clarifying and evaluating enhance individual experiences" (p. 39).

In this study, subjects used either a cooperative or individual learning strategy while receiving instruction from a television lesson. The independent variables were instructional method (individual or cooperative) and need for affiliation (high or low). The dependent variables were performance, time on task, and satisfaction. It was hypothesized that students with a high need for affiliation who worked cooperatively would perform better and report greater satisfaction than students with a low need for affiliation who worked cooperatively. Furthermore, it was expected that students who worked cooperatively would spend more time on task and report greater satisfaction than subjects who worked alone, regardless of their need for affiliation.

METHOD

Subjects

Subjects were 55 undergraduate education majors (8 males and 47 females) enrolled in a required course in educational psychology at a large southwestern university. Subjects were randomly assigned to one of two treatments—cooperative or individual learning strategy—and were assigned to one of two need for affiliation categories—high or low. Group sample sizes ranged from 12 to 15: 12 subjects in the individual learning/low-affiliation group, 15 in the individual learning/high-affiliation group, 15 in the cooperative learning/low-affiliation group, and 13 in the cooperative learning/high-affiliation group. The small variation in group size was due to random assignment of subjects to the cooperative or individual treatments prior to assigning each subject to a need for affiliation category.

Materials

Materials used in this study were an instructional television lesson, a need for affiliation scale, an instrument to measure time on task, a measure of student satisfaction, and a posttest.

The instructional television lesson was from the series *Instructional Theory: A Nine Unit Mini-Course* (Gerlach, 1973). The lesson included a videotape and a workbook that provided instruction on the topic of objectives-based assessment. The videotape was divided into seven segments which presented information and examples on the content of the lesson. The length of the videotape portion of the lesson was approximately 30 minutes.

After each segment, the videotape instructed subjects to turn to their workbook for practice and feedback on the content presented in that segment. For example, Segment 4 provided instruction on the use of paper-and-pencil tests, interviews, and observations of student performance or products. After providing information and examples of these three types of objectives-based assessment, the videotape presented three instructors who wished to evaluate a student's work of sculpture. The videotape then directed subjects to "Turn to Exercise 4 in your workbook," where they were asked to "Describe the best type of objectives-based assessment for this situation." The following page of the workbook provided written feedback on this practice item.

The affiliation scale of the Personality Research Form–E was used to measure need for affiliation. This scale consists of 16 items that measure the degree to which an individual is motivated to affiliate with others. A true/false format is used to indicate whether or not a person agrees with statements such as "Sometimes I have to make a real effort to be social" and "I spend lots of time visiting friends." According to Jackson (1974), a high score on this scale suggests that the individual enjoys being with other people, accepts people readily, and makes an effort to have friends and maintain associations with others. Norming data indicate that the mean for this scale is 8.6 (SD = 3.35) and that the internal consistency reliability is .86 when used with college students (Jackson, 1974). For subjects in the current study the mean was 10.02 (SD = 3.71), and the range was 1–16.

A median split was used to assign subjects to high and low categories of the need for affiliation. Subjects with scores at or above the median (Md = 11) were assigned to the high-affiliation category (n = 28) and those with scores below the median were assigned to the low-affiliation category (n = 27). The mean for subjects assigned to the high-affiliation group was 12.86 (SD = 1.9) and the range was 11–16. The mean for those assigned to the low-affiliation group was 7.07 (SD = 2.67) and the range was 1–10.

A record-keeping sheet was developed by the authors to measure time on task during the practice portion of instruction. This was used to record the time that subjects started and ended each of the seven practice exercises. Total time on task was calculated by adding the length of time spent on all practice exercises. Time on task was reported in minutes and seconds.

Satisfaction was measured using the Instructional Materials Motivation Scale (IMMS), subscale S (Keller, 1987). This subscale consists of six questions that measure student perceptions toward the motivational characteristics of instruction in the affective area of satisfaction. A five-point Likert scale is used to answer the questions:

1. Participating in the activity gave me a satisfying feeling of accomplishment.
2. The practice and feedback in the lesson helped me feel satisfied while participating in the activity.
3. I enjoyed the activity so much that I would like to learn more by participating in a similar type of activity.
4. I really did not enjoy the activity.
5. It felt good to successfully complete this activity.
6. It was a pleasure to work on such a well-designed activity.

The Cronbach alpha internal-consistency relationship reliability estimate of this subscale is .92 (Keller, 1987).

Performance was measured using a 15-item constructed response posttest. The items were developed to evaluate student mastery of the instructional objectives for the lesson on objectives-based assessment. The posttest measured both application and knowledge of the lesson content.

The application test consisted of ten items. Individual answers were checked against a scoring key and were scored as either right

or wrong. One person scored all of the items on this test. The maximum score on this portion of the posttest was ten points. The internal-consistency reliability of the application test was .81. Following is an example of an application item:

An industrial technology instructor is teaching his students to adjust a communications receiver so that the sound is of certain minimum quality, at the very least. How should he test for the attainment of this objective?

The knowledge portion of the test consisted of five items. The maximum score on this portion of the posttest was ten. Individual answers were checked against a scoring key and points were assigned for each answer. Partial credit was given for questions that required a multiple response, such as "List three types of objectives-based assessment." One person scored all of the items on this test. The internal-consistency reliability of the knowledge test was .69.

Procedures

Subject participation was solicited several weeks prior to the study. Each subject was required to choose one of ten time periods to participate in the study. Upon arrival to the study site, subjects were randomly assigned to one of two treatment conditions, one which required subjects to work individually during the lesson and one which required subjects to work in dyads. Subjects in each treatment condition participated in the study in separate rooms; each room had more than one individual or dyad present at a time.

Subjects in both treatment conditions were informed that they would be viewing an instructional television program on objectives-based assessment and that they would be using a workbook to receive practice and feedback on the content of the lesson. In addition, all subjects were told to write the answer to each practice exercise in the workbook and read the feedback that followed each exercise.

Subjects received specific directions for implementing individual versus cooperative strategies. Subjects who would be working alone were given a workbook, instructed to work independently during the lesson, and told to do their best work. Subjects who would be working in dyads were randomly assigned a partner. Each dyad was given a workbook and told to (a) work together during the lesson, (b) discuss all practice exercises and any disagreements over the answers, and (c) discuss the given feedback.

After the above instructions were provided, the videotape was started for each treatment condition. When Segment 1 was completed, the tape was stopped and subjects completed Exercise 1. When subjects indicated that they were ready, the videotape was started again. Time on task was recorded during each lesson section. This cycle was continued until all seven segments of the lesson were completed. Upon completion of the activities, all workbooks were collected and each subject individually completed the affiliation scale and the satisfaction questionnaire. One week later, all subjects were given the posttest and were required to work individually to complete it. Subjects in both groups were tested together in the same room.

Design and Data Analysis

A 2 × 2 factorial design was used, with instructional method—individual or cooperative—and need for affiliation—high or low—as the independent variables. The dependent variables were performance, time on task, and satisfaction.

Multivariate analysis of variance (MANOVA) was used to test for an overall difference between groups on the posttest. This analysis was followed by univariate analyses on the knowledge and application portions of the posttest. MANOVA was also used to test for an overall difference between groups on the satisfaction scale. This analysis was followed by univariate analyses on the individual satisfaction items. Analysis of variance (ANOVA) was used to analyze data from the time on task measure. Alpha was set at .05 for all statistical tests. Effect size estimates *(ES)*, expressed as a function of the overall standard deviation, were also calculated (Cohen, 1969).

RESULTS

Performance

Performance was measured using the 15-item, constructed response posttest. The posttest measured both knowledge and application of the lesson content. Mean scores and standard deviations for both portions of the posttest are given in Table 1.

MANOVA revealed a significant interaction between instructional method and the need for affiliation, $F(2, 50) = 3.63, p < .05$. Univariate analyses revealed that this interaction was significant for the application portion of the posttest, $F(1, 51) = 3.86, p < .05, MS_e = 1.87$, but not the knowledge portion. To determine the nature of this interaction, a post hoc analysis of the simple main effects was conducted using Scheffé's method of multiple comparisons (Ferguson, 1981). This analysis indicated that performance of subjects with a high need for affiliation who worked alone was significantly lower than that of all other groups on the application portion of the posttest (see Figure 1).

In addition to the interaction, results of the MANOVA indicated a significant main effect for the need for affiliation, $F(2, 50) = 4.08, p < .05$. Univariate analyses revealed that performance of subjects with a low need for affiliation was significantly better than that of subjects with a high need for affiliation on the application portion of the posttest, $F(1, 51) = 4.14, p < .05, MS_e = 1.87, ES = .03$. The MANOVA did not reveal a significant main effect for instructional method.

Time on Task

Time on task was measured by determining the amount of time subjects spent working on all practice exercises. Mean scores and standard deviations for time on task are given in Table 2. ANOVA revealed that type of instructional method had a significant effect on time on task, $F(1, 51) = 68.03, p < .001, MS_e = 15.21, ES = 1.48$. Subjects who worked cooperatively spent more time working on the practice exercises ($M = 22.84, SD = 5.02$) than those who worked individually ($M = 13.92, SD = 2.66$). Results also suggested that subjects with a low need for affiliation spent more time on task ($M = 19.47, SD = 3.72$) than those with a high need for affiliation ($M = 17.22, SD = 3.78$), $F(1, 51) = 4.61, p < .05, MS_e = 15.21, ES = .61$. However, no significant interaction for time on task was found.

Satisfaction

Satisfaction was measured using the Instructional Materials Motivation Scale subscale S (Keller, 1987). Mean scores and standard deviations for each item on the satisfaction measure are given in Table 3. These data suggest that subjects who worked cooperatively

TABLE 1 ☐ Mean Scores and Standard Deviations on Performance Test

	TYPE OF ITEMS*					
	Knowledge		*Application*		*Total*	
CONDITION	*M*	*SD*	*M*	*SD*	*M*	*SD*
Individual Learning						
Low Affiliation ($n = 12$)	5.08	1.78	7.08	1.70	12.17	2.77
High Affiliation ($n = 15$)	6.73	1.58	5.60	1.15	12.33	2.13
Total ($n = 27$)	6.05	2.29	6.26	1.58	12.26	2.39
Cooperative Learning						
Low Affiliation ($n = 15$)	6.07	2.43	6.83	1.52	12.90	3.41
High Affiliation ($n = 13$)	6.15	3.02	6.81	1.03	12.96	3.34
Total ($n = 28$)	6.11	2.76	6.82	1.29	12.93	3.32

*Maximum possible score was 10 for both the knowledge and application portions of the performance test.

FIGURE 1 ☐ Effects of Instructional Method and the Need for Affiliation on Application Portion of Posttest

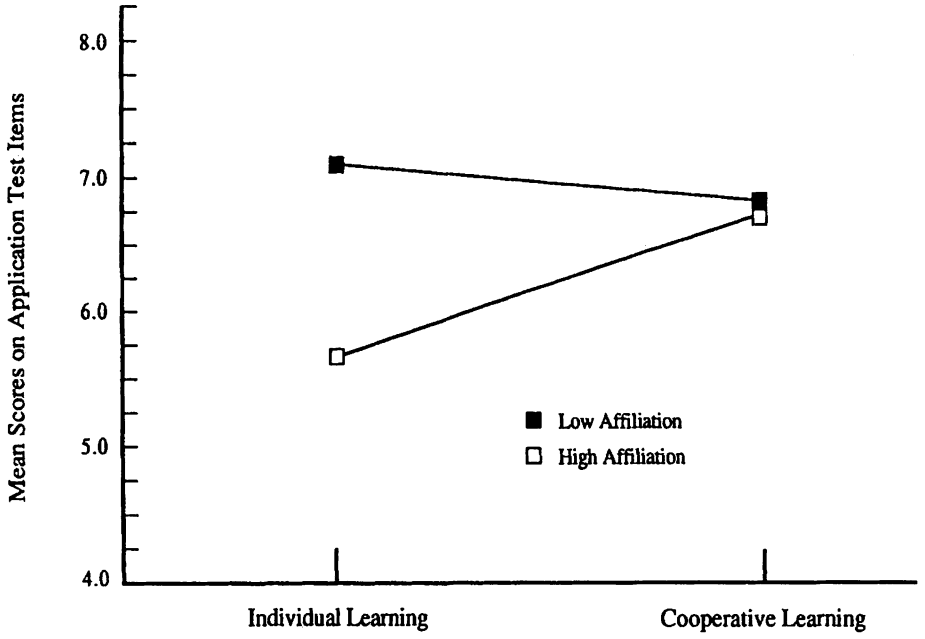

TABLE 2 ☐ Mean Scores and Standard Deviations for Time on Task and Satisfaction

	DEPENDENT MEASURE			
	*Time on Task**		*Satisfaction***	
CONDITION	*M*	*SD*	*M*	*SD*
Individual Learning				
Low Affiliation (n = 12)	14.50	2.97	14.50	3.80
High Affiliation (n = 15)	13.45	2.39	16.20	5.58
Total (n = 27)	13.92	2.66	15.44	4.86
Cooperative Learning				
Low Affiliation (n = 15)	24.44	4.47	18.33	5.72
High Affiliation (n = 13)	20.99	5.16	18.77	5.76
Total (n = 28)	22.84	5.02	18.54	5.63

*Time on task is reported in minutes.
**Maximum possible satisfaction score was 30.

TABLE 3 ☐ Mean Scores and Standard Deviations for Satisfaction Items

	GROUP					
	Individual		*Cooperative*		*Total*	
SCALE ITEM*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1. Participation was satisfying.	2.19	0.96	2.75	0.93	2.47	0.98
2. Practice and feedback were satisfying.	2.56	1.22	3.29	1.08	2.93	1.19
3. Would like to participate in similar activity.	1.63	0.88	2.29	1.08	1.96	1.04
4. Did not enjoy activity.	3.56	1.09	3.89	1.45	3.73	1.28
5. Felt good to complete activity successfully.	2.74	1.29	3.32	1.25	3.04	1.29
6. Activity was well designed.	2.78	1.19	2.93	1.09	2.85	1.13

*Full text of scale items is found in text.

reported greater overall satisfaction with the instruction (M = 18.54, SD = 5.63) than those who worked individually (M = 15.44, SD = 4.86).

MANOVA revealed a significant interaction between instructional method and the need for affiliation, $F(6, 46) = 2.77$, $p < .05$, and a significant main effect for instructional method, $F(6, 46) = 2.68$, $p < .05$. Univariate analyses revealed that the interaction was not significant for any of the individual satisfaction items. However, results indicated that subjects who worked cooperatively were more likely than those who worked alone to agree with the following statements:

1. Participating in the activity gave me a satisfying feeling of accomplishment, $F(1, 51) = 5.54$; $p < .05$, $MS_e = 0.87$, $ES = 0.57$.
2. The practice and feedback in the lesson helped me feel satisfied while participating in the activity, $F(1, 51) = 5.45$; $p < .05$, $MS_e = 1.36$, $ES = 0.61$.
3. I enjoyed the activity so much that I would like to learn more by participating in a similar type of activity, $F(1, 51) = 5.96$; $p < .05$, $MS_e = 1.01$, $ES = 0.63$.

DISCUSSION

The purpose of this study was to investigate the effect of cooperative learning and the need for affiliation on performance, time on task, and satisfaction. Subjects used either a cooperative or individual learning strategy while receiving information, examples, practice, and feedback from an instructional television lesson.

Results of the study indicated that subjects who worked cooperatively spent more time working on practice activities and reported greater satisfaction than subjects who worked alone. Results also revealed that performance of subjects with a high need for affiliation who worked alone was lower than that of all other groups on the application portion of the posttest.

The result for time on task is consistent with the findings of other research on cooperative learning. According to Slavin (1990), "most studies that have measured time on task have found higher proportions of engaged time for cooperative learning students than for control students" (p. 47). These findings are likely due to the additional demands that a cooperative learning strategy requires of students. As was done in other research, subjects in the current study who worked in dyads were given specific directions for implementing a cooperative strategy. These subjects were told to work together during the lesson, discuss all practice exercises and any disagreements over the answers, and discuss the given feedback.

Informal observations of subjects who worked cooperatively suggested that they did, in fact, implement these directions. After each segment of the tape was stopped, one member of the dyad usually read the practice question aloud. If the question was unclear to either member, the other would spend time explaining it. The pair would then discuss the answer. If they disagreed on the answer, one member of the dyad would usually check the feedback for the correct answer before writing the answer down. These behaviors differ from those of the subjects who worked alone. Individuals read each question quietly and would either immediately write their answer in the workbook or would check the feedback for the correct answer. These informal observations tend to suggest that subjects who worked cooperatively were more engaged in the instruction than those who worked alone.

Results indicated that subjects who worked cooperatively were more satisfied with the instruction than those who worked individually and were more likely to agree with the statements "Participating in the activity gave me a satisfying feeling of accomplishment," "The practice and feedback in the lesson helped me feel satisfied while participating in the activity," and "I enjoyed the activity so much that I would like to learn more by participating in a similar type of activity." Effect size estimates ranging from .57 to .63 indicate that cooperative learning had a moderate effect on satisfaction (Cohen, 1969). However, results also suggest that neither group was highly satisfied with the instruction.

While subjects who worked cooperatively spent more time on task and reported greater satisfaction than subjects who worked alone,

there was no difference between the two groups when performance was measured. However, performance results revealed an interaction between instructional method and the need for affiliation. When subjects were asked to apply what they learned, performance of subjects with a high need for affiliation who worked alone was lower than that of all other groups.

One possible explanation for this finding is that people with a high need for affiliation are less likely than those with a low need for affiliation to be motivated and to learn when instruction is presented via television. Students with a high affiliation motive prefer to participate in activities that allow them to work with others (Jackson, 1974; McClelland, 1965, 1976). Television is designed to be an individual experience in our society and is typically implemented for individual use in instruction. Hence, students with a high need for affiliation should be given the opportunity to interact with others when instruction is presented via television.

This study has some implications for those who design instruction. Instructional technologists can increase student achievement and motivation by employing cooperative groups in settings originally designed for individual learning. Others have indicated that cooperative learning strategies can affect performance in CAI lessons (Dalton et al., 1989; Johnson et al., 1985). The current study suggests that cooperative learning can be used with instructional television lessons. The study also indicates that designers should consider student characteristics when assigning learners to instruction that requires them to work by themselves to accomplish goals.

Some potential limitations of this study should be noted. The relatively short duration of the treatment may have influenced the outcomes. Extending the time for overall instruction could produce different results for practice time, satisfaction, and performance. In addition, because the study population consisted of undergraduate education majors and was predominantly female, the generalizability of the results is limited. Finally, the average score on the need for affiliation measure in this sample was somewhat higher than the average for the general college population reported by Jackson (1974). The results may have been different if more subjects with a low need for affiliation had participated.

Future research should continue to explore the use of cooperative learning with technologies originally developed for individual learning. Studies should investigate different elements of cooperative learning (e.g., goals, incentives, accountability) to determine if these elements influence outcomes in settings utilizing educational technology. Cooperative learning studies should continue to examine student characteristics to discover which student attributes influence performance and motivation in cooperative settings. Researchers who measure time on task should explore ways to eliminate possible biases toward cooperative learning groups; subjects who work alone might be given additional tasks such as answering or generating questions.

As was done in this study, future cooperative-learning research should include several performance and motivational outcomes to increase our understanding of the influence of cooperative learning on educational outcomes. These studies should include qualitative data to examine the interaction patterns of students in cooperative groups. Implementation of these suggestions will assist us in determining the benefits of cooperative learning. □

James D. Klein and Doris R. Pridemore are with the Learning and Instructional Technology Program at Arizona State University in Tempe.

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