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ABSTRACT

This paper reviews experimental research on the pedagogical effects of three immediate instruction programs in oral communication. Formative evaluations indicate that students enjoyed the level-III interactive video instruction (IVI) programs. Results of an immediate posttest, delayed posttest, control group design indicate that the IVI program "Coping with Speech Fright" appears to be as effective on speech fright and recall measures as lecture/linear videotape instruction by two outstanding public speaking instructors. Furthermore, students in the IVI condition achieved significantly greater reduction of speech fright over a four-week period than did students in the control group. Results of two separate studies using an immediate posttest, control group, comparison group design indicate that students receiving IVI in "Constructing Speaking Outlines" and "Developing Key Ideas: The Four S's" achieved significantly higher immediate recall/application test scores than did students in the control group or the comparison group. Regression analysis indicated no significant effects of novelty, GPA (grade point average), IVI feedback rating, IVI video rating, or nature of participation (voluntary versus required) on cognitive test scores of the IVI treatment group in either study. Two statistical tables are appended. (Contains 50 references.) (Author)

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A Review of Experimental Studies of Interactive Video Instruction in Oral Communication

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Michael Cronin

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Abstract

This paper reviews experimental research on the pedagogical effects of three IVI programs in oral communication. Formative evaluations indicate that students enjoyed the level-III interactive video instruction (IVI) programs. Results of an immediate posttest, delayed posttest, control group design indicate that the IVI program "Coping with Speech Fright" appears to be as effective on speech fright and recall measures as lecture/linear videotape instruction by two outstanding public speaking instructors. Furthermore, students in the IVI condition achieved significantly higher immediate and delayed cognitive test scores and significantly greater reduction of speech fright over a four-week period than did students in the control group. Results of two separate studies using an immediate posttest, control group, comparison group design indicate that students receiving IVI in "Constructing Speaking Outlines" and "Developing Key Ideas: The Four S's" achieved significantly higher immediate recall/application test scores than did students in the control group or the comparison group. Regression analysis indicated no significant effects of novelty, GPA, IVI feedback rating, IVI video rating, or nature of participation (voluntary versus required) on cognitive test scores of the IVI treatment group in either study.

Recent reviews report significant learning outcomes associated with IVI (Bosco, 1986; DeBloois, 1988; Gayeski & Williams, 1985; Kalowski, 1987; Kearsley & Frost, 1985; McNeil, 1989; Smith, 1987). The most recent review (Fletcher, 1990), which included a meta-analysis of 47 empirical studies of IVI in defense training and related applications in industrial training and higher education, concluded that IVI is more effective and less costly across a variety of instructional settings and objectives than conventional instruction. However, these findings must be interpreted with caution because methodological weaknesses in many of the IVI studies have been identified, including: investigator bias, non-random assignment of subjects, lack of a control group, inadequate definition of instructional treatments, failure to measure the degree to which the treatments were implemented by subjects, artifact, lack of generalizability, and inadequate sampling (Bosco, 1986; Bunderson, Baillio, Olsen, Lipson, & Fisher, 1984; Cushall, Harvey, & Brovey, 1987; Reeves, 1986, 1990; Slee, 1989; Smith, 1987).

Many of the empirical studies considered in these reviews were conducted in the hard sciences. Theorists (Biglan, 1973; Kolb, 1981; Kuhn, 1962; Moses, 1990) have identified significant differences in typical teaching style and typical learning style in the hard sciences (laboratory science and mathematics) as compared to soft skill disciplines (humanities and social sciences). Do the reported pedagogical advantages of IVI apply to the soft skill disciplines? Cronin and Cronin (1992) reviewed 32 post-1984 empirical studies in soft skill areas and concluded that "taken as a whole, these studies appear to indicate that IVI produces significantly greater cognitive and application gains than conventional methods of soft skill instruction" (p. 59). IVI produced significant cognitive or application gains in soft skill areas such as reading, management, study skills, logical reasoning, foreign language, sales training, photography, secondary and special eduction, economics, and art. Furthermore, Cronin and Cronin (1992) concluded that:

1. IVI with videotape produced similar learning outcomes compared to IVI with videodisc.
2. The significant pedagogical advantages of IVI in soft skill areas are <u>not</u> due to (a) novelty effects, (b) superior instructional product in the IVI treatment versus the conventional instruction treatment, or (c)

additional learning time possible with uncontrolled time-on-task in the IVI treatment.

3. IVI may be more effective than conventional instruction in addressing a wide variety of uncontrolled student variables. Most studies reported a lower mean standard deviation on dependent variables for the IVI group than for the comparison group.

4. Recent IVI research in soft skill areas addressed several of the methodological criticisms of earlier research.

All but two of these studies used a control or comparison group; 48% used 80 or more subjects; and 61% of the studies randomly assigned subjects to treatment groups. However, most studies in this area remain open to the charge of investigator bias because 70% were conducted by the IVI developer(s) or the developing organization. Furthermore, none of these studies treated the subjects' actual implementation of the interactive video instruction available as an independent or a dependent variable.

The most serious methodological weaknesses in the empirical research reviewed have direct relevance to the necessity of developing and testing theories explaining why IVI produces significant learning effects. Researchers failed to describe the IVI treatment in adequate detail in 73% of the empirical studies, making interpretation of findings difficult. Moreover, because no study in this critical synthesis provided a detailed analysis of the video components of IVI, interpretations of the unique video contributions to learning via this medium are impossible. In addition, although some studies measured user attitudes toward the medium, no study that allowed for learner control reported on variations in actual use of the instructional program among users. Interpretations of the relationship between users' attitudes toward IVI and their actual instructional use of the medium are difficult absent such measures. Continued failure to isolate subject differences in the actual use of the instructional program and to provide detailed analysis of the video components of IVI make it difficult to integrate the empirical research into any comprehensive

theory. (Cronin & Cronin, 1992, p. 69)

Although IVI in soft skill areas appears to offer significant instructional benefits in cognitive achievement, transfer of learning to performance, motivation to learn, student achievement across uncontrolled student characteristics, user acceptance of the technology, and time required to achieve content mastery; do these outcomes apply for IVI in oral communication? The remainder of this paper summarizes experimental studies of the pedagogical effects of IVI in "Coping with Speech Fright," "Constructing Speaking Outlines," and "Developing Key Ideas: The Four S's."

"COPING WITH SPEECH FRIGHT"[1]

Recent research indicated that approximately seventy percent of the population experiences moderately high or high communication apprehension in public speaking contexts (Richmond & McCroskey, 1989). High levels of communication apprehension have negative consequences in the speech-making process such as: communication avoidance (Beatty, 1987; Mulac & Wiemann, 1984); shorter speeches (Beatty, Forst, & Stewart, 1986); lower self-esteem, less effective public communication (Daly & Stafford, 1984); less effective preparation for public speaking, increased perceptions of failure in speaking (Kelly, 1984); increased disfluencies, less effective nonverbal communication while speaking in public (McCroskey, 1982); more frequent decision-making errors in constructing a speech (Beatty, 1988); and considerable anxiety in those with high levels of communication apprehension if they are forced to communicate (Beatty, 1987).

Most institutions have too few speech faculty competent to provide traditional instruction in coping with communication apprehension to such a large population (Ayres & Hopf, 1987). Interactive video instruction (IVI) is capable of providing effective training to large numbers of students in a cost-effective manner.

Research Hypotheses

This investigation involved a control group which received no formal instruction in overcoming speech fright, an IVI group, and a group which received lecture/linear videotape instruction by outstanding teachers in cognitive restructuring techniques to cope with speech fright. Because the content of the

lecture/linear videotape version of the lesson was virtually identical to the IVI and because only outstanding instructors were used to present the lecture/linear videotape version in this study, no significant differences on cognitive gains between treatment groups were predicted. However, given the educational advantages of IVI discussed previously:

H1: Students using IVI will achieve significantly higher cognitive test scores immediately after treatment than will students in the control group.

H2: Students using IVI will achieve significantly higher cognitive test scores four weeks after treatment than will students in the control group.

After receiving IVI, students in all conditions presented at least one graded speech before completing the delayed-test instruments. Because students trained over a substantial time period in cognitive restructuring techniques and given opportunities to practice them showed significant reductions in communication apprehension (Connell & Borden, 1987; Harris, 1980), we expected:

H3: Students using IVI will achieve significantly greater reduction in speech fright over a four-week period than will students in the control group.

Method

Subjects. After adjusting for student absences and failures to follow directions, 138 college students enrolled in introductory public speaking classes at a middle-sized, comprehensive university in the southeast region served as subjects. Male subjects comprised 48% of the sample and female subjects made up 52%. Students received no extra course credit for participation in the study.

Instructional Materials. Two parallel forms of the lesson were developed, a lecture/linear videotape and a level-III interactive videotape version. The multimedia IVI module incorporates a tutorial/simulation approach. It includes carefully designed orienting activities, questions, feedback, and review options to promote understanding. A user-friendly design facilitates student use by explaining the nature of IVI, instructing students in program use, and repeating specific instructions for use of each screen requiring student reaction.

The multimedia approach promotes interest and

understanding through humorous graphics, visual memory cues, and workbook exercises designed to enable students to apply IVI learning to their specific problems of speech fright. Video adapted to the target audience includes examples of speakers experiencing speech fright, testimonies of those who suffer from speech fright, examples of students' negative self-evaluation, trainer-led exercises and simulations for developing positive self-evaluation, and a brief analysis of other techniques for coping with speech fright.

The IVI program provides a carefully constructed combination of learner-control of major topics to be explored (i.e., the nature of speech fright, how to overcome speech fright, and nonverbal indicators of speech fright) with program-control of IVI within each major topic. This allows learners to focus on topics that interest them and ensures that they will follow the lesson sequence developed by experts in instructional design for each topic selected (Canelos, Baker, Taylor, Belland, & Dwyer, 1986).

Procedures and Design. An immediate posttest, delayed posttest, control group design was used for this study. The independent variable consisted of the videotape-based instructional materials with two levels (interactive videotape vs. lecture/linear videotape). The dependent variables included immediate and delayed cognitive test scores, immediate and delayed scores on the public speaking section of the Communication Apprehension in Generalized Contexts instrument, and immediate responses on the formative evaluations by the treatment groups.

Students in intact public speaking classes, most of whom had not received any instruction in reducing speech fright, served as the control group. In an attempt to avoid a Hawthorne-type effect, students in the control group received a 45-minute placebo lecture on public speaking techniques unrelated to coping with speech fright.

Students in the treatment groups, most of whom had not received any instruction in reducing speech fright, were randomly assigned to IVI or lecture/linear video (LLV) treatments. Treatments were conducted during the second week of the Spring 1991 semester. The 45-minute LLV treatment was presented in three classes by the assigned instructor to groups of eight to ten students in a classroom equipped for videotape playback. Both instructors received outstanding teaching ratings from the department chair and averaged 4.5 out of 5 on their

most recent student evaluations. The instructional content of the LLV was virtually identical to the IVI version and included almost all the video included in the IVI condition. However, this video was presented as linear video.

IVI users received an average of 46 minutes of individual instruction in a small private laboratory room. This condition included the opportunity to complete workbook exercises but did not require completion of these exercises, provided no opportunity for class discussion, and did not require students to be exposed to all the content instruction.

Students completed a ten-item test of cognitive recall (test-retest reliability = .693) and the CAGC-PS (test-retest reliability = .702) immediately after they received the instructional material. They completed Form B of the recall test and the CAGC-PS (Richmond & McCroskey, 1989) four weeks later.

Results

Cognitive Test--Immediate. The results supported hypothesis 1, which predicted that students using IVI would achieve significantly higher cognitive test scores immediately after treatment than would students in the control group. There was no significant difference between the mean immediate cognitive test scores of students in the IVI and the LLV conditions. The maximum possible score on the cognitive test was 10. The mean score was 8.63 for students in the IVI condition, 8.37 in the LLV condition, and 7.10 in the control group. ANOVA results showed significant differences among the mean immediate cognitive test scores of subjects in the three groups (R^2 = .26, F [2, 135] = 23.92, p < .0001). The group differences accounted for 26% of the variance.

Cognitive Test--Delayed. The results supported hypothesis 2, which predicted that students using IVI would achieve significantly higher cognitive scores four weeks after the treatment than would students in the control group. There was no significant difference between the mean delayed cognitive test scores of students in the IVI and LLV conditions. The maximum possible score on this cognitive test was 10. The mean score was 7.77 for students in the IVI condition, 7.26 in the LLV condition, and 6.22 in the control group. ANOVA results showed significant differences among the mean delayed cognitive test scores of subjects in the three groups (R^2 = .22, F [2, 135] = 18.70, p < .0001).

The group differences accounted for 22% of the variance.

Communication Apprehension Test Scores. The results supported hypothesis 3, which predicted significantly greater reduction in speech fright over a four-week period for students in the IVI treatment than in the control group. Students in the IVI condition showed a mean reduction in speech fright of .866 points over the four-week period, while students in the control condition showed a mean increase in speech fright of .876 points. An independent t-test indicated that these mean change scores were significantly different (t [70.5] = -1.81, $p < .04$). There were no significant differences between the CAGC-PS scores of students in the IVI and LLV treatment groups on either immediate or delayed measures.

Educational Implications

Discussion of implications relevant to all three studies of IVI in oral communication will be presented in the final section of this paper. Only implications unique to each separate study will be discussed in these subsections.

The finding of no significant differences between the IVI and LLV treatments may encourage educators to investigate innovative applications of IVI in "Coping with Speech Fright." The use of individualized self-paced IVI to train large numbers of students may be at least as effective, and perhaps more effective and less costly across a wide variety of instructional settings and objectives than conventional instruction (Fletcher, 1990).

A review of previous research comparing IVI and LLV in soft skill areas concluded that "IVI appears to produce significantly greater recall or application of learning than linear video instruction" (Cronin & Cronin, 1992, p. 59). Although the findings of this study appear to be at variance with this conclusion, most previous studies failed to control for the quality of the instructor or the quality of the instructional products compared. The time and talent devoted to developing IVI may produce an instructional product superior to a less thoroughly prepared product by an instructor using LLV. The combination of outstanding instructors, virtually identical instructional content, and the careful preparation of the LLV lesson may explain its comparability to the IVI treatment in significantly enhancing learning.

Given the demonstrated success of the IVI program in cognitive instruction, the CAGC-PS scores of

students in the IVI and control conditions may show even more significant differences if compared over a longer period of time. Cognitive restructuring training requires substantial time and speaking practice for students to apply these techniques to reduce their specific fears. The absence of instructor-led practice in applying cognitive restructuring techniques to public speaking performance, while helpful to the integrity of the research design, reduces the likelihood of producing significant effects on speech fright

A follow-up analysis of the results of this study compared cognitive test scores and the actual use of IVI by subjects. Major variations among subjects' time-on-task on the IVI program occurred in section I (The Nature of Speech Fright) and section II (Cognitive Modification Techniques to Cope with Speech Fright). Subjects (n = 14) who spent no time on section I scored slightly higher on cognitive tests (immediate M = 8.8, delayed M = 7.9) than subjects (n = 16) who spent time on that section (immediate M = 8.5, delayed M = 7.7). Likewise, subjects (n = 10) who spent less than 10 minutes on section II scored about the same on cognitive tests (immediate M = 8.6, delayed M = 7.7) as subjects (n = 20) who spent more than 10 minutes on that section (immediate M = 8.6, delayed M = 7.8).

Major variations in time spent on sections I and II of the IVI program did not result in significant differences on immediate or delayed cognitive test scores. Subjects using the "Coping with Speech Fright" IVI appeared to demonstrate appropriate judgements regarding what material they needed to study and how much time they needed to spend on "branches" of the IVI program.

"CONSTRUCTING SPEAKING OUTLINES"[2]

Theoretical Perspectives

Research, though limited, generally supports the conclusion that effective organization of an oral message increases recall, attitude change, and speaker credibility ratings (Daniels & Whitman, 1981; McCroskey & Mehrley, 1969; Thompson, 1967; Whitman & Timmis, 1975). The authors of current public speaking textbooks view outlining as critical to the organization process. A survey of recent public speaking texts reveals that organization is seen as a key to speaker success and outlines are seen as the key

to organization (e.g., Sprague & Stuart, 1988; Sproule, 1991, Verderber, 1991).

Research Hypotheses

Given the educational advantages of IVI discussed previously:

H1: Students using IVI in "Constructing Speaking Outlines" will achieve significantly higher cognitive test scores immediately after treatment than will students in the control group.

H2: Students using IVI in "Constructing Speaking Outlines" will achieve significantly higher cognitive test scores than will students in the comparison group.

No previous study has investigated the effects of voluntary versus required participation in IVI. High willingness-to-communicate subjects are significantly more willing to agree to participate and significantly more likely to participate in communication research studies than low willingness-to-communicate subjects (Zakahi & McCroskey, 1989). Thus, volunteer subjects in communication research are likely to exhibit higher willingness-to-communicate than students who are required to participate. Furthermore, volunteer subjects are likely to be more accepting of IVI than non-volunteer participants and thus may be more motivated to learn from the IVI.

H3: Volunteer subjects receiving IVI will achieve significantly higher cognitive test scores immediately after treatment than will subjects required to use IVI.

Several theorists assert an alternative hypothesis for the reported pedagogical effects of IVI, namely; the novelty effect of IVI may produce higher initial motivation to learn (Clark & Sugrue, 1988; Hannafin, 1985; Slee, 1989). However, a critical synthesis of IVI research in soft skill areas identified several studies that controlled for novelty effects and reported significant pedagogical effects for IVI (Cronin & Cronin, 1992). Furthermore, the only reported experimental study of IVI in speech communication found no significant novelty effect for IVI on immediate or delayed cognitive test scores. Neither preference for IVI over traditional instruction nor previous use of other IVI modules versus first-time use showed a significant association with cognitive test scores (Cronin, Grice, & Olsen, 1992).

H4: There will be no association between treatment group subjects' preferences for IVI

versus traditional instruction and their cognitive test scores immediately after treatment.

H5: There will be no association between treatment group subjects' previous use of other IVI modules and their cognitive test scores immediately after treatment.

The self-paced individualized instruction available in IVI may be more effective than traditional instruction for low-prior-achievement users. Savenye and Strand (1989) reported that the average student using IVI in physical science instruction demonstrated higher achievement levels than the average student receiving traditional physical science instruction. This difference was even more pronounced for students of lower prior achievement. Furthermore, research on application-intensive IVI similar to that used in this investigation found either no significant difference on immediate posttests between high-prior achievers and low-prior achievers using IVI (Dalton, 1986; Gray, 1987) or a significant prior achievement x treatment interaction (Schaffer & Hannafin, 1986). Students with high GPAs generally surpass students with low GPAs on cognitive tests on instructional material. However, IVI may help close the cognitive-gain gap between students with lower academic achievement and students with higher GPAs.

H6: There will be no association between treatment group subjects' reported grade point averages and their cognitive test scores immediately after treatment.

Method

Subjects. After adjusting for student absences and failures to follow directions, 141 college students at a middle-sized, comprehensive university in the southeast region served as subjects. Male subjects comprised 51% of the sample and female subjects made up 49%.

Instructional Materials. The multimedia approach promotes interest and understanding through humorous graphics, visual memory cues, dual screen and dual channel presentations, and exercises designed to enable students to apply IVI learning to the construction of speaking outlines. Examples of the multimedia design features are provided below.

Graphics, voice overs coordinated with text summaries, and a friendly "tutor" are incorporated to illustrate key principles and to enhance motivation to

learn. The graphics include putting the tips for designing speaking notes on separate notecards to highlight the tips and to illustrate the use of notecards in a speech. Other graphics serve as mnemonic devices for the user. One graphic uses a combination of large and small submarines to illustrate the relationship of subpoints to main points. The idea being that subpoints are subordinate to main points just as the small submarines are arranged under the large submarines. A related graphic identifies types of oranges under a visual of an orange and types of apples under a visual of an apple. Thus, graphically illustrating the outlining principles that subpoints must be related to main points and that main points should be mutually exclusive.

The program also incorporates simultaneous display on two screens and voice overs combined with text summaries. Two-screen or two-channel display in IVI provides two major pedagogical advantages. First, these dual options allow the user to become the editor of the program. The user can decide whether to listen intently to the voice over, to listen while reading the summary, to try to tie in the graphic with the text, or to integrate all of these elements. This editing option allows users to adapt the IVI program to their learning styles. Secondly, the simultaneous use of several interactive channels adapts to the modern TV, remote control, stimulus-load expectations of users. The stimulus load may be a necessary adaptation to the media expectations of users accustomed to the quick-cutting images of modern music videos, commercials, and movies, as well as routine "channel hopping."

Procedures and Design. An immediate posttest, control group, comparison group design was used for this study. The independent variable consisted of the presence or absence of videodisc-based IVI on "Constructing Speaking Outlines." The dependent variables included immediate cognitive test scores and treatment group responses on the formative evaluations. Analysis of variance (ANOVA) was used to analyze the cognitive test scores among the treatment, control, and comparison groups. Following a significant *F*, Duncan's Multiple Range Test was used to determine significant differences among individual group means. Regression analysis was used to analyze the cognitive test scores of the treatment group with the nature of participation (required versus voluntary) and S's rating of feedback in the IVI program, rating of the video in the IVI program, reported grade point average, previous use of

IVI on other topics, computer skills estimate, and preference for IVI compared to traditional classroom instruction serving as predictor variables.

Students from non-speech classes in economics, political science, health, and marketing either volunteered or were required to undergo IVI. They were randomly assigned to the treatment or the control group. These subjects received neither instruction in constructing speaking outlines in class prior to the study nor extra credit for their participation in this study. In an attempt to avoid a Hawthorne-type effect, students in the control group received approximately 30 minutes of placebo IVI in "Developing Key Ideas: The Four S's." This instruction provided no information on constructing speaking outlines. The control group consisted of 25 males and 22 females, 24 volunteered and 23 were required to participate.

The treatment group received approximately 35 minutes of IVI in "Constructing Speaking Outlines." The treatment group consisted of 24 males and 20 females, 24 volunteered and 20 were required to participate. These ratios were virtually identical to those in the control group.

The comparison group consisted of 50 students from three intact performance classes in speech (two in public speaking and one in argumentation and debate) who had received "normal" instruction, practice, and feedback on constructing speaking outlines. The comparison group was included to compare learning outcomes from IVI in constructing speaking outlines with the usual instruction on this topic provided in these speech classes.

The study was conducted between November 12 and 26, 1991. Participants in both the treatment and control conditions were shown how to use the IVI program by a trained student worker and were left alone to complete the lesson. Students in both treatment and control groups completed a sixteen-item test on constructing speaking outlines (split-half reliability = .89), a sixteen-item test on developing key ideas, and a formative evaluation of the instruction immediately after they received the instructional material. Students in the comparison group completed both sixteen-item tests during a regularly scheduled class. These measures were randomly ordered and randomly assigned in all groups to control for an order effect.

Results

ANOVA results supported hypothesis 1, which predicted that students using IVI on constructing speaking outlines would achieve significantly higher cognitive test scores immediately after treatment than would students in the control group. ANOVA results also supported hypothesis 2, which predicted that students using IVI on constructing speaking outlines would achieve significantly higher cognitive test scores than would students in the comparison group. The maximum possible score on the cognitive test was 16. The mean score was 10.72 for volunteer participants in the treatment group, 10.21 for required participants in the treatment group, 7.82 for required participants in the control group, 7.76 for volunteer participants in the control group, and 7.62 for participants in the comparison group. These scores were significantly different (R^2 = .30, F = [4, 136] = 14.72, p < .0001). The group differences accounted for 30% of the variance.

Regression analysis did not support hypothesis 3 that volunteer participants would achieve significantly higher cognitive test scores immediately after treatment than would subjects required to participate. The mean cognitive test scores in the treatment group for volunteers (M = 10.72) and required participants (M = 10.21) were not significantly different (F [2, 41] = .61, p < .4382). The addition of this predictor variable to the regression model increased the R^2 by only .014 (see Table 1).

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Insert Table 1 about here

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Regression analysis indicated that, as hypothesized (4 and 5), there was no significant novelty effect on cognitive test scores in the treatment group. No significant association was found between immediate cognitive scores in the IVI treatment and variations in subjects' previous use of other IVI modules (R^2 = .05, F [1, 42] = 2.23, p < .1432). Likewise, there was no significant association between immediate test scores and variations in preference for IVI versus conventional instruction (F [7, 36] = .10, p < .7582). The addition of this predictor variable to the regression model increased the R^2 by only .002 (see Table 1).

Regression analysis supported hypothesis 6 that there would be no significant association between variations in GPA and cognitive test scores immediately after treatment. There was no significant association between variations in GPA and cognitive test scores in the IVI treatment group (F [4, 39] = .26, $p < .6158$). The addition of this predictor variable to the regression model increased the R^2 by only .006 (see Table 1).

Educational Implications

IVI may enhance the effectiveness of video by facilitating active discovery and application on the part of the learner (Hamilton & Taylor, in press; Hansen, 1989). Students reported that the video portion of the IVI was helpful in promoting understanding of the material and made the IVI more enjoyable and more interesting. However, scores on this three-item measure of the pedagogical effectiveness of the video portion of the IVI (M = 1.87, SD = .64, Cronbach's α = .48) showed no significant relationship with students' cognitive test scores. More precise descriptions of the nature and functions of the video portions of IVI, more reliable self-report measures, and measurements of students' actual use of the video options would promote theory building and theory testing.

Feedback constructs developed in the communication discipline may be helpful in designing IVI and explaining empirical results. Positive feedback from a highly credible source and feedback that is perceived as informative (versus controlling) produces increased internal motivation (Cusella, 1980). Most students reported that the feedback in the IVI program was believable, informative, and did not attempt to control their behavior regarding constructing speaking outlines. However, the reliability of the three-item additive index of students' perceptions of the pedagogical effectiveness of the feedback in the IVI program was so low (M = 2.04, SD = .56, Cronbach's α = .12) that no definite conclusions can be drawn regarding contributions of IVI feedback to learning. More reliable measures of the various, and perhaps distinct, functions of feedback in IVI; more precise descriptions of the nature and functions of the feedback design in IVI; and measurements of students' actual use of the feedback options would promote theory building and theory testing.

"DEVELOPING KEY IDEAS: THE FOUR S's"

This study was conducted concurrent with the "Constructing Speaking Outlines" study. The theoretical perspectives were similar in exploring the effects of organization in oral communication. However, this study focused on the organization of key ideas via signposting, stating, supporting, and summarizing each key idea. Except for substituting "developing key ideas" for "constructing speaking outlines," the research hypotheses, educational implications, and the method were identical to those described in the "Constructing Speaking Outline" study with three exceptions. (1) The split-half reliability of the cognitive/application test in this study was .891 and Cronbach's α for the three-item measures of the pedagogical effectiveness of the video portion and the feedback portion of the IVI were .65 and .68 respectively. (2) The instructional material provides a tutorial approach in this multimedia IVI module. It includes carefully designed orienting activities, questions, feedback, graphics, video simulations, and review options to promote understanding. A user-friendly design facilitates student use by explaining the nature of IVI, instructing students in program use, and repeating specific instructions for use of each screen requiring student reaction. (3) The subjects in the treatment group in this study served as the subjects in the control group in the "Constructing Speaking Outlines" study and vice versa.

Results

ANOVA results supported hypothesis 1, which predicted that students using IVI on developing key ideas would achieve significantly higher cognitive test scores immediately after treatment than would students in the control group. ANOVA results also supported hypothesis 2, which predicted that students using IVI on developing key ideas would achieve significantly higher cognitive test scores than would students in the comparison group. The maximum possible score on the cognitive test was 16. The mean score was 13.96 for volunteer participants in the treatment group, 13.14 for required participants in the treatment group, 4.95 for required participants in the control group, 4.96 for volunteer participants in the control group, and 7.27 for participants in the comparison group. These scores were significantly different (R^2 = .60, F = [4,

138] = 51.75, $p < .0001$). The group differences accounted for 60% of the variance.

Regression analysis results did not support hypothesis 3 that volunteer participants would achieve significantly higher cognitive test scores immediately after treatment than would subjects required to participate (see Table 2). The mean cognitive test scores in the treatment group for volunteers (M = 13.96) and required participants (M = 13.14) were not significantly different (F [1, 43] = 1.56, $p < .219$).

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Insert Table 2 about here
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Regression analysis indicated that, as hypothesized (4 and 5), there was no significant novelty effect on cognitive test scores in the treatment group. No significant association was found between immediate cognitive scores in the IVI treatment and variations in subjects' previous use of other IVI modules (R^2 = .07, F [5, 39] = .10, $p < .756$). The addition of this predictor variable to the regression model increased the R^2 by only .002 (see Table 2). Likewise, there was no significant association between immediate test scores and variations in preference for IVI versus conventional instruction (F [7, 37] = .00, $p < .979$). The addition of this predictor variable to the regression model increased the R^2 by .000 (see Table 2).

Regression analysis results supported hypothesis 6 that there would be no significant association between variations in GPA and cognitive test scores immediately after treatment. There was no significant association between variations in GPA and cognitive test scores in the IVI treatment group (F [3, 41] = .47, $p < .495$). The addition of this predictor variable to the regression model increased the R^2 by only .011 (see Table 2).

GENERAL EDUCATIONAL IMPLICATIONS

The apparent efficacy of IVI in significantly enhancing subjects' learning of oral communication techniques in each of the three studies is consistent with research on the effects of IVI in related soft skill areas (Cronin & Cronin, 1992). This finding appears to indicate that a well-designed IVI program

can prove effective in training students in oral communication.

The formative evaluations conducted in each of the three studies indicate that IVI users appeared to be highly motivated to learn from the medium. Most users found the IVI programs interesting and enjoyable and wanted to learn more about oral communication after taking the training. IVI users felt that they would be capable of using the training to improve their oral communication competency. Likewise, none of the IVI subjects found it difficult to use the programs. This finding may reinforce the results of a recent study (Cennamo, Savenye, & Smith, 1991) in which undergraduate students perceived that it was significantly easier to learn from IVI than from instructional television and television.

The speaking outline and developing key ideas studies found no significant effects of GPA, IVI feedback rating, IVI video rating, or nature of participation (voluntary versus required) on cognitive test scores in the IVI treatment groups. Furthermore, the most plausible competing hypotheses did not appear to explain results in these studies. Time-on-task and instructional content were equivalent for the IVI and lecture/linear video groups in the speech fright study which reported that IVI was as effective as instruction from outstanding teachers. The novelty effect associated with IVI (Clark & Sugrue, 1988; Hannafin, 1985; Slee, 1989) did not appear to explain results in any of the three studies.

Perhaps the most important outcome of these studies is the preliminary empirical documentation of the instructional effectiveness of IVI in oral communication. Prior to these studies, very little research supporting applications of IVI in oral communication was available.

NOTES

[1] Material in this section is taken from Cronin, Grice, and Olsen (1992).

[2] Material in this section is taken from Cronin (1992, November).

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TABLE 1

"Constructing Speaking Outlines"
Treatment Group Increments to R^2 and p for
Each Predictor Variable

Variable	R^2	Increment	F	df	SE	p
Previous use of IVI	.0503	---	2.23	1, 42	.279	.143
Required vs. voluntary	.0643	.014	1.41	2, 41	.548	.256
Feedback rating	.0755	.011	1.09	3, 40	.754	.364
Reported GPA	.0816	.006	.87	4, 39	.651	.492
Computer competence	.0880	.006	.73	5, 38	.273	.602
Video rating	.0946	.006	.64	6, 37	.683	.693
Preference for IVI	.0970	.002	.55	7, 36	.287	.788

TABLE 2

"Developing Key Ideas: The Four S's"
Treatment Group Increments to R^2 and p for
Each Predictor Variable

Variable	R^2	Increment	F	df	SE	p
Required vs. voluntary	.0349	---	1.56	1, 43	.569	.219
Video rating	.0557	.0208	.93	2, 42	.568	.342
Reported GPA	.0665	.0108	.47	3, 41	.611	.495
Computer competence	.0716	.0051	.22	4, 40	.255	.642
Previous use of IVI	.0739	.0023	.10	5, 39	.233	.756
Feedback rating	.0742	.0003	.01	6, 38	.544	.918
Preference for IVI	.0742	.0000	.00	7, 37	.350	.979