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# Effects of Orienting Activities and Practice on Achievement, Continuing Motivation, and Student Behaviors in a Cooperative Learning Environment

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*The purpose of this study was to investigate the effect of orienting activities and type of practice on achievement, continuing motivation, and student behaviors in a cooperative learning environment. Eighty graduate education majors were assigned to cooperative groups and required to learn instructional design principles from three instructional television lessons. Each lesson included specific orienting activities (advance organizers or objectives) and different types of practice (verbal information or intellectual skills). Results indicated that subjects who worked in groups that received intellectual skills practice performed better on the application portion of the posttest than those who received verbal information practice. Knowledge acquisition and student behaviors were affected by a combination of type of practice and orienting activity. Groups that received intellectual skills practice discussed more content, gave more help to their fellow group members, and exhibited less individual behavior than groups that received verbal information practice. Groups given objectives discussed significantly more content than groups given advance organizers.*

☐ Cooperative learning has received considerable attention from educational technology researchers in recent years. The success of cooperative learning in classroom settings (cf. Johnson & Johnson, 1989; Sharan, 1980; Slavin, 1990) has prompted educational technologists to investigate the effect of employing cooperative strategies with mediated instruction.

Studies conducted to examine the effect of implementing cooperative learning with computer-assisted instruction (CAI) have provided mixed results. Some researchers have reported that student achievement increased when cooperative strategies were used with CAI (Dalton, Hannafin, & Hooper, 1989; Hooper, Temiyakarn, & Williams, 1993; Johnson, Johnson, & Stanne, 1985). Others have not found a significant effect for achievement when learners used cooperative CAI (Carrier & Sales, 1987).

Findings from research on using cooperative learning with instructional television (ITV) have also produced mixed results. Some researchers have reported that students who used cooperative strategies to learn from ITV were more motivated than those who worked alone, but achievement in those settings was influenced by students' affiliation motives (Klein & Pridemore, 1992). Others have found that students who worked alone during an ITV lesson achieved more and expressed more continuing motivation than those who worked in small groups (Klein, Erchul, & Pridemore, 1994).

These mixed results may be due to the instructional strategies employed within medi-

ated lessons. Two such strategies are orienting activities and practice.

An orienting activity is a mediator through which new information is presented (Hannafin & Hughes, 1986). Orienting stimuli evoke inspection behaviors in learners, which help to influence what is learned from a text (Rothkopf, 1970). An example of an orienting activity is when learners are provided with the objectives of a lesson. According to Gagné (1985), objectives help to activate a mental set that focuses student attention and directs selective perception of specific lesson content.

Reviews of research have generally supported the prescription of providing objectives to learners. However, inconsistencies in the results of these studies have suggested that objectives as orienting activities may not be effective in every learning setting (Duchastel & Merrill, 1973; Hamilton, 1985; Hannafin & Hughes, 1986; Melton, 1978). Researchers have indicated that objectives increase the attainment of factual information, but do little to help students process higher-level skills (Clark, 1984, Hannafin, 1985; Ho, Savenye, & Haas, 1986; Mayer, 1984). Others have reported that objectives enhance learning of relevant content, but may inhibit learning of incidental material (Duchastel & Brown, 1974).

In addition to objectives, another orienting activity is supplying learners with advance organizers. Ausubel (1968) defined an advance organizer as "relevant and inclusive introductory materials . . . introduced in advance of learning . . . at a higher level of abstraction, generality, and inclusiveness" (p. 148). The purpose of an advance organizer is to relate potentially meaningful information to be learned to existing structures that exist within a learner's memory (Ausubel, 1960, 1968). Advance organizers remind students of something they already know and assist in organizing information to be learned (Gagné & Driscoll, 1988).

Researchers have found that advance organizers increase both retention and comprehension of instructional content (Ausubel, 1968; Mayer, 1979, 1984; Stone, 1983). But advance organizers have not facilitated performance in every learning setting (Barnes & Clawson, 1975). For example, they have increased learn-

ing from mediated instruction (Nugent, Tipton, & Brooks, 1980), but have had reduced benefits when more powerful instructional elements such as practice were included in mediated lessons (Bertou, Clasen, & Lambert, 1972; Hannafin, 1987; Hannafin, Phillips, Rieber, & Garhart, 1987; Phillips, Hannafin, & Tripp, 1988).

Most instructional design theories include the element of practice (Salisbury, Richards, & Klein, 1985). Practice is defined as the event of instruction provided to learners after they have been given information required to master an objective (Gagné, 1985). Theorists from a cognitive perspective have suggested that practice is valuable for strengthening automaticity of skills and for enhancing encoding, retention, and retrieval of information (Anderson, 1980; Travers, 1982). Behavioral theorists have indicated that active practice with reinforcement strengthens associative bond formation (Gropper, 1983).

Researchers have reported that the type of practice questions given to learners influenced what they learned from a lesson. Factually explicit practice items have increased student mastery of verbal information during instruction, but have not increased the attainment of higher-level skills (Hamaker, 1986; Phillips et al., 1988). Higher-order questions have been more effective than factual questions for enhancing learner ability to apply what they learn from a lesson (Andre, 1979; Hamaker, 1986).

The purpose of the current study was to investigate the effects of orienting activities and type of practice on achievement, continuing motivation, and student behaviors in a cooperative learning environment. Students who were assigned to cooperative learning groups received information, examples, practice, and feedback from three instructional television (ITV) lessons. Each lesson included specific orienting activities (advance organizers or objectives) and different types of practice (verbal information or intellectual skills). Achievement was measured using a posttest developed to determine individual student mastery of the verbal information and intellectual skills presented in the lessons (Gagné, 1985). Continuing motivation was assessed

using a survey designed to ascertain each student's willingness to return to tasks like those used in the study (Kinzie, 1990; Maeher, 1976). Student behaviors in the cooperative groups were observed and classified as either helping behaviors, on-task interactions, off-task interactions, or working alone (Webb, 1982, 1987).

The study is a continuation of a program of research on how cooperative learning can be effectively implemented with instructional television (cf. Klein, 1994; Klein et al., 1994; Klein & Pridemore, 1992). Others have speculated that strategies which engage students in examining, comparing, clarifying and evaluating will enhance learning and motivation when cooperative learning is employed with television (Adams, Carson, & Hamm, 1990). However, few research studies have been conducted to determine which strategies are effective when cooperative learning is implemented with ITV. Research on orienting activities and practice has indicated that these instructional strategies can influence outcomes when they are given to individual learners. The current study was conducted to determine the effect of orienting activities and practice when cooperative learning was employed with instructional television.

Although the study was exploratory in nature, we expected that the cooperative groups that received objectives would discuss more content and learn more than those who received advance organizers. We also expected that the groups that received intellectual skills practice would discuss more content and indicate more continuing motivation than those who received verbal information practice. Finally, we anticipated that intellectual skills practice would be more effective than verbal information practice for enhancing student ability to apply what they learned from the ITV lesson, but that verbal information practice would increase student mastery of factual knowledge.

## METHOD

### Design and Subjects

A 2 × 2 factorial design was used in this study, with orienting activity (advance organizer versus objectives) and type of practice (verbal information versus intellectual skills) as the independent variables. The dependent variables were achievement, continuing motivation, and student behaviors.

Subjects were 80 graduate education majors (16 males, 64 females) at a large southwestern university. All subjects were enrolled one of two sections of a required graduate level course on learning and instruction during a five-week summer session. Subjects participated in the study to meet a course requirement.

Several days prior to the study, students were stratified by gender to ensure proportional representation and randomly assigned to one of 16 cooperative learning groups. Each cooperative group was constructed to include one male and four female students. After students were assigned to cooperative groups, each group was randomly assigned to one of four instructional treatments (advance organizers/verbal information practice, advance organizers/intellectual skills practice, objectives/verbal information practice, objectives/intellectual skills practice).

### Materials

Materials used in this study were three instructional television lessons from the series, *Instructional Theory: A nine lesson mini-course,* (Gerlach, 1973). These lessons were directly related to the content of the learning and instruction course. All three lessons included a videotape and a workbook. The videotape portion of each lesson was approximately 30 minutes long and was divided into segments of information and examples. The first lesson, "Stating Instructional Objectives," consisted of six information and example segments; the second lesson, "Objectives-based Assessment," included eight segments; the third lesson, "Designing Effective Practice," included three

segments. After each segment, the videotape instructed subjects to turn to their workbooks for practice and feedback on the content presented in that segment. Variations in the materials occurred in the workbooks. These variations were based on the instructional elements (orienting activity and type of practice) under study.

*Orienting activity.* Each workbook provided either an advance organizer or a list of instructional objectives for the lesson. The advance organizer provided students with an overview of the lesson for that day. The following is an example of the advance organizer provided to students for the lesson on writing objectives:

Perhaps the best known component of the systematic approach to instructional design is the instructional objective. Since the early 1960s, many educators have written instructional objectives. An objective is a statement of what students will be able to do after they have completed a unit of instruction. In this lesson you will be learning how to use objectives in order to improve your instruction.

The other set of workbooks provided a specific list of the instructional objectives for each lesson. The following is an example of the objectives provided to students for the lesson on writing objectives.

If the materials in this unit accomplish what the designers intended, you should be able to do the following after viewing the videotape and completing the exercises in the workbook:
  1. Explain why well stated objectives are essential to the development of effective instruction.
  2. Identify examples of properly stated objectives, given examples of properly and improperly stated objectives.
  3. Name the desired characteristics of objectives that are missing, given an improperly stated objective.

*Type of practice.* Each workbook included practice on the content of the lessons. The number of practice exercises for the three lessons was six, eight, and three, respectively. The workbooks for each lesson differed in the type of practice given after each video segment. Eight of the 16 cooperative learning groups used workbooks that provided practice on verbal

information presented in each videotape. This type of practice required students to summarize the information provided in each lesson segment. The other eight groups used workbooks that provided practice on the intellectual skills in the lessons. This type of practice required students to identify and describe whether specific objectives, practice, and assessment items were appropriate for given instructional settings.

For example, Segment 4 of the lesson on objectives-based assessment provided information and examples on paper-and-pencil tests, interviews, and observations of student performance or product. Practice on the verbal information for this segment required students to summarize the key information in the videotape by listing the three types of objectives-based assessment. Practice on the intellectual skills for this segment required students to identify the best type of objectives-based assessment for the objective of sculpting a human head based on criteria discussed in an art class. After each practice question, written feedback that was specific to each practice item was provided on the next page of the workbook. Feedback for the verbal information item given above listed the three types of objectives-based assessment (paper-and-pencil tests, interviews, observations of student performance or product); feedback for the intellectual skill item informed students that direct product evaluation would be most appropriate for the objective.

## Procedures

On day one of the study, all students were verbally provided with the following introduction:

Over the next three days, you will be participating in a group-based activity that will help you design effective instruction. You and your group will view several instructional television lessons and will work through a series of practice exercises in a workbook. Each individual is responsible for learning the material presented in these lessons. Each group is responsible for helping its team learn this material.

Students were then told that some groups would be completing the activity in another

room so that everyone could see the television screen. Each student was given a slip of paper with a group number and a room number written on it. Students were told to go to the room number that was written on the paper. Each room had four cooperative groups present at a time; the four cooperative groups in each room received the same treatment materials.

When they arrived at the assigned room, students were told to sit at the table that corresponded to the group number on their slips of paper. The room was arranged with four tables; each table had five chairs facing a television set at the front of the room. Students were told to clear everything off the table except a pen or pencil. Student were each given a large index card and told to fold it in half, write their name on it, and place it on the table in front of them.

Each cooperative group was given one workbook for the lesson on stating instructional objectives and told to write the name of each group member on the front cover. Students were then told to read the directions on page 2 of the workbook. The following written directions were provided to all groups:

This workbook is designed to give you practice and feedback on the material presented in the videotape entitled, *Stating Objectives*. After the videotape provides you with some information and examples, it will be stopped and your group will work on a practice exercise related to that information. Your group should work together during this lesson. The group should discuss all practice exercises as they are presented, discuss any disagreements over the answers, and write the agreed upon answer in the workbook. The group should then discuss the feedback that follows each practice exercise. Then, when the group is ready to continue to the next segment of the tape, raise your hand.

Students were also told to read the introduction on page 3 of the workbook, and to raise their hands when the group was ready to begin the videotape. The introduction was different for half of the groups, depending on assignment to one of the two orienting conditions (advance organizers, objectives).

When all cooperative groups indicated that they were ready to begin, the videotape was started. When Segment 1 was completed, the

tape was stopped and groups completed the first practice exercise. When all groups indicated that they were ready, the videotape was started again. This cycle was continued until all six sections of the lesson were completed. While students worked through the lesson, an observer watched the groups and recorded student behaviors. Upon completion of the lesson, all workbooks were collected and students were reminded to report to the same room on the following day.

Similar procedures were followed on days two and three of the study. All cooperative groups received the lesson on objectives-based assessment on day two and the lesson on designing effective practice on day three. At the start of each class, students were asked to sit at the same table as the previous day and to place their name card and pen or pencil on the table in front of them. Each cooperative group was given one workbook for the day's lesson and told to write their names on it. Students were told to read the directions for implementing cooperative learning and the appropriate orienting activity. When all cooperative groups were ready, the videotape was started and stopped following the same procedures as used on day one. An observer watched the groups and recorded student behaviors as they worked through each lesson. All workbooks were collected at the end of each lesson.

After the workbooks were collected on day three, each student individually completed a survey to measure his or her continuing motivation for tasks like those used in the study. Three days later, each student completed a 22-item, constructed response posttest in the regular class to evaluate individual student mastery of the three lessons.

## Criterion Measures

Criterion measures used in this study were achievement, continuing motivation, and student behaviors.

*Achievement.* Achievement was measured using a paper-and-pencil posttest that consisted of 22 short-response items. This posttest was divided into two sections. The first section

contained 14 intellectual skill items to evaluate application of lesson content. An example of an intellectual skill item is:

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 second section of the posttest contained eight verbal information items to evaluate knowledge of lesson content. An example of a this type of item is "List three types of objectives-based assessment."

The sections of this test were worth 20 points each. The scoring procedures for this test were similar to those used in previous studies on cooperative learning with ITV (Klein et al., 1994; Klein & Pridemore, 1992). Individual answers to each item were checked against a scoring key and points were assigned for each response. Using this key, an objective scoring procedure was followed. An item was worth one point unless it required a multiple response. For example, the verbal information item given above was worth a maximum of three points; it was scored by providing one point for each type of assessment listed in the student's response. One person scored all of the items on this test. The Kuder-Richardson internal-consistency reliability of the posttest was .74 for subjects in the present study.

*Continuing motivation.* Continuing motivation was defined as each student's willingness to return to tasks like those used in the study (Kinzie, 1990; Maeher, 1976). It was assessed using a six-item, paper-and-pencil survey. This survey asked subjects about their willingness to return to group- or individual-learning activities, instructional television or other delivery systems, and instructional television accompanied by objectives and written practice. Each item provided a set of two future learning activities from which to choose; subjects were required to select the one activity that they would prefer in each set. An example item from this survey is:

I would prefer to learn from instructional television:
   A. in group-based learning activities.
   B. in individual learning activities.

*Student behaviors.* Student behaviors were observed during each of the three lessons and were recorded by the researchers on a data collection form. This form provided space for an observer to record field notes about how students in the cooperative groups worked through the phases of each lesson (i.e., orienting activities, film segments, practice exercises).

Prior to the study, the researchers discussed observation procedures and decided that field notes should focus on the content of group discussions and on the actions of students in each cooperative learning group. During the study, one researcher observed four cooperative groups at a time as they worked through a lesson. All cooperative groups were observed during each of the three lessons; both researchers had the opportunity to observe each of the 16 cooperative groups for at least one entire lesson. At the end of each day of the study, the researchers met to discuss their field notes and observation procedures.

Several weeks after data collection had occurred, one of the researchers developed a classification scheme for the field notes based on research findings from Webb (1982, 1987). Webb suggested that student behaviors in small groups can involve on-task versus off-task interactions, helping behaviors, and working alone. The classification scheme developed for the current study identified four sets of student behaviors, including (1) helping behavior (asking for help, giving help when asked, giving unsolicited help); (2) on-task group behavior (taking turns, sharing materials, group discussion of content); (3) on-task individual behavior (assuming control, taking notes, working alone); and (4) off-task behavior (talking to other about something unrelated to the lessons and non-verbal actions such as reading a newspaper).

Using this classification scheme, both researchers examined all of the field notes to calculate the total number of times these behaviors occurred within each of the 16 cooperative learning groups. Reliability of observa-

tions was based on both observers having similar totals for each set of student behaviors. The inter-rater reliability between observers was .84 for helping behaviors, .84 for on-task group behaviors, .79 for on-task individual behaviors, and .82 for off-task behaviors.

### Data Analysis

A 2 × 2 multivariate analysis of variance (MANOVA) was used to analyze achievement data. If significant, MANOVA was followed by univariate analyses on the knowledge and application portions of the posttest. Alpha was set at .05 for these statistical tests.

Chi-square tests of significance were used to analyze continuing motivation data. First, a 4 (experimental treatment) × 2 (item choice) chi-square analysis was conducted on each survey item to determine the relationship of the treatments to willingness to return to future learning activities. If a significant chi-square was found for an item, follow-up 2 (levels of independent variable) × 2 (item choice) chi-square analyses were performed to determine if orienting activity and level of practice had an effect on continuing motivation. Alpha was set at .05 for chi-square tests.

A 2 × 2 MANOVA was used to separately analyze each of the four sets of student behaviors (helping behaviors, on-task group behaviors, on-task individual behaviors, off-task behaviors). Student behaviors were considered as a group-based measure in these analyses, since a combined score was obtained for subjects in each cooperative learning group. First, the total number of times each student behavior occurred was calculated for the 16 cooperative groups. Each behavior was then classified as belonging to a set of helping behaviors, on-task group behaviors, on-task individual behaviors, or off-task behaviors. A MANOVA was conducted on each of these four sets of behaviors. Alpha was set at .05 for these multivariate tests. If a significant multivariate effect was found, MANOVA was followed by univariate analyses on the student behaviors in that set. To account for the possibility of inflated statistical error, alpha was set at .015 for the

univariate analyses using the Bonferroni method (Stevens, 1986).

### RESULTS

#### Achievement

Mean scores and standard deviations for both the knowledge and application sections of the posttest can be found in Table 1. Data for 79 out of 80 subjects were included in the analysis of achievement, since one subject did not complete the posttest.

MANOVA revealed a significant disordinal interaction between orienting activity and type of practice, $F(2, 74) = 3.95$, $p < .05$. Univariate analyses revealed that the interaction was significant for the knowledge portion of the posttest $F(1, 75) = 5.41$, $p < .05$. As shown in Figure 1, subjects who received verbal information practice attained more knowledge from the lessons when they were provided with objectives rather than advance organizers. However, subjects who received intellectual skills practice attained more knowledge when they were given advance organizers rather than objectives.

Scheffé multiple comparison tests revealed that subjects who received objectives and verbal information practice obtained significantly more knowledge ($M = 11.6$) than those who received advance organizers and verbal information practice ($M = 9.4$), $F(3, 75) = 3.27$, $p < .05$; and those who received objectives and intellectual skills practice ($M = 9.3$), $F(3, 75) = 3.57$, $p < .05$. No other differences were found.

In addition to the interaction, MANOVA indicated a significant main effect for type of practice, $F(2, 74) = 8.03$, $p < .01$. Univariate analyses revealed that type of practice had a significant effect on the application portion of the posttest, $F(1, 75) = 9.71$, $p < .01$, but not the knowledge portion. Subjects who received practice on the intellectual skills presented in the lessons performed significantly better on the application portion of the posttest ($M = 13.0$) than subjects who received practice on the verbal information ($M = 10.9$). MANOVA did not reveal a significant main effect for orienting activity.

Table 1 ☐ Mean Scores and Standard Deviations on Performance Test

| Condition | | Type of Test Items | | |
| --- | --- | --- | --- | --- |
| | | Knowledge | Application | Total |
| Verbal Information Practice | | | | |
| Objectives | M | 11.6 | 10.7 | 22.3 |
| (n = 20) | (SD) | (3.3) | (2.5) | (5.0) |
| Advance Organizer | M | 9.4 | 11.0 | 20.5 |
| (n = 20) | (SD) | (3.4) | (3.3) | (6.0) |
| Total | M | 10.5 | 10.9 | 21.4 |
| (n = 40) | (SD) | (3.5) | (2.9) | (5.5) |
| Intellectual Skills Practice | | | | |
| Objectives | M | 9.3 | 12.9 | 22.5 |
| (n = 20) | (SD) | (4.6) | (3.8) | (7.7) |
| Advance Organizer | M | 11.1 | 13.1 | 24.3 |
| (n = 19) | (SD) | (3.7) | (3.3) | (6.1) |
| Total | M | 10.4 | 13.0 | 23.4 |
| (n = 39) | (SD) | (4.2) | (3.5) | (6.9) |

Note: Minimum and maximum scores were 0, 17 for knowledge test, 5, 20 for application test, and 7, 36 for total test.

Figure 1 ☐ Effects of orienting activities and type of practice on the knowledge portion of posttest
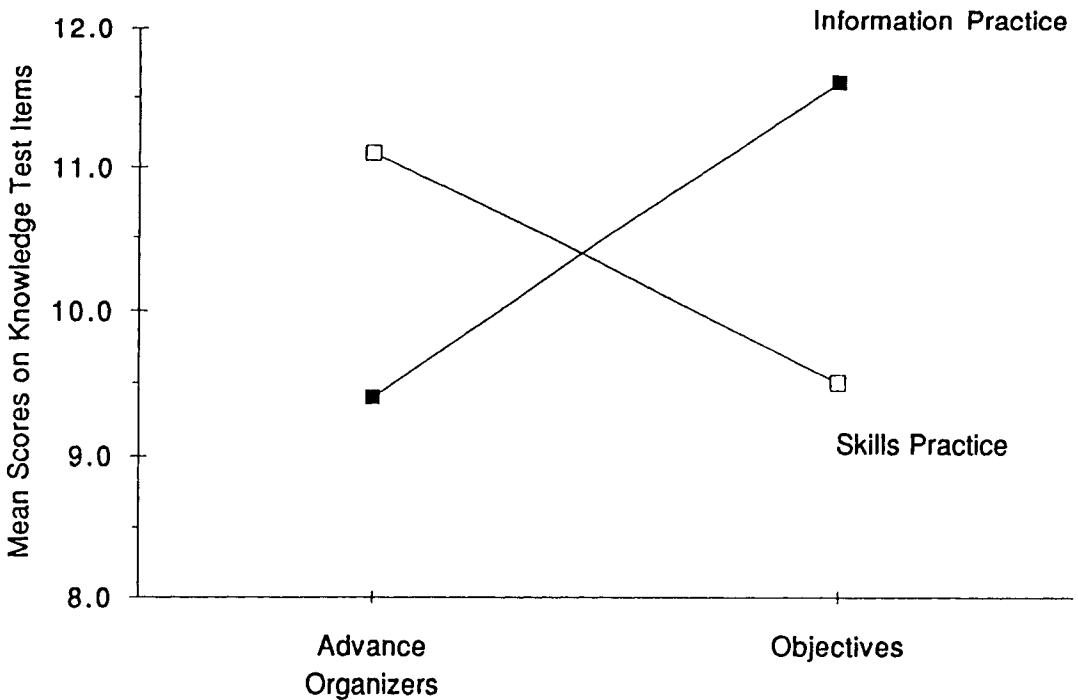
Table 2 □ Proportion of subjects selecting continuing motivation alternatives by treatment group

| Survey Item[a] | Treatment Group[b] | | | | |
|---|---|---|---|---|---|
| | ADV/VI | ADV/IS | OBJ/VI | OBJ/IS | Total |
| 1. Group-based activities vs. | .60 | .79 | .55 | .75 | .67 |
| Individual activities | .40 | .21 | .45 | .25 | .33 |
| 2. ITV vs. | .0 | .32 | .10 | .20 | .13 |
| Instructor | 1.0 | .68 | .90 | .80 | .87 |
| 3. Group-based ITV vs. | .85 | 1.0 | .80 | 1.0 | .91 |
| Individual ITV | .15 | .0 | .20 | .0 | .09 |
| 4. ITV vs. | .60 | .79 | .55 | .70 | .66 |
| Textbook | .40 | .21 | .45 | .30 | .34 |
| 5. ITV with practice vs. | .90 | 1.0 | .95 | .95 | .95 |
| ITV without practice | .10 | .0 | .05 | .05 | .05 |
| 6. ITV with objectives vs. | 1.0 | .95 | 1.0 | .90 | .96 |
| ITV without objectives | .0 | .05 | .0 | .10 | .04 |

[a] Each of the survey items asked subjects to choose between two future learning activities.

[b] ADV/VI = advance organizers/verbal information (n = 20); ADV/IS = advance organizers/intellectual skills (n = 19); OBJ/VI = objectives/verbal information (n = 20); OBJ/IS = objectives/intellectual skills (n = 20)

## Continuing Motivation

Table 2 provides the number of subjects in each treatment group who indicated a willingness to return to the future learning activities listed on the continuing motivation survey. Data for 79 out of 80 subjects were included in the analysis of continuing motivation, since one subject did not complete the survey.

These data show that a majority of subjects (67%) indicated a willingness to return to group-based learning activities over individual activities (33%). A majority of subjects (91%) also indicated continuing motivation for group-based ITV over individual ITV (9%). When asked to compare instructional television with other delivery systems, most subjects (87%) indicated a willingness to return to content delivered by an instructor over ITV (13%). However, a majority of subjects (66%) indicated continuing motivation for ITV over a textbook (34%). Finally, when asked about ITV accompanied by instructional elements, subjects exhibited more continuing motivation for ITV with written practice (95%) rather than without practice (5%) and for ITV with written objectives (96%) rather than without objectives (4%).

Separate 4 (experimental treatment) × 2 (item choice) chi-square analyses revealed a significant difference between the treatment groups for survey items 2 and 3 only. Item 2, $\chi^2 = 9.31$, $p < .05$, asked subjects to indicate their willingness to return to content delivered by ITV or an instructor. Data revealed that 32% of subjects in the advance organizer-intellectual skill groups exhibited a willingness to return to ITV when it was compared to an instructor. However, no subjects in the advance organizer-verbal information groups selected ITV over an instructor. Twenty percent of subjects in the objectives-intellectual skill groups and 10% in the objectives-verbal information groups indicated continuing motivation for ITV over an instructor.

A follow-up 2 (type of practice) × 2 (item choice) chi-square analysis revealed a significant effect for type of practice on survey item 2, $\chi^2 = 4.30$, $p < .05$. Although 21% of subjects who received intellectual skills practice indicated a willingness to return to ITV over an instructor, only 5% of subjects who received verbal information practice indicated this willingness. A follow-up 2 (orienting activity) × 2 (item choice) chi-square analysis did not reveal a significant effect for orienting activity on this survey item.

The 4 × 2 chi-square analysis was also significant for survey item 3, $\chi^2 = 7.80$, p < .05. This item asked subjects about their willingness to return to instructional television using either group-based activities or individually-based activities. Data revealed that 20% of subjects in the objectives-verbal information groups and 15% of those in the advance organizer-verbal information groups indicated continuing motivation for ITV using individually-based activities. However, no subjects in the other two groups indicated continuing motivation for individually-based ITV.

A follow-up 2 (type of practice) × 2 (item choice) chi-square analysis revealed a significant effect for type of practice on survey item 3, $\chi^2 = 7.49, p < .01$. While 100% of subjects who received intellectual skills practice indicated a preference for group-based instructional television, only 82% of subjects who received verbal information practice indicated this preference. A follow-up 2 (orienting activity) × 2 (item choice) chi-square analysis did not reveal a significant effect for orienting activity on this survey item.

## Student Behaviors

*Helping Behaviors.* A 2 × 2 MANOVA was conducted on the set of student behaviors classified as helping behavior (asking for help, giving help when asked, giving unsolicited help). MANOVA indicated that the type of practice given to students significantly affected their helping behaviors, $F(3, 10) = 6.59$, $p < .05$. Follow-up univariate analyses indicated that students who received practice over the intellectual skills presented in the lesson gave significantly more help to their fellow group members $(M = 2.13)$ than students who received practice over the verbal information $(M = 0.5)$, $F(1, 12) = 15.36, p < .01$. No other significant effects were found for helping behaviors.

*On-task Group Behaviors.* A 2 × 2 MANOVA was conducted on the set of student behaviors classified as on-task group behavior (taking turns, sharing materials, group discussion of content). MANOVA indicated that both type of

practice, $F(3, 10) = 7.28, p < .01$, and orienting activity, $F(3, 10) = 4.23, p < .05$, had a significant effect on students' on-task group behaviors. Follow-up univariate analyses indicated that students who received intellectual skills practice discussed significantly more of the lesson $(M = 9.75)$ than students who received verbal information practice $(M = 4.88)$, $F(1, 12) = 21.83, p < .01$. In addition, students who received objectives discussed significantly more of the lesson $(M = 9.25)$ than students who received advance organizers $(M = 5.34)$, $F(1, 12) = 13.79, p < .01$. No other significant effects were found for on-task group behaviors.

*On-task Individual Behaviors.* A 2 × 2 MANOVA was conducted on the set of student behaviors classified as on-task individual behavior (assuming control, taking notes, working alone). MANOVA indicated that the type of practice given to students significantly affected their on-task individual behaviors, $F(3, 10) = 18.26$, $p < .05$. Follow-up univariate analyses indicated that students who received verbal information practice took more notes on the lesson $(M = 6.63)$ than students who received intellectual skills practice $(M = 0.5)$, $F(1, 12) = 62.63, p < .01$. No other significant effects were found for on-task individual behaviors.

*Off-task Behaviors.* A 2 × 2 MANOVA was conducted on the set of student behaviors classified as off-task behavior (off-task talking and non-verbal actions). MANOVA did not indicate a significant effect for type of practice or orienting activity when off-task behaviors were analyzed.

## DISCUSSION

The purpose of this study was to investigate the effects of orienting activities and type of practice on achievement, continuing motivation, and student behaviors. Subjects assigned to cooperative learning groups received information, examples, practice, and feedback from three instructional television lessons. Each lesson included specific orienting activities

(advance organizers or objectives) and different types of practice (verbal information or intellectual skills).

Results for achievement indicated that knowledge acquisition was influenced by a combination of type of practice and orienting activity. Students who worked in groups that received verbal information practice performed better on the knowledge section of the posttest when they were provided with objectives rather than advance organizers. However, students who worked in groups that received intellectual skills practice attained more knowledge when they were given advance organizers rather than objectives.

Providing objectives to groups that practiced the verbal information in the lessons may have been necessary to direct student attention and selective perception to relevant lesson content (Gagné, 1985). Supplying advance organizers to groups that received intellectual skills practice may have helped students relate the meaningful verbal information from the lessons to their existing mental structures (Ausubel, 1960, 1968). While the advance organizers in the current study were not written strictly following criteria prescribed by Ausubel, they were designed to remind students of something they already knew and relate information to be learned to existing structures within their memory (Ausubel 1960, 1968; Gagné & Driscoll, 1988).

The results of the current study provide some support for researchers who have suggested that objectives as orienting activities may not be effective in every learning setting (Duchastel & Merrill, 1973; Hamilton, 1985; Hannafin & Hughes, 1986; Melton, 1978). Other studies have suggested that objectives increase the attainment of factual information, but do little to help students process higher-level skills (Clark, 1984, Hannafin, 1985; Ho et al., 1986; Mayer, 1984). The current study indicates that objectives, in combination with verbal information practice, can increase the attainment of factual knowledge for students in cooperative learning groups.

The present results also indicated that performance on the application section of the posttest was affected by the type of practice provided to the cooperative learning groups.

Students who worked in groups that received intellectual skills practice performed better on the application items than those who received verbal information practice. A possible explanation for this finding may be due to the alignment between the intellectual skills practice provided throughout the three lessons and the subsequent achievement measure. Students in groups that received intellectual skills practice had the opportunity to perform tasks similar to those required on the application items. This practice likely strengthened student ability to apply concepts presented in the lessons.

Another explanation concerns the influence that the practice questions had on students' learning processes. Subjects who received intellectual skills practice were given questions at a higher-level than those who received verbal information practice. Research findings suggest that higher-order questions are more effective than factual questions for enhancing learner ability to apply what they learn, and that factually explicit practice items do little to help students learn higher-level skills (Andre, 1979; Hamaker, 1986; Phillips et al., 1988). The differences in the level of questions provided to students in the current study may have influenced their cognitive processing. According to Andre (1979), "factual questions are believed to involve less complex cognitive processing . . . questions that require more than simple direct memory are believed to involve more complex cognitive processing" (p. 282–283).

In addition to achievement, the type of practice given to the cooperative learning groups had a strong influence on student behaviors in the current study. Groups who received intellectual skills practice discussed more content, gave more help to their fellow group members, and exhibited less individual behavior than groups that received verbal information practice. Clearly, the intellectual skills practice was more challenging and difficult than the verbal information practice. The intellectual skills practice may also have prompted students to relate their expertise in teaching to what they were learning. According to Slavin (1990), student expertise on a topic helps to ensure student participation in cooperative discussion groups.

It is also likely that groups that were given intellectual skills practice found the lessons more interesting and engaging than those that received verbal information practice. An interesting pattern emerged for some of the groups that received verbal information practice. During the second and third day of the study, one or two members of these groups would write the answer to each practice item in the workbook while information and examples were presented via television. When students were directed to "turn to the workbook" for practice, each group member would copy the verbal information into his or her own notes instead of discussing the answer as a group. These behaviors are in contrast to those exhibited by groups that received intellectual skills practice. The latter groups would usually wait until they were directed to answer each question. During practice, group members would ask each other for opinions, clarify answers for each other, and bring their past experiences into the discussions. Thus, groups that received intellectual skills practice were more engaged in the task than those that received verbal information practice.

Results also indicated that groups given objectives discussed significantly more content than groups given advance organizers. This result may have occurred because the students had extensive experience with using instructional objectives as a study tool and little experience with implementing advance organizers. It is also possible that the advance organizers had little effect in this study because students had extensive prior knowledge about the content of the lesson and the advance organizers were somewhat limited. Mayer (1979) concluded that "the best test of advance organizers occurs when material is unfamiliar, technical, or otherwise difficult for the learner to relate to his or her existing knowledge" (p. 372).

Another plausible explanation is that the objectives gave the cooperative learning groups in the current study a clear goal, while the advance organizers did not. Most successful cooperative learning methods use some type of group goals (Johnson & Johnson, 1989; Slavin, 1990). These goals are often in the form of group-based rewards to entice students to work together (Slavin, 1991). Providing instruc-

tional objectives to groups may also be an effective method for increasing student interactions in a cooperative environment.

Turning to continuing motivation, results suggest that when given a choice of future learning activities, students indicated a willingness to return to cooperative learning over other methods of instruction. A majority of subjects in the current study indicated continuing motivation for group-based learning activities over individual activities and for group-based ITV over individual ITV. When asked about ITV accompanied by instructional elements, almost every subject indicated a preference for ITV with written practice and objectives rather ITV without these elements. Few students indicated a preference for instructional television over an instructor. However, significantly more students who received intellectual skills practice indicated a preference for ITV than those who received verbal information practice. This result may be due to the fact that subjects who received intellectual skills practice interacted more during the ITV lessons than those who received verbal information practice.

The current study has some limitations that should be addressed. First, the advance organizers provided to students were not written strictly following criteria prescribed by Ausubel (1960). Advance organizers designed following these criteria may have more of an impact than those used in this study. Second, students in the cooperative groups were not trained on how to implement cooperative strategies. Providing training to students on how to cooperate may serve to increase student interactions regardless of the elements designed into the instructional lessons. Finally, two of the lessons in the current study (i.e., objectives and practice) dealt with the same variables that were manipulated in the treatments. The results of this study should be replicated using content other than instructional design.

This study has some implications for those who implement cooperative learning with media. Results substantiate the notion that practice is a major element in isolation and in combination with other elements in mediated instruction (cf. Hannafin, 1987). The current findings suggest that instructional technolo-

gists can increase achievement, continuing motivation, and student interaction by employing specific orienting activities and practice when using cooperative learning with media originally designed for individual learning. Cooperative learning appears to be enhanced by objectives that provide groups with a learning goal and by high-level questions that allow students to practice authentic skills. Systematic application of appropriate instructional elements will increase the success of cooperative learning. ☐

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