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Stanley B. Supinski

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Abstract: This study compared two strategies using cooperative learning and interactive video instruction, and measured their effect on German language achievement, amount of invested mental effort, and attitudes. In the individualized video treatment, subjects used interactive video individually, then participated in a cooperative learning session. In the cooperative interactive video treatment, subjects worked together with interactive video for the entire instructional sessions.

Eighty-nine Air Force Academy freshman were randomly assigned to the treatment groups. Achievement was measured by performance on written dialogues constructed by the cooperative groups, and with a posttest. Performance on the dialogues was assessed by a type (number of different words used) and token (number of words used) analysis. Amount of invested mental effort and attitudes were measured with a post-study questionnaire and an opinion survey.

Wilcoxon tests on the types and tokens in the dialogues, and t-tests on the posttest scores, revealed no significant differences between the treatments on achievement. T-tests showed no differences between the treatments on the amount of invested mental effort, and attitudes toward interactive video instruction and language learning. The cooperative interactive video treatment showed significantly higher

attitudes toward cooperative learning, which was contrary to the pre-experimental hypothesis.

The results suggest that conducting interactive video instruction and cooperative learning in sequence, versus simultaneously, does not influence achievement in foreign language acquisition. The findings reinforce researcher recommendations to install two position interactive video workstations, with their inherent cost savings over individual workstations, as they may be equally effective.

THE FLORIDA STATE UNIVERSITY

COLLEGE OF EDUCATION

A COMPARISON OF SIMULTANEOUS VERSUS SEQUENTIAL USE OF INTERACTIVE VIDEO INSTRUCTION AND COOPERATIVE LEARNING: EFFECTS ON ACHIEVEMENT, AMOUNT OF INVESTED MENTAL EFFORT, AND ATTITUDES

By

STANLEY B. SUPINSKI

A Dissertation submitted to the
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Walter Wager
Professor Directing Dissertation

Elizabeth Platt
Outside Committee Member

Robert Reiser
Committee Member

Marcy Driscoll
Committee Member

Approved:

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The words in this document are a reflection of my thoughts as they have been molded, twisted, and reshaped over the past three years. The document, and my thoughts, could only have arrived at this point with the support, understanding, assistance, and encouragement from numerous individuals. Without the following family and friends, completing this dissertation would have been much more difficult, if not impossible.

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ABSTRACT

This purpose of this study was to compare two instructional strategies using cooperative learning and interactive video instruction, and to measure the effect of these strategies on achievement, amount of invested mental effort, and attitudes. In the individualized video treatment, subjects worked on an interactive video lesson on the German language, then participated in a cooperative learning session. In the cooperative interactive video treatment, subjects worked together with the interactive video for the entire instructional session. The study was conducted during 10 instructional sessions spanning five weeks.

Eighty-nine college freshman and sophomores were randomly assigned to the treatment groups. Achievement was measured by performance on three written dialogues constructed by cooperative groups during three of the 10 sessions, and by a posttest on German language listening, writing, and translating skills. Performance on the dialogues was assessed by a type (number of different words used) and token (number of words) analysis. Amount of invested mental effort was measured with a post-study questionnaire. Attitudes were measured with a post-study questionnaire and an opinion survey.

Wilcoxon rank sum tests on the types and tokens in the dialogues, and t-tests on the posttest scores, revealed no significant differences between the treatments on achievement. Use of t-tests revealed no differences between the treatments on the amount of invested mental effort, and attitudes toward interactive video instruction and language learning. The cooperative interactive video treatment showed significantly higher attitudes toward cooperative learning, which was contrary to the pre-experimental hypothesis. The opinion questionnaires reflected generally positive attitudes in the cooperative interactive video treatment, and a bipolarity of attitudes, negative and positive, toward the individualized treatment.

The results suggest that conducting interactive video instruction and cooperative learning in sequence, versus conducting this method and medium simultaneously, does not influence achievement in foreign language learning. The findings reinforce the recommendation of numerous researchers to install two position interactive video workstations, with their inherent cost savings over individual workstations, as they may be equally effective. Further research is recommended to determine how mature learners are best grouped when using technology-based instructional environments and cooperative learning.

CHAPTER 1

INTRODUCTION

This study examined the effectiveness of an instructional strategy that combines cooperative learning and interactive videodisc-based instruction. This chapter establishes the need for this study, examining the theoretical framework underlying this combination of instructional events; past research and practice; the rationale for the proposed treatment; methods for second language instruction; and why prescriptive research of this type can provide direct, positive impact upon classroom practice.

Background

Numerous studies have been conducted on the specific effects of cooperative learning on academic achievement, social interaction, goal accomplishment, affective factors, and several other areas. Although the results of these studies are often contradictory, the majority have generally shown that cooperative learning improves learning. A meta-analysis of 226 studies (Johnson and Johnson, 1990) revealed an effect size of .63, indicating that the average cooperative learner performed almost two thirds of a standard deviation (.63σ) higher than those learning individually.

These generally positive results have prompted researchers to study employing cooperative learning concurrently with other classroom instructional methods or educational media, such as interactive video. This type of research is a logical step in supporting the use of cooperative methods, since they would normally be used in addition to other instructional methods. Research, however, has frequently yielded no significant differences when empirically measuring achievement or other variables. For example, in a study employing cooperative learning simultaneously with television instruction, academic performance was higher for individuals than for cooperative groups (Klein, Erchul, & Pridemore, 1994). When combining cooperative learning with interactive videodisc-based instruction, no significant improvements were reported in Spanish language acquisition (Chang & Smith, 1991). Carrier and Sales (1987) also reported no achievement gains when students worked cooperatively on problem solving simultaneously with computer-assisted instruction. The question of whether one can achieve improved educational benefit by combining cooperative learning with an electronically-mediated form of instruction has yet to be resolved.

A possible reason for the failure to find positive results is that the cooperative learning was conducted simultaneously with the media-based instruction. A medium that is being used simultaneously with cooperative learning may compete for learner attention and overburden limited cognitive

resources, encourage passivity, and motivate off-task behavior. Additionally, other studies suggest that the types of learning normally benefited from cooperative learning and mediated instruction may conflict when attempted simultaneously. Cooperative learning is most beneficial for intellectual skills, while mediated instruction has been shown to best support learning of verbal information (Cohen, 1994; Hannafin, Phillips, & Tripp, 1986; Hannafin, Phillips, Rieber, & Garhart, 1987; Klein & Pridemore, 1992; Phillips, Hannafin, and Tripp, 1988). These factors may inhibit the desired benefits normally gained by cooperative methods from taking place, particularly when examining the primary theorized causes of enhanced performance in cooperative learning: cognitive elaboration and vocalization.

Researchers most often credit the positive effect of cooperative learning to cognitive elaboration. According to information processing theory, information to be learned must be related to existing knowledge in long term memory (Gagne, Briggs & Wager, 1992). Accordingly, cooperative learning helps the learner reconstruct or elaborate upon the new information to create more connections to the existing knowledge. In a series of studies, when pairs of students elaborated technical material to each other, both the listener and the elaborator used metacognitive strategies more frequently and performed better on tests of material recall than students working alone (Dansereau, 1985). In similar research, students who elaborated information during cooperative activities achieved the largest performance gains (Webb, 1985).

Explaining material from a personal viewpoint appears to foster more in-depth processing of the information (King, 1990), particularly when compared with typical teacher-delivered instruction.

A second theorized cause of increased achievement in cooperative learning is vocalization. Webb (1988) posits that when learners develop oral explanations, they cognitively reconstruct the information, thus deepening understanding. The reconstructions foster development of alternative symbolic representations, thereby bolstering the ties to existing knowledge. Numerous studies have shown that when students vocalized information to peers, achievement improved. In a cooperative learning study specifically designed to promote verbal interaction, by externalizing thoughts learners clarified ideas and made them accessible to other members of their cooperative group (King, 1990). In another study, students orally summarizing information significantly improved recall as the summarization provided more opportunity to organize and rehearse information (Yager, Johnson & Johnson, 1985).

Assuming the basic tenets of these theories, the presence of media in a cooperative group session may be inhibitive. Learners may not feel the need to elaborate when a medium does this task for them; the learners, therefore, become more passive. King (1990) emphasized that the elaboration strategies were effective when used "*prior to* instruction as well as after" (p. 683), but not during instruction. For similar reasons, vocalization

may be inhibited. This may partially explain the failure to produce significant findings in performance in studies in which cooperative learning and media use occur simultaneously, particularly those in which time on task is constrained. With two methods of instruction competing for cognitive resources, and reducing the amount of vocalization time, deeper processing may never come about.

Improvements in achievement can only occur when the learner attends to, or is mindful of, the presentation of material. Salomon (1983) defined mindfulness as a conscious cognitive manipulation of the environment. A direct relationship exists between the level of mindfulness of video-based information and encoding. Salomon identifies this relationship as the amount of invested mental effort. His research suggests that if mindfulness is reduced, which logically occurs when attention is directed to other members of a cooperative group and away from the medium, achievement may also be reduced.

Salomon's work (1984) has also shown that the amount of invested mental effort is negatively correlated to preconceived notions about the ease of learning with particular forms of media. Learners perceived video-based material as being easier to learn from than print-based material, thereby reducing effort, and consequently resulting in lowered achievement. A more passive approach is taken by learners due to their *a priori* attitudes. The introduction of another learner may serve to further promote passivity. More

passive attitudes may explain why some studies have reported significantly more time off task as group members engage in socialization. Carrier and Sales (1987) reported that over one fourth of the interactions between undergraduate learners in dyadic groups during computer-based instruction did not relate to the task at hand.

Another possible cause for failing to realize improved achievement in combination treatments is the type of learning most often affected by visually-based electronic media: verbal information (Gagne, Briggs & Wager, 1992). A study on the effects of practice and orienting activities on learning from interactive video (Phillips, Hannafin, and Tripp, 1988) revealed that achievement gains were greatest for verbal information or declarative knowledge. Such has been the case with computer-assisted instruction (Hannafin, Phillips, Rieber, & Garhart, 1987), television instruction (Klein & Pridemore, 1992), as well as for other studies of interactive video (Hannafin, Phillips, & Tripp, 1986). Cooperative learning, on the other hand, is most effective for learning intellectual skills. Therefore, if cooperative learning is not specifically structured to occur after verbal knowledge is gained from the media-based lesson, the learners may be attempting to work with information in the cooperative session that they have not yet fully mastered.

Purpose and Rationale of this Study

Based on the previous summary of research, when cooperative learning and electronically mediated instruction are conducted

simultaneously, one might deduce that: (a) Learner attention is reduced; (b) learners may not elaborate upon or vocalize information when a medium performs this task for them; (c) off-task behavior is facilitated; and (d) the acquisition of verbal information and intellectual skills is improperly sequenced. However, used in a linear versus simultaneous combination, interactive video and cooperative learning might provide a very powerful instructional strategy.

The purpose of this study is to examine the strategy of combining cooperative learning and interactive video instruction sequentially as compared to simultaneously. It is hypothesized that this method will result in increased achievement, an increase in the amount of mental effort invested in the medium, and improved attitudes. The previous failure to find improvement in these variables suggests that individualized interactive video instruction may serve to better prepare learners for subsequent cooperative sessions. Combining these two instructional events in this linear manner should consequently result in learners gaining the benefits of individualized interactive video instruction, proper sequencing of verbal information and intellectual skill learning, and a reduction of off-task behavior. This study will test this strategy by comparing learners using interactive video instruction alone followed by a cooperative session, to learners using interactive video cooperatively.

The primary benefit this strategy offers is individualization with interactive video instruction. When a learner has sole control of the instructional path, computers and interactive video instruction can accommodate individual preferences, thereby providing review where it is needed. Dalton, Hannafin, and Hooper (1989) recognized that well-designed CAI lessons that provide individualized instructional feedback account for increases in performance and attitudes. Similar results can be expected when interactive video instruction is used that offers learners individualized instructional options throughout a lesson.

Individuals would be better prepared for cooperative learning after gaining verbal information from interactive video instruction. Current technological capabilities limit interactivity between the machine and its user, thereby best suiting these media to the role of conveying information (Bush & Crotty, 1989). Once verbal information is acquired, the higher level of interactive discourse afforded learners in a cooperative group should improve encoding and retention of information. Johnson and Johnson (1990) cite numerous studies that indicate cooperative learning was particularly conducive to using and improving achievement for higher level reasoning, or intellectual skills. However, a study examining cooperative learning sessions in a Portuguese-for-Spanish-speakers classroom, cooperative groups were ineffective when learners were unprepared by not having the declarative

knowledge of vocabulary necessary to make the cooperative sessions effective (Milleret, 1992).

The problem of off-task behavior has been fairly consistent in combined media and cooperative learning studies. Off-task time accounted for fully 25 percent of the cooperative interactions among undergraduate learners in a study by Carrier and Sales (1987). Numerous studies have measured time on task as a variable (Dalton, 1990; Klein & Pridemore, 1992; Simisek & Hooper, 1992) and have noted that time and achievement are positively correlated. However, instructional efficiency, determined by dividing performance by time, has not improved as additional time provided learners is often spent off-task. When fifth and sixth grade learners in cooperative groups were allowed to direct their own interactive video lesson pacing, they provided themselves time for socializing (Dalton, 1990). The perceptions of easy learning from electronic media, and the opportunity provided by working in groups of peers, creates an environment for off-task behavior. This problem may be alleviated with the method proposed by this study.

A final rationale for examining this instructional strategy is that with learners aware of the requirement to participate in cooperative learning following an interactive video session, knowledge of the subsequent session should serve as an orienting activity. Hannafin and Hughes (1986) identify orienting activities as "mediators through which subsequent instruction can be

presented" (p. 94). With learners aware that vocalization and elaboration of the information gained during the interactive video lesson will occur in the cooperative group session immediately following the lesson, the amount of invested mental effort should increase. In other words, the moderators of improved performance in cooperative learning should have an impact on the preceding interactive video instruction when the learners know that they will be expected to actively participate in a cooperative session.

Use of Second Language Content

Though this sequencing strategy may be tested in virtually any content area, foreign or second language is particularly suitable because comprehension and interaction are assumed to be major facilitative variables of language acquisition, and interaction between learners promotes both. The interactionist theory of language acquisition suggests that language develops as a result of interplay or interaction among language users (Lightbown & Spada, 1992). Learners working in cooperative groups use structures and vocabulary that are often limited, primarily because they have yet to achieve higher competencies. However, since group member's abilities are approximately equivalent (unless groups are specifically structured otherwise), they create comprehensible input, or language at a level that each can understand (Krashen & Terrell, 1982). This type of language is similar to caretaker language or "Motherese" as it models the way parents make their talk understandable to children by using simplified vocabulary and syntactic

structures (Lightbown & Spada, 1992). While there is no hard evidence that actual language acquisition is linked to the comprehensibility of language input, it is assumed to be a causal variable. Working in cooperative groups has obvious advantages in that learners have increased opportunities for interaction over traditional-teacher delivered classroom instruction, in addition to making language available within each cooperative group member's capabilities, thereby potentially supporting the language acquisition process.

Second language acquisition has also been recognized as particularly suitable for interactive video instruction (Herron & Moos, 1993; Kozma, 1991). This recognition stems from the capacity to combine computer-based, individually optimized interactivity and the ability of video to accurately portray authentic language usage in culturally authentic surroundings. Physical settings and speaker identification, such as age, gender, appearance and socio-cultural identifiers (such as clothing and hairstyle) support achievement of communicative competence in second language acquisition (Yalden, 1987). Video also permits the learner to observe paralinguistic or non-verbal communication, which may account for up to 65% of communicative content (Galloway, 1980). Holistic presentation of authentic material provides a model to follow, as well as a topic stimulus for cooperative activity (McCoy & Wieble, 1984).

Conducting Prescriptive Research

Clark (1989) has criticized much of the research done in instructional technology, in which a favored method is compared to more typical methods, for producing information of little use. The criticism stems from the often careful development of the favored method, which is experimentally compared to existing treatments that may have been produced with little effort or poorly conceived designs. In much of the research done on the instructional events and media that are the subject of this study, using cooperative methods simultaneously with interactive video instruction or CBI is most often the favored method, but for good reason: the appeal of an instructional approach that requires fewer costly electronic workstations. While the primary hypothesis made here, that learners will perform better by first conducting interactive video instruction individually, counters this, it is neither the favored nor disfavored treatment. The purpose of this study is to compare treatments and performance that may provide information on cognitive processes, and answer the following question: in order to gain the benefits normally achieved by cooperative learning (i.e., a .66σ performance increase), how should interactive video instruction be included in the instructional environment?

Clark (1989) recommends a prescriptive approach to research, which may be suitable for answering this question. The prescriptive approach seeks to advance understanding about the variables in a process so that this understanding can result in better predictions or suggestions for teaching

methodologies. His recommendations are founded in the work of Glaser (1976), who stated that when deciding among alternative treatments, the substantive components of these treatments should be examined. The types of issues that Glaser recommends should be of concern when conducting prescriptive research include: (a) Analyzing conditions which foster the acquisition of competence, and (b) assessing the effects of instructional implementation. The central concern of this study, comparing instructional design options, is in consonance with Glaser's recommendations, as well as similar recommendations made by Orr and Davidson (1993).

Summary

Research has shown that gains are made in achievement when cooperative learning is properly utilized. Research also has shown that electronic visually-based media can support learning environments without detriment. Intuition dictates that when combining the two, achievement gains should be expected to reach at least those reached in well-designed cooperative learning studies. This has not, however, occurred as the theoretical underpinnings of the instructional method (cooperative learning) and the instructional media (interactive video) are in conflict. This research will test a method that should result in additive, rather than counterproductive, instructional benefits, when using cooperative learning and interactive video instruction. These benefits should be evident in academic achievement,

amount of invested mental effort, and in attitudes toward cooperative learning interactive video instruction, and language learning.

CHAPTER 2

REVIEW OF THE RELEVANT LITERATURE

This study will compare two strategies for combining cooperative learning with interactive video instruction. Research investigating this combination has shown mixed results. The purposes of this literature review are to:

1. Provide a framework in which to consider the value of cooperative learning, and under what conditions it is most effectively implemented.

2. Examine the research conducted in which cooperative learning has been simultaneously combined with television, computer-based, or interactive video instruction.

3. Discuss the research on amount of invested mental effort and effects of preconceptions on difficulty of learning from media, and how those preconceptions actually affect achievement.

4. Review the impact cooperative learning and mediated instruction have had on attitudes.

5. Examine research analyzing cooperative learning and interactive video in the context of second language instruction.

Implementing Cooperative Learning Methodologies

Johnson and Johnson (1990) have concluded that simply placing learners together in a group does not promote cooperation or more efficient learning. It is only under prescribed circumstances that cooperative learning can result in productivity gains over individual effort. Cooperative learning can thus be defined in terms of these circumstances, which involve the interaction that occurs within a group, and the goal structure of the group. Interaction requires considerable promotive, or face-to-face, time among cooperative group members, which involves providing assistance, aiding the processing of information, providing feedback, and supporting motivation for mutual benefit (Slavin, 1990). The interaction must also include periodic group maintenance, which entails evaluating the group's performance and taking corrective action when necessary. Another requirement is that the reward or goal structure for the cooperative group's effort be tied to both the individual and the group. Group members must be positively interdependent, meaning that all members of a group receive a common reward, such as a grade, but the contributions of each member must have an impact upon the group reward. Tuckman (1991) draws a metaphor to a baseball team: a victory or loss is for all on the team, although individual members may have hit home runs or struck out. Considering these requisite group features, cooperative learning can be operationally defined as a small group of students that "incorporate a cooperative task structure, a cooperative

incentive structure, and a cooperative motive to produce cooperative behavior" (Hooper, 1992, p. 24).

Cohen (1994) conducted a qualitative review of cooperative learning studies in order to determine the conditions required for group productivity and effectiveness. The key conclusions of her examination were that specific levels of interactivity were required for specific types of learning to take place, and that task structures must be appropriately established. For lower levels of learning, such as verbal information, limited informational exchanges were sufficient. For learning of conceptual knowledge or problems in ill-structured domains (Spiro, Feltovich, Jamieson, & Coulson, 1991), more elaborated discussion and interaction were necessary. Regarding the structure imposed upon cooperative groups by the instructor, Cohen (1994) found that an inverse relationship existed between structure and task: the more difficult the task, the less structure should be imposed for learning effectiveness.

Once effective cooperative behavior begins to occur in a group, the benefits of elaboration and vocalization discussed earlier can moderate improved achievement. Johnson and Johnson's (1990) meta-analysis that reflected the increase of two thirds of a standard deviation improvement included all studies examined. When the studies were reduced to those considered high quality--those in which subjects were randomly assigned, teacher and curriculum effects were controlled for, and experimental and control conditions were successfully implemented--the increase in

achievement reached .81 standard deviations. Successful implementation signifies that the cooperative groups were structured in accordance with the above conditions and guidelines for effectiveness.

Slavin (1991) indicated that the most critical factors to promoting achievement in cooperative groups are establishment of group goals and individual accountability. Based on these factors, he developed several cooperative methods which have found widespread success. These methods include student team learning (STL), in which students have responsibility for both their own and other team members' learning (Slavin, 1980). The groups in STL do not have a specific task to accomplish; learning, in response to specific objectives, is the central task. Another method is team assisted individualization (TAI), which is similar to STL, but learners begin at different levels and progression is the primary objective. In both STL and TAI, the groups are rewarded when objectives of all individual members have been achieved. Another commonly used method is Jigsaw, (Aronson, Blancy, Stephan, Sikes, & Snapp, 1978). In the Jigsaw method, cooperative group members begin by joining another group that focuses on a particular topic or content area, then return to their original groups to teach other members what they learned. These methods require individual accountability, and insure group goals are established. The methods also facilitate interdependence by virtue of the outcome or the means used during the process. With outcome interdependence, the end result can only be achieved by the team, whereas

with means interdependence, the resources, goals or tasks overlap (Johnson and Johnson, 1990).

Much of the research conducted to date that combined cooperative learning with visually-based media has not focused on a specific cooperative method, and has often failed to use the successful implementation guidelines and rules discussed above. Several problems have arisen when the guidelines were not followed. One of these problems, off-task behavior, has already been mentioned. Spending time off task is similar to social loafing, in which individual group members decrease effort due to the efforts of others in the group. This problem generally increases as the size of the group increases and "hiding" is easier. A related problem is the free rider effect, in which less able group members allow others to perform most of the work and minimize their own efforts (Hooper, 1992). This in turn leads to the sucker effect, in which the more able feel they are being taken advantage of, and they expend less effort on the task. In some instances the more able group members dominate their groups by operating at their level of understanding, resulting in the rich-get-richer effect (Slavin, 1990; Johnson & Johnson, 1990).

In summary, cooperative learning can have a positive impact on various aspects of the learning process. Group interaction allows for elaboration and vocalization of material which fosters deeper processing and facilitates achievement. Interaction also contributes to numerous

socialization benefits, such as better attitudes toward learning and peers. However, the cooperative process must be developed in accordance with research-proven principles and continuously maintained if it is to be effective. When conducting research of this type, in which cooperative learning is combined with another classroom event, using established methods becomes even more critical as results may be confounded or incorrectly attributed.

Review of Research Combining Cooperative Learning with Visually-Based Electronic Media

A great deal of research separately examining cooperative learning, television instruction, computer-based instruction (CBI), and interactive video instruction has been conducted. However, the number of studies done combining cooperative learning with one of these electronic mediated forms of instruction is surprisingly sparse. Researchers often discuss these media concurrently, however, due to their unique attributes, as outlined by Kozma (1991), and consequent instructional use, they warrant separate consideration. This section will examine the research conducted on the use of cooperative learning with television instruction, cooperative learning with CBI, and cooperative learning with interactive video instruction, and the effects on achievement. Following this is an analysis of the impact upon learner attitudes. Although the overall results have been mixed, some trends have emerged.

Television Instruction

Television instruction has the least potential to improve learning achievement when combined with cooperative learning (Klein, Erchul, & Pridemore, 1994). Television differs from CBI and interactive video instruction in that the speed with which information is provided is not controlled by the learner. The transience of information causes learners to give the medium only periodic attention. The amount of attention paid the medium is reduced when other activities are available in the instructional environment (Anderson and Field, 1983). Cooperative learning is such an activity; even when actual interaction is not taking place, the presence of group members may be a distraction which reduces the amount of information acquired from televised instruction.

When instructional television was examined with individuals versus cooperative groups, both achievement and overall motivation were higher for the individuals (Klein, Erchul, & Pridemore, 1994). The researchers claimed that the possible cause was that "television is an individual experience with little opportunity for interaction," (p. 30), and they found that much of the time spent in the groups was off task. In another study (Klein and Pridemore, 1992), high need for affiliation learners scored highest on verbal information items on a posttest when working alone versus in cooperative groups. The subjects in both studies were undergraduate college students. Performance for the individual versus cooperative learners overall did not differ statistically,

despite the fact that the cooperative groups spent, on average, about nine more minutes on task. Although during both of these studies the cooperative discussion did not occur simultaneously with the televised instruction, attentiveness may have decreased simply due to the presence of the members of the cooperative groups, thereby reducing the amount of information gained, as shown on the verbal information portions of the posttests.

Computer-Based Instruction

CBI differs from televised instruction due to the potential for interactivity and feedback. As previously discussed, it is precisely this interactivity and feedback that make CBI more effective when used individually, versus using it in pairs. Individuals take instructional paths optimal to their learning needs, while a group may take a path that is a compromise for each group member (Kinzie, 1990). Herron and Moos (1993) cited the value of the thousands of experiences a computer can generate that relate to individual needs when used in a foreign language learning context. Whether CBI alone improves learning achievement has been a subject of considerable debate. A meta-analysis of 48 studies (Kulik, Bangert, & Williams, 1983) reported that 39 of the studies reflected improvement, averaging .32 standard deviations. However, Clark (1994, 1983) has claimed that the improvements stemmed primarily from the uncontrolled effects of instructional methods and the novelty of the new media, and that the medium

itself does not influence learning. Despite this debate, research has continued, and far more has been conducted with CBI and cooperative learning than with television or interactive video instruction.

Many researchers suggest that combining CBI with cooperative learning promotes improved performance, but the findings are not conclusive (Orr & Davidson, 1993). Carrier and Sales (1987) did not find improvements in achievement when paired versus individual students worked on computer-based math lessons. They noted that learner control decisions were affected by grouping students. Pairs of students spent significantly more time on a feedback-type selection screen, which offered knowledge of response, knowledge of correct response, elaborated response, or no feedback options, as defined by Dempsey, Driscoll, and Swindell (1993). Preferences for the most useful type of feedback varied between the paired learners, resulting in debate of which path to take, and a compromise to optimal learning. In another study, significant increases in achievement and attitudes did result in cooperative groups in middle school health classes using CBI (Dalton, Hannafin, & Hooper, 1989). However, they noted potential limitations to their findings. The study involved only a single 30 minute lesson, and the subject matter, human reproduction, inspired an inordinate amount of interest and activity in the adolescent subjects. Additionally, time on task was not controlled. The inconsistency of improved achievement has occurred across the wide range of subject ages and content areas examined, which may

suggest that other factors, such as learner intrinsic or extrinsic motivation, may be the moderating variable. This also provides a possible explanation of why off-task time has varied widely.

The increasing amount of research over the past several years conducted on combining cooperative learning and CBI has prompted researchers to review the studies in an effort to consolidate results and determine salient trends. The researchers conducting these reviews have been fairly consistent in their interpretations of the results. Rysavy & Sales (1991), reported that achievement results have been mixed. Shlechter (1991) reported that no consistent effects were realized in achievement, and that those studies in which positive results were found, (Dalton, et. al, 1989; Hooper and Hannafin, 1991; and Mevarech, Silber & Fein, 1991), the results were not very substantial. Mevarech, et. al. (1987), in a review of studies done prior to 1987, indicated that "there is no evidence that learning alone or together in CAI produced different levels of achievement" (p. 164). A listing of the majority of studies done since 1987 is shown in Table 2.1.

Numerous researchers have suggested that the most beneficial role of the computer in the instructional environment is to stimulate human-to-human interaction. In a review of technology used in the study of second languages, Garrett (1991) indicated that the ability of the computer to provide a stimulus for inter-student interaction may be its best use. Underwood (1984) also recognized this potential, particularly within a foreign language context,

Table 2.1

Summary of Selected Cooperative Learning/Computer-Based Instruction

Studies Examining Achievement

Author(s)/ Pub. Year	Independent Variables	Dependent Variables	Key Results/Comments
Crooks, Klein, Jones, & Dwyer (1995)	Monads/Dyads Learner Control Option	Achievement Attitude Option Use Interactions	No differences in achievement found between individuals and cooperative groups using CBI.
Bueno & Nelson (1993)	N/A	N/A	A qualitative study--observers often noted that group members at keyboards entered information and responses, while others did the thinking. Achievement was measured by how much students relied on each other as resources, which improved cooperation.
Orr & Davidson (1993)	Monads/Dyads	Achievement Attitude	No differences in achievement found between individuals and cooperative groups using CBI.
Mevarech (1993)	Monads/Dyads High/Low Achievers	Achievement AIME Social Acceptance	Low achievers performed better in groups, while there was no difference in high achievers.
Mitchell (1993)	Monads/Dyads Auditory/Visual Learning Style	Achievement	No significant differences between individuals and cooperative groups using CBI.
Hooper, Temiyakarn & Williams (1993)	Monads/Dyads High/Average Achievers Learner/ Program Control	Achievement Attitudes Practice Items	Dyads scored significantly higher on generalization questions on achievement posttest; no differences on problem solving, fact, or application-type questions.

Table 2.1-- continued

Summary of Selected Cooperative Learning/Computer-Based Instruction

Studies Examining Achievement

Author(s)/ Pub. Year	Independent Variables	Dependent Variables	Key Results/Comments
Hooper, 1992	Monads/Dyads High/Average Achievers	Achievement Efficiency Interaction	Dyads scored significantly higher on achievement posttests.
Whyte, Knirk, Casey, & Willard (1991)	Monads/Dyads Field Dependent/ Independent	Achievement	No significant differences between individuals and pairs.
Dalton, Hannafin & Hooper (1989)	Monads/Dyads	Achievement Attitudes	A one time study in which cooperative groups did better on achievement, but no differences found in attitudes toward learning with the computer.
Hooper & Hannafin, (1988)	Monads/Dyads High/Low Achievers	Achievement	No significant differences between individuals and pairs.
Carrier & Sales (1987)	Monads/Dyads	Achievement Retention	No differences found in achievement. Groups spent a great deal of time off task.
Mevarech, Stern, & Levita (1987)	Monads/Dyads	Achievement Attitudes Sociability	Achievement differences and attitudes toward CBI were not statistically significant; attitudes towards classmates favored the cooperative groups.

stating "it may very well turn out that the biggest advantage to computer assisted language learning software is a side effect, the dialog that occurs in front of the screen rather than on it" (p. 95). Pappert (1980) also recognized this role, and described the computer as a "transitional object to mediate relationships that are ultimately between person and person" (p. 183). In reporting on the development of the Just in Time Open Learning (JITOL) project, a computer mediated learning environment that supports both cooperative learning and individualized self-direction, Steeples (1993) indicated that "the significance in computer-mediated learning environments of human-human interaction and collaboration is being recognised, but there is potential tension with well established educational principles of self-direction and independence for adult learners" (p. 443). This notion contributed to the underlying methodology of the project that provides for both individualized, mediated learning as well as a separate human-to-human interaction component. The results of research, and the recommendations of numerous researchers, suggest that the computer's role in cooperative learning environments may be most effective in stimulating cooperative interaction that occurs away from the computer. The strategy being examined in this study will help determine whether the medium, interactive video, is better utilized to stimulate discussion in a separate cooperative session, thereby improving overall achievement.

Interactive Video Instruction

Much less research has been conducted on interactive video instruction than on CBI, perhaps due to the higher cost of this medium and because it has been used more extensively in business and industry rather than in education (Litchfield, 1993). In a review of interactive video instruction use in defense, industry, and higher education, Fletcher (1990) concluded that interactive video instruction did improve achievement. In research examining interactive video instruction over a 10 year period, McNeil and Nelson (1991) examined achievement effects of 63 studies. Although the results were not conclusive, they determined that interactive video instruction can be effective, particularly when appropriately used. There is overlap with CBI research, as interactive video instruction is considered by many researchers as simply CBI which incorporates video images (Cronin & Cronin, 1992). This is true with Level III interactive video, which consists of videodisc linked to a separate microprocessing system, or computer, which can perform higher order branching and answer processing, and overlay video with text to support user sequencing and selection of metacognitive strategies (Bush & Crotty, 1989).

Despite the overlap, interactive video instruction has been generally more successful than CBI in realizing achievement differences, perhaps due to the increased effectiveness of providing veridical representation, which is more dynamic and spatial, and facilitates the formation of mental models

(Cognition and Technology Group, 1989). Kozma (1991) has recognized that the prospective value of interactive video instruction lies in its ability to help learners analyze rich information from video scenes, with added support from the computer in the form of exercises, prompting, etc. According to the dual code hypothesis, encoding of information may be enhanced when both semantic and graphical representations can be cross-referenced (Park & Hannafin, 1993). Additionally, interactive video instruction has the benefits of interactivity and feedback, which inhibit the potential for passive viewing that televised instruction is often criticized for. As with CBI, however, interactive video instruction has been principally recognized as beneficial to learning due to its adaptability to the needs of individual learners (Dalton, 1990; Clement, 1981).

Only a handful of studies have examined the combined use of interactive video instruction and cooperative learning. In a study which compared individual learners (monads) to cooperative learners (dyads) using interactive video instruction for learning Spanish (Chang and Smith, 1991), no differences in achievement were realized. However, their groups received no instruction in cooperation, and failed to meet the criteria of cooperative learning as defined by Johnson and Johnson (1990) and as defined for the purposes of this study. Simisek and Hooper (1992) also compared monads to dyads, using Level II videodisc, which consists of a computer program embedded on one of its audio tracks that allows limited branching and answer

processing. They reported that the dyadic groups scored higher on achievement tests. However, their study also measured time on task as a variable, and the dyads averaged about seven more minutes time on task than the monadic groups. When determining instructional efficiency, which divides achievement scores by the time on task, the groups were virtually identical. While no other studies have made direct comparisons between individuals and pairs, a study by Dalton (1990) warrants mention. Dalton specifically measured the instructional efficiency of pairs of students using interactive video instruction, and noted that when learners were allowed to jointly make decisions on the path taken through the instructional course, they performed no better than pairs completing the course with no learner control options. This may indicate that compromised decisions were only as effective as no decision; thus, the benefits of an individualized instructional path were removed.

The paucity of studies in this area precludes drawing conclusions or making generalizations. It is important however, that more is learned about effective use of interactive video instruction as the distinction between this medium and CBI begins to erode. Technological advances have made digitized video available, so multimedia systems can increasingly include visuals without the requirement of a videodisc player. The added capability of visuals to increase the comprehensibility of content, learner attention, and enjoyment must be addressed (Cronin & Cronin, 1992). These capabilities

must be emphasized when combining interactive video instruction with cooperative learning. Additionally, Litchfield (1993) recommends that instructional designers must be knowledgeable of cooperative learning methods to make the most effective use of multimedia. This study will contribute to this effort.

Attitudinal Issues

Research on cooperative learning with television instruction, interactive video instruction, and CBI has also been inconclusive on the issue of attitudes, regardless of which specific attitudes were being assessed. The varying foci of researchers examining attitudes reflect the varying views of what is specifically meant by the term and which attitudes are considered important. A common theme does, however, exist in the study of attitudes: a correlation has been found indicating that students with better attitudes will invest more effort and consequently perform better in the learning environment (Repman, 1993; Slavin, 1990; Slavin, 1980). As a result, research has been conducted examining attitudes toward cooperative learning and toward the medium used, and the subsequent effects on sociability, motivation, gender acceptance, self-esteem, acceptance of learning and physically disabled students, and race relations. Generally speaking, when attitudes are positive, these variables are also positively affected. The acknowledged existence of this relationship necessitates that

research continue to determine which specific cooperative methods and media facilitate the improvement of attitudes.

Hooper, Temiyakarn, and Williams (1993), noted that learners with negative views of cooperative learning are less prone to invest effort in the process or to vigorously engage in activities that foster achievement. Hooper and his colleagues found that attitudes toward cooperative learning, when combined with CBI, were favored by subjects in the cooperative treatments. In studies with CBI and other electronic media, cooperative learning has been favored more often by those participating in cooperative groups (Crooks, et. al, 1995; Klein & Pridemore, 1992; Simisek & Hooper, 1992; Mevarech, et. al., 1987). On the contrary, there have been some studies that showed no differences in attitudes toward cooperative learning between subjects in cooperative and individual treatments (Dalton, et. al., 1990; Johnson, et. al., 1985). Several studies have also examined the motivation to continue studying the subject material or with the particular method presented in the research study. Here again, results have been inconclusive. Johnson, et al. (1985) found that cooperative groups were more motivated to continue toward the learning goals of the study. Klein & Pridemore (1992) found that cooperative learners would "like to learn more by participating in a similar type of activity" (p. 45), but Klein, et. al. (1994), found contradictory results, indicating that individual learners expressed more overall continuing

motivation. This is further evidence that numerous variables intervene, thereby causing inconsistent results.

Attitudes toward the medium have also varied. Bueno and Nelson (1993), observed that students learning at the computer cooperatively led to increased value of computer sessions as opportunities to understand and practice material learned in the classroom. Crooks, Klein, Jones, and Dwyer, (1995) found that students in individual learning conditions preferred working with CBI over those in cooperative treatments. On the other hand, Mevarech, et. al. (1987), found no overall differences between the monadic and dyadic conditions, and Johnson, et. al. (1986) found that the cooperative learners liked CBI the best. Interestingly, in the Hooper, et. al. (1993) study, despite the fact that cooperative learners showed significantly better attitudes toward cooperative learning, there was no difference in attitudes toward CBI.

Common to all the research cited on attitudes is that the cooperative learning occurred simultaneously with either the television instruction, interactive video instruction, or CBI. Although many of the researchers queried subjects on specific aspects of the treatment, such as whether they liked cooperative learning or CBI, with the events occurring simultaneously it may have been difficult to isolate which part of the treatment actually caused the positive attitudes. The residual effects of a strong positive attitude toward one aspect of instruction may affect the self-reported attitudes towards other aspects. As the method proffered by this study will isolate these variables by

conducting the cooperative learning and interactive video instruction separately, it may better define which components of the instructional environment result in better attitudes.

Review of Research on Amount of Invested Mental Effort

The notion of amount of invested mental effort (AIME) is crucial to understanding why cooperative learning may impede learning from televised instruction, CBI, or interactive video instruction. According to Salomon (1983), and Mevarech (1993), the level of AIME is correlated negatively with a learner's preconceived notion, or perceived demand characteristic (PDC), of how easy a medium is to learn from. Salomon (1984) later tested this notion with television and print instruction. Learners believed television was easier to learn from than print, and with a self-reported measure, indicated that they invested less mental effort. Less AIME consequently resulted in lower achievement scores. Therefore, when learners believed that a medium was harder to learn from, achievement improved.

The research on AIME has not been completely conclusive. Cennamo, Savenye and Smith (1991) did not find a correlation between the PDC of interactive video, television instruction, and television, and AIME. Cennamo and her colleagues attributed this to the level of learners in their study, college students in a program with stringent academic requirements, and the construct of their questionnaires. The AIME questionnaire required learners to rate how hard they thought, tried to remember, concentrated, and how

much effort they expended in comprehending the lesson; whereas the PDC questionnaire did not specifically identify these factors. Their study realized no differences in AIME between the three treatment groups, which may also be attributable to all the media being visual and electronically-based. The end result, however, was similar to those found by Salomon: a correlation existed between the PDC and the achievement scores.

The construct of AIME has been identified in other research as effort, attention, concentration, or use of cognitive capacity; all terms which infer increased cognitive resources directed toward a particular stimulus (Cennamo, et. al., 1991). Research to increase this cognitive effort has been done with advance organizers (Ausubel, 1960); prequestions or adjunct questions (Hamaker, 1986; Reynolds & Anderson, 1982); and the use of cues or signals that point to key portions of instructional content (Mayer, 1984). The research has shown that such methods do produce superior learning, but relatively little has been done that is unique to interactive video instruction (Clark, 1985). In a study by Krendl and Watkins, (1983), one treatment group was composed of subjects informed that they were watching a television program for entertainment purposes, while the control group was told the program was educational and that they would be tested. The group watching for educational purposes showed a deeper level of understanding of the program's content. Informing subjects of the purpose of the program served as an orienting activity, which may have increased AIME and improved

understanding of the program's story line. Phillips, Hannafin, and Tripp (1988) noted that elaborated practice of material gained from interactive video instruction, the type that often occurs in effective cooperative learning, resulted in higher levels of achievement of verbal information. In their study, the conclusion could therefore be drawn that knowledge of a forthcoming elaborative practice session resulted in greater AIME for the interactive video session.

It seems intuitively apparent that seeking to increase AIME should be a goal when designing instructional procedures. Winn (1986) advocated research that could specifically identify methods of increasing AIME. Park and Hannafin (1992) suggested seeking ways to increase AIME as one of their guiding principles for designing interactive multimedia. Additionally, they suggested learning can decline when there is competition for the same cognitive resources. This competition could come from simple physical responses, such as pointing and clicking, and could result in important details from the multimedia going undetected or interrupting processing continuity. Responding to a cooperative group member may have a similar result. The subjects participating in this study should increase AIME in the interactive video instruction when aware that they will need the knowledge presented to effectively participate in the cooperative session that will occur immediately following. Additionally, the potential distractions of having a group member present during the interactive video instruction sessions will be eliminated.

Review of Research on Second Language Learning with Cooperative Learning and Interactive Video Instruction

Second Language Learning and Cooperative Learning

Cooperative learning has long been advocated as an effective method in the second or foreign language classroom. Krashen and Terrell (1983) believed that the primary role of the language instructor was to "create a net of speech which will enable students to begin interacting using the target language and to begin the acquisition process" (p. 180). They indicated that small group work allowed students the benefit of hearing large amounts of speech, and had the additional motivational benefit of allowing inadequate responses without embarrassment. Cooperative learning has also been recognized as most characterizing the proficiency-oriented classroom in a survey of language teachers, program coordinators and program supervisors (Birckbichler and Corl, 1993). Proficiency-oriented classrooms are those in which the goal is to reach specific, defined levels of language skill, and primary emphasis is placed on the meaning of language and communicative uses. Porter and Long (1985) examined much of the work done on cooperative work in the language classroom, and cited pedagogical and psycholinguistic arguments for using cooperative learning (see Table 2.2).

The use of cooperative learning in the language classroom is also supported by the theory of the zone of proximal development (Vygotsky, 1978). The zone is defined as the difference between actual and potential

Table 2.2

Long and Porter's (1985) Arguments for Cooperative Learning in the SLA Classroom

Pedagogical Argument	**Justification**
Group work increases practice opportunities	Interaction in small groups more frequent
Group work improves the quality of student talk	Talk for real communicative purposes Reduces use of isolated (decontextualized) language use
Group work helps individualize instruction	Group members focus on their own needs rather than whole class needs Affords a variety of level and content
Group work promotes a positive affective climate	Greater support from group members Greater error toleration
Group work motivates learners	Group members feel less inhibition Active participation increased
Psycholinguistic Argument	**Justification**
Comprehensible input more often used	Learners produce language output at the level of their group members
Negotiated communication between non-native speakers	Negotiated meaning promotes acquisition

levels of learning. Cooperative learners may form a zone of proximal development for each other by virtue of their individually varying capabilities. The interaction that occurs in groups, to include provision of feedback, is conducive to learning as peers stay within each other's zones. However, prior

to being able to manipulate language during discourse, the learner must have been exposed to it beforehand. The instructional strategy examined in this study should facilitate this process.

An additional theoretical perspective on the value of interaction, which further supports the use of cooperative learning in the language classroom, is derived from Donato's (1994) study on collective scaffolding. Donato, working in a Vygotskian perspective, noted that learners at the same level can provide scaffolding for each other. Since the linguistic knowledge of each member of a cooperative group varied, the collective knowledge of the group was greater than that of any individual member. Donato observed that during group interaction, the speakers were "at the same time individually novices and collectively experts," and that "co-construction of the collective scaffold reduces the distance between the task and individual capabilities" (Donato, 1994, p. 44). Donato concluded that group members developed linguistically as a result of their social interactions.

Long (1985) studied interaction patterns of various language classroom methodologies and noted that in cooperative groups, learner language, defined as target language use of the learner, reflected more questions and responses, and students took more initiative to speak spontaneously than in teacher-centered classrooms. The study also showed that a much larger variety of language functions were used, such as defining, requesting, disagreeing, etc. Another study (Bejarano, 1987) found that achievement

significantly improved when cooperative learning was used, and the researcher noted that it met the demands of modern communicative approaches, which emphasize ability to use the language, over earlier paradigms which focused on language form. In a qualitative study, cooperative techniques provided "more and richer language learning in a challenging context" (Milleret, 1992, p. 439). Milleret also noted, however, that the conditions which make cooperative learning effective, as stated by Johnson and Johnson (1990), are equally important to the language classroom. When these conditions were not applied, students spent time off task, hurried through work so they could conduct off-task discussion, worked alone, or allowed one student to do all the work.

Although little second language learning research has been conducted directly measuring the effects of cooperative learning, it is intuitively evident that more target language interaction can occur in small groups than in a teacher-centered classroom or by an individual student. Significantly increased opportunity, qualitative improvements due to actual communicative use, and an atmosphere that promotes positive affective attitudes, as well as positive empirical results, are the key reasons use of cooperative learning has been suggested to benefit the language classroom.

Second Language Learning and Interactive Video Instruction

Although televised and computer-based instruction have been used to support teaching foreign/second languages, interactive video instruction has

been recognized as having the greatest potential (Herron & Moos, 1993; Kozma, 1991), due primarily to the addition of graphic information. Despite broad use of interactive video in language instruction, little empirical research has been done to confirm its effectiveness. Video shown in an interactive video instruction format resulted in significantly greater Spanish language acquisition than when shown in a linear mode (Gale, 1989). In a similar study, students learning Spanish were compared using three modes of interactive video instruction: linear viewing of video only, segmented viewing with computer-embedded questions, and segmented viewing with computer-embedded questions that also provided knowledge of correct response feedback and other help functions that could be randomly accessed. Both interactive groups, those with embedded questions, significantly outperformed the linear groups (Verano, 1989). Verano noted that interactive video instruction was "beginning to confirm intuitions and support the theoretical framework concerning the effectiveness of these technologies" (Verano, 1989, p. 254).

Perhaps the greatest benefit of using interactive video to support language instruction is the improvement of motivational factors. Interactive video instruction has regularly shown to improve attitudes toward learning and instructional content (Nichols & Toporski, 1993; Schaffer & Hannafin, 1986; Dalton, 1986). Cronin and Cronin (1992) noted that the provision of visuals and interactive features of interactive video instruction were the primary

factors that enhanced learner motivation with this technology. Improved attitudes have, in turn, been shown to improve second language learning (Lightbown & Spada, 1992). According to Krashen's (1981) affective filter hypothesis, affect and attitude are directly related to success in language acquisition. If affective filters are low, then the acquirer is more receptive to language input and consciously attempts to increase the quantity of input. A classroom atmosphere with low anxiety levels, and any instructional activity which improves attitudes, promotes language acquisition (Krashen & Terrell, 1983). Nichols and Toporski (1993) noted that students learning advanced Russian with interactive videodisc reported a high measure of satisfaction with the video and the technology.

Though limited, evidence from previous research strongly indicates the potential value of interactive video instruction to both achievement and attitudes when learning a second language. However, mixed results when used with cooperative learning justify conducting further research to develop the most effective methods for incorporating interactive video instruction into the language learning environment.

Summary

A review of the literature on the three modes of visually-based electronic media, televised instruction, CBI, and interactive video instruction, when combined with cooperative learning, reveals that achievement gains have been limited and occur only when time on task was uncontrolled. This

review also suggests, however, that if postured correctly, the media, particularly interactive video, can be successfully combined with cooperative learning to achieve quantifiable gains in achievement. The instructional strategy tested in this study may be particularly suited to support second language instruction, however, the results should generalize to any instructional task of educational content area.

Hansen (1990) reviewed misuses of technologies in the classroom, and developed guidelines for avoiding past mistakes. Among his rules was that "learning experiences gained in using interactive video need to be cycled back into the classroom process" (p. 18). Logic dictates that when this "learning experience" is recycled with a method that research has shown to be effective, such as cooperative learning, the results should be positive. The successful outcome of this method should have direct practical classroom applicability.

CHAPTER 3

METHOD

This study was conducted to compare alternative instructional strategies using cooperative learning and interactive video instruction. The argument has been made that the traditional approach, conducting cooperative learning simultaneously with interactive video instruction, may result in reducing attentiveness paid to the interactive video medium, failure to correctly sequence the acquisition of verbal information and intellectual skills, and facilitation of off-task behavior. This study compared the effects of individual students receiving interactive video instruction followed by participation in cooperative learning sessions, to pairs of students working cooperatively with interactive video for the entire instructional session. It was hypothesized that the individualized interactive video instruction treatment would minimize the aforementioned problems and result in higher achievement, increased amount of invested mental effort, and improved learner attitudes.

This chapter first outlines the research design, specific research questions examined, the variables of the experiment, and specific hypotheses

made. The second section describes the participants, their educational environment and the materials used, and provides an overview of procedures followed. In the final section instrumentation and data analysis are discussed.

Design, Variables and Hypotheses

This study compared individual use of interactive video followed by cooperative learning, to cooperative use of interactive video, using a posttest only control group design. The design is represented in Table 3.1.

Table 3.1 Experimental Design

R	X_1 O_1 x3
R	X_2 O_2 x3

R=random selection; X=treatment group;
O=observations made; x=multiple of observations
number=condition (Tuckman, 1988)

Independent Variables

The one independent variable, type of treatment, had two levels, individualized video followed by cooperative learning, and cooperative interactive video. In the individualized video treatment, subjects received interactive video instruction alone, then participated in cooperative learning on the content of the interactive video lesson during each of the 10 sessions of the study. The cooperative interactive video treatment consisted of pairs of

subjects working cooperatively at workstations receiving interactive video instruction during each session. Learners were randomly assigned to the individualized and cooperative interactive video instruction groups, and those subjects in the individualized treatment were also randomly assigned to groups in the subsequent cooperative sessions. Subjects worked with the same cooperative partners throughout the study. The variables are graphically portrayed in Figure 3.1.

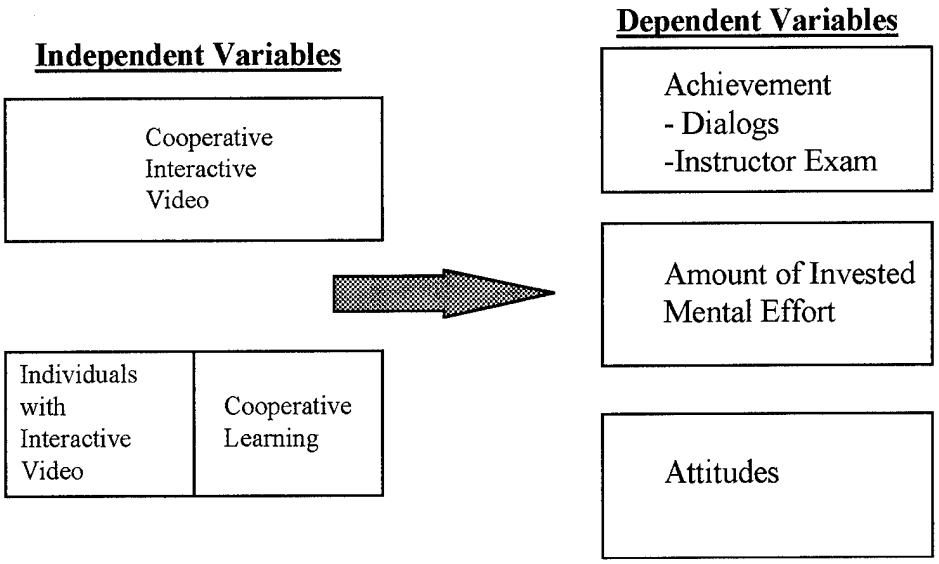


Figure 3.1

Experimental Variables

Dependent Variables and Hypotheses

There were three dependent variables used to measure the differences between the two levels of the independent variable. The first dependent variable, achievement, was measured with two instruments. The primary instrument was three dialogue construction worksheets completed during three of the cooperative sessions. Achievement was also measured by performance on an instructor-developed unit exam, or graded review, administered at the conclusion of the study. It was predicted that the individualized video treatment subjects would score higher on all achievement measures than those in the cooperative interactive video group.

The second dependent variable, amount of invested mental effort, was measured with a self-report questionnaire administered to each subject at the end of the study. It was predicted that subjects in the individualized video treatment would report greater amounts of invested mental effort.

The final dependent variable, attitude, was also measured with a self-report questionnaire administered to each subject at the end of the study. It was predicted that the individualized video treatment would report better attitudes towards cooperative learning, interactive video instruction, and language learning than the cooperative interactive video group. Additionally, during the study a decision was made to collect qualitative data on attitudes with an open-ended opinion questionnaire administered near the end of the study.

Research Site and Participants

The study was conducted at the Language Learning Center (LLC) of the Foreign Language Department, United States Air Force Academy (USAFA), in Colorado Springs, Colorado. This location and its military population were chosen for several reasons. First, the study fit well with the research agenda of the institution. The LLC is noted as one of the largest and most advanced language laboratories in the nation, with an ongoing effort toward improving the effectiveness of interactive video instruction. This researcher is a language instructor with USAFA, user of the LLC, and participant in its development efforts. Second was the availability of subjects: all were military cadets, and all in the course selected participated in the study. Class attendance was mandatory, thereby assuring that all subjects, barring illness, attended each session of the study, and experimental mortality was minimized.

The participants were 89 USAFA cadets enrolled in German 131, during the fall semester of the 1995/1996 school year. Most of the cadets were in their first year at USAFA; the few who were not were upperclassman taking German as an elective. The subjects were representative of the Academy cadet population, which consists of approximately 15 percent females, eight percent minorities, and the remaining Caucasian males. The Academy maintains stringent academic and physical requirements for acceptance; entrants have typically excelled in all aspects of high school and

have Scholastic Aptitude Test scores averaging approximately 1200. Freshman ages normally range from 18 to 21 years old. The population is heterogeneous, as cadets are drawn from all fifty states, as well as from diverse economic and social classes.

The USAFA curriculum requires that cadets attend one year of language study or validate the requirement with a minimum language test score. Prior to beginning their freshman year, cadets are required to complete a placement/validation examination. Based on their scores and the number of semesters of language training received in high school, cadets are placed into one of three levels of language, or given validation credit which fulfills the requirement. German 131 is the beginning level course in the German language program; students in this course are those who score at the lowest level on the placement examination and have had two semesters or less of high school study in the German language. All cadets are placed in German on a voluntary basis; they are asked to prioritize their top three language choices, and all receive one of these choices.

In this study, each cadet was in one of five classes, ranging in size from 14 to 20 students each. Class placement was based strictly on when the course could be fit into the cadets' schedules. The classes were taught by military instructors ranging in teaching experience from four to 15 years. The course was designed by a designated course director who developed the syllabus, which was used by all of the instructors teaching this course. The

course director also developed the examinations used by all of the instructors to ensure consistency. All course instructors assisted with the conduct of the experiment by ensuring that subjects followed directions, and with the administration of the evaluation instruments.

Materials

Interactive Video Instruction

The research was conducted in the USAFA LLC. The LLC consists of 96 workstations, each equipped with an Everex 486 multimedia computer and a Sony Lasermax videodisc player. The workstations are networked to provide the programming software that supports the interactive video instruction, but cadets at each workstation select and use separate videodiscs. The workstations, or carrels, are arranged in circular groups of five, with an equipment storage area in the middle of each grouping. Each carrel also comes equipped with two pairs of headphones, and control of the interactive video is done with one keyboard and mouse. The LLC is used exclusively for foreign language education.

The interactive video instruction controlling software was developed at the LLC. The videodisc lessons are divided into eight to 13 minute video scenes. When viewing scenes, learners have numerous options for interaction, or modes, which may be used or switched to at any time. The modes were as follow:

1. The Presentation Mode, in which scenes can be viewed from start to finish with no intervention.

2. In the Discovery Mode, scenes are divided into utterances or phrases. An utterance is a continuous segment of speech, normally one to three sentences or eight to 15 seconds in length. The videodisc stops after each utterance, providing time for the learner to reflect on what has been said. If the learner does not understand, the utterance and the visual scene may be replayed. Additionally, the text of the utterance may be viewed in written form in the target language, or the text of selected words or the entire utterance may be viewed translated into English. The translations are not literal, but rather a syntactic translation designed to foster greater depth of language processing.

3. The Review Mode offers two choices of practical exercise activities. The unscramble mode, which plays one or several utterances from the scene, then places the text from either the entire utterance, one sentence, or one word on the display in a scrambled form. Students unscramble the text by selecting the first, second, and subsequent utterances, words or letters (depending on the option selected) in proper sequence. The second choice is the guess meanings exercise, which plays utterances, then asks learners, in a multiple choice format, what was meant by the utterance. Learners choose the English translation they believe best matches the utterance, and are

provided knowledge of correct response feedback. They may continue choosing until the correct response has been selected.

4. The Exam Mode is a cloze (fill in words deleted from a text) exercise. All utterances from the lesson are displayed on the screen with several words missing, which appear at the bottom of the screen. The words are then moved to their correct locations and the learner is informed by a tone if the word selected is incorrect.

Instructional Content

The videodisc series "LernExpress" was used as the content for this study. This series supports the primary text used in the German 131 course, also named LernExpress. The LernExpress series consists of seven programs used in the course, with each program containing a various number of scenes. During each of the 10 interactive video/cooperative learning sessions, cadets viewed a various number of scenes from programs 1 through 3 that were chosen to their match the foreign language curriculum used in the classroom. Program 1 involved names, personal identification and age/birthdays; Program 2 dealt with identifying siblings, parents, and pets; and Program 3 involved discussion about home and addresses.

The LernExpress video program used narrated and authentic scenes to foster learner acquisition of the German language. For example, the Program 1 scene on age and birthdays begins with the narrator speaking to the viewer, in English, discussing birthdays. She then goes to a kindergarten class and

asks the students their names, how old they are, and what day is their birthday. Each of the questions is repeated to each student. In another scene, the narrator is attending an international boating festival in Hamburg Germany. She asks numerous festival attendees their names and where they are from. This scene provides further repetition, as well as allowing the viewer to hear the language pronounced with several different accents.

Some of the scenes do not directly address the viewer, but show language users in natural, authentic settings. For example, a Program 2 scene about siblings and parents, two individuals look through a family photo album. One of the individuals asks who the photos depict, and the other identifies and describes the people in the photos. This scene targets the vocabulary used in the classroom lessons, and uses repetition and an authentic, natural setting. The content areas covered in each scene are shown in table 3.2, the schedule of events.

Procedures

The study was conducted over five weeks, with the interactive video instruction/cooperative sessions occurring every other day. The 10 interactive video instruction/cooperative learning sessions were each 50 minutes in length.

Cadets attended the LLC every other day. The Academy operates on a two-day cycle of classes, designated M days and T days. The days are numbered consecutively (e.g. M1, T1, M2, T2, etc.), with 42 days of

each designation occurring during each semester, for a total of 84 instructional days. On each M day, the cadets are in the laboratory, while on each T day they are in the classroom. The schedule of classes, examinations, and questionnaire administrations followed during this study are also shown in Table 3.2.

Pre-experimental Instruction

Prior to the first session, cadets received instruction in cooperative learning and experimental procedures. Instruction consisted of explaining procedures for each treatment group and the structure of the cooperative sessions. Each of the subjects was also given a handout (see Appendix A) telling them which treatment group they were in, providing instructions for each of the tasks they were to complete, and outlining the schedule of events. The procedure was practiced to acquaint the cadets with the method, thereby avoiding confusion when the experiment began and preventing possible time on task inequity between treatments. As the cadets had already used the LLC for approximately two weeks prior to the beginning of the study, instruction on equipment use was not required.

Individualized Interactive Video Treatment Procedure

Cadets in the individualized group used the interactive video workstations for the first 30 minutes of the period, and were allowed to use the Presentation, Discovery, Review, or Exam modes as they wished. They then worked with their cooperative partner for the remaining 20 minutes without

Table 3.2

Schedule of Activities

Class/Date	Instructional Content	Event
M4/Aug. 18	Names, Birthdays; LernExpress Program 1, Scene 3	LLC session 1, Cooperative Learning Training
M5/Aug. 22	Colors, Sizes; LernExpress Program 1, Scenes 4, 5	LLC session 2, Practice Dialog Worksheet
M6/Aug. 24	Review; LernExpress Program 1, Scenes 1-5	LLC session 3, Text worksheets, Cooperative process review
M7/Aug. 28	Siblings, Household items; LernExpress Program 2, Scenes 1, 2	LLC session 4, Dialog Worksheet 1
M8/Aug. 30	Siblings, Household items, Questioning; LernExpress Program 2, Scenes 3, 4	LLC session 5, Text worksheets
M9/Sep. 1	Pets, Questioning; LernExpress Program 2, Scenes 5, 6	LLC session 6, Text worksheets
M10/Sep. 6	Relatives; LernExpress Program 2, Scene 7	LLC session 7, Text worksheets
M11/Sep. 8	Review; LernExpress Program 2, Scenes 1-7	LLC session 8, Dialog Worksheet 2
M12/Sep. 12	Review; LernExpress Program 2, Scenes 1-7	LLC session 9, Oral Review, Cooperative process review/Opinion Questionnaire
M13/Sep. 14	Homes, Apartments; LernExpress Program 3, Scene 1	LLC session 10, Dialog Worksheet 3
T13/Sep. 15	Household items; LernExpress Program 3, Scene 2	Classroom, Administration of AIME and Attitude Questionnaires
T14/Sep. 19		Classroom, Graded Review 1

access to the video. During the cooperative portion of the period, they had one of three researcher assigned tasks:

1) Provide an oral summary of the events of the video - one group member provided the summary, and the other member critiqued this summary and/or provided additional details. The summaries were not graded.

2) Complete worksheets on the video from the LernExpress text - one group member orally provided the answers, while the other member wrote them down. These worksheets were designed for the specific lessons viewed on the interactive video, and contained a variety of exercises, such as cloze or short answer questions and translations. These worksheets were graded by the course instructors.

3) Complete the dialogue worksheets - one group member began a dialogue on a designated subject related to the video, while the other provided a response. The subjects continued with the dialogues as long as they could. One member wrote the dialogue down, and both critiqued and edited the written dialogue as needed. The dialogue worksheets, one from each group, were collected at the end of the session for analysis. The cooperative groups performed these functions at the workstations for the sake of expediency, but were not allowed to review the interactive video material during dialogue construction.

For each cooperative activity, the responsibility for oral and written portions was rotated between group members for each session. The subjects

were also told to evaluate group effectiveness, and were provided time to do so during the third and ninth days of the study. Written instructions were provided for the second cooperative process review, and they are provided in Appendix B.

Cooperative Interactive Video Procedure

The cooperative interactive video group used the interactive video workstations for the entire 50 minute period. The instructions received were to view the lesson assigned to the class, and they were also allowed to use the Presentation, Discovery, Review, or Exam modes at their own discretion. This treatment group also completed the text worksheets and oral reviews in the same manner as the individualized video group, but they had continuing access to the video material. However, they were only instructed at the beginning of the period to conduct these activities at some time during the 50 minute session.

This treatment group also completed the dialogue worksheets in the same manner as the individualized video treatment. They also did not have access to the interactive video material as would it would have enabled using dialogue directly from the video, which could potentially confound the results of the dialogue worksheet achievement measure. Therefore, during sessions 4, 8, and 10, this treatment was similar to the individualized treatment in that the groups had access to the video for the first 30 minutes, and did not have access during the final 20 minutes.

Instrumentation

Achievement Measures

Achievement was measured from the written dialogue on the worksheets. The dialogues were constructed during four of the cooperative learning sessions. The first dialogue construction session was to acquaint the subjects with the process, and was not scored. The remaining three were scored and served as an achievement measure and indicator of developing second language knowledge.

Moffett and Wagner (1983) recommend using invented dialogue, done both orally and in writing, as an activity learners should engage in to achieve discourse goals. They suggest that this activity yields "complete and authentic discourse, thus preserving the wholeness which gives meaning to communication" (p. 23).

Measuring achievement with dialogue analysis can be described as authentic assessment, which calls for instruments and evaluations that characterize language use in real life. Authentic assessment supports Canale's (1981) requirements for language test validity as it avoids the use of "contrived utterances" and requires both "unpredictability and creativity in form and message" (p. 44). The use of authentic assessment with learner interaction is widely recommended. Wiggins (1994) condones interaction during authentic assessment as it requires solving communication problems and making judgments on the efficacy of communication. Boyles (1994)

specifically suggests that learners conduct collaborative discourse after viewing video-based presentations and constructing dialogues based on the video. Valette (1994) recommends speaking in a dialogue context for testing schema for both oral and written expressive proficiency. Regarding validity, Canale (1981) also believed that interaction is integral to communicative testing.

Such assessments should also have predetermined guidelines established by the evaluator while being sufficiently open-ended to allow for learner creativity (Valette, 1994). The construction of dialogues in this study was guided by requiring learners to begin with the content area of the video, but subjects were free to use any language they had acquired and continue the dialogue on any subject desirable.

The dialogues were scored with a type and token analysis (Finn, 1977), and syntactic maturation was measured with a T-unit word count (Hunt, 1977, 1970). Types are the number of different words used in the dialogues, and tokens are the total number of words written. The number of types reflect a direct measure of the breadth of German vocabulary acquired. The token analysis was conducted on T-units. Hunt (1977) developed the notion of the T-unit, defining it as "the single main clause plus whatever other subordinate clauses or nonclauses are attached to, or embedded within, the one main clause" (p. 92). His research showed that as learners matured or developed intellectually, the length of the T-unit increased (Hunt, 1965). Finn's type and

token analysis, and Hunt's T-unit measurements, have been described as "powerful methods of measuring students' growth" (Odell, 1977, p. 128). The dialogue construction worksheets are in Appendix C, and the results are reported in Chapter 4.

The dialogue worksheets were designed to provide group interdependence, while the secondary achievement measure, the instructor-developed unit examination, provided individual accountability. The examination, Graded Review 1, was that normally used in the course. Graded Review 1 consisted of five sections: (1) Listening to a tape, and answering multiple choice and cloze questions; (2) Culture, with multiple choice questions; (3) Vocabulary, with cloze questions; (4) Gisting/Reading, in which students translated written German text to English; and (5) Writing, in which students wrote sentences on a designated subject. The exam was similar in form to unit exams used during previous iterations of this course. The content of the exam had been modified during the three years the LernExpress curriculum had been in use to compensate for variations in student abilities, however, no reliability data exists. The exam was scored by all the instructors in the course, with each instructor grading one section of all students' examinations to ensure consistency. Graded Review 1 is in Appendix D, and the results are reported in Chapter 4.

Amount of Invested Mental Effort

This measure was similar to that initially developed by Salomon (1983) and used subsequently by Salomon (1984), Cennamo, et. al. (1991), and Mevarech (1993). Cadets responded to the five question, self-report questionnaire administered on the day following the last interactive video instruction/cooperative learning session. The questionnaire used a five point Likert-type scale, with values assigned to each response (1 was low and 5 was high). Salomon recommended that a general AIME score be computed to determine the reliability of the instrument. The reliability of this instrument in past studies, using Cronbach's alpha (an inter-question reliability measure), has varied: Salomon, (1984), .81; Cenamo, et. al. (1991), .55; and Mevarech (1993), .70. The survey is in Appendix E, and both the results and reliability are reported in Chapter 4.

Attitude Questionnaire

Subject attitudes on using interactive video instruction, cooperative learning, and language learning were also measured with a self-report questionnaire. Henerson, Morris, and Gibbon (1987) recommend using self-reports when subjects are able to answer the questions, have sufficient self-awareness to provide the information, and are likely to respond honestly. The college level students that served as subjects in this study adequately met the criteria, to include honesty as required of the Academy's stringent honor code. The 15 questions, seven on interactive video and eight on cooperative

learning, also used a five point Likert-type scale, and the values on the scale were represented with words (strongly disagree, disagree, undecided, agree, and strongly agree). The values were converted to numbers, from one to five respectively, to facilitate scoring. The questionnaire was similar to that used by Dalton (1990; 1986); Dalton, Hannafin and Hooper (1987); and Simisek and Hooper (1992). Although the instrument was not identical to any of these measures but rather a compilation, the reliability coefficient obtained was expected to be similar: Dalton, 1990, .93 (Split-half method, Flanagan's r); Dalton, 1986, .95 (Cronbach's Alpha); Dalton, Hannafin and Hooper. 1987, .86 (Split-half method); Simisek and Hooper, 1992, .88. Responses were totaled to yield individual scores for attitudes on cooperative learning, interactive video instruction, and language learning. Subject attitudes toward language learning were calculated using four items from the survey. The items were: a) I prefer learning language from interactive video than from a teacher; b) I think it is easier to learn a language with interactive video; c) I can learn more language when I work in a small group; and d) I enjoy working with other cadets to learn language. The instrument's reliability was determined with the split-half reliability method. A copy is of the questionnaire is located in Appendix F and the results and reliability are reported in Chapter 4.

Additionally, qualitative data regarding attitudes toward cooperative learning, interactive video instruction, and the instructional strategies were

collected with an open-ended opinion questionnaire. This questionnaire was provided to subjects on the ninth day of the study. The questionnaire is located in Appendix B, and the results are also reported in Chapter 4.

Data Analysis

Statistical analyses were conducted to determine if differences existed between the means of the two levels of the independent variable, individualized video treatment/cooperative learning and cooperative video treatment. Individual analyses were done on each of the three dialogue construction worksheets, total types used on all three dialogue worksheets, the unit examination, and on the amount of invested mental effort and attitude questionnaires.

For the unit examination and the amount of invested mental effort and attitude questionnaires, the simple linear regression model with dichotomous independent variables (essentially a two independent sample t-test) served as the basis for statistical analysis. The assumptions required by the test selected were in place: subjects were randomly selected; there was inter- and intra-sample independence; measurement was interval; the sample was drawn from a normally distributed population; and the variances between the two groups were equal. Based on the test selected, Cohen's (1988) guidelines were used to determine the minimum required sample size of 70. This minimum is based on a pre-established alpha level of .05, beta of .10, and a medium effect size of .50 standard deviations, thereby requiring 35

subjects for each treatment group. Sample size at the start of the study was 90, and size at the conclusion was 89 due to a self-initiated elimination from the Academy.

Due to questionable distribution normality revealed during post-collection scrutiny of the data and unequal sample sizes, the Wilcoxon Rank sum non-parametric test was chosen for the dialogue worksheet type and token analyses. Subjects completed these in cooperative teams, therefore the total sample size was 45 at the beginning, and 44 at the conclusion of the study. The sample size varied for each iteration of the worksheets due to absenteeism, and make-up sessions were not possible. All analyses were done with the Statistical Package for the Social Sciences (SPSS).

CHAPTER 4

RESULTS

This study compared two instructional strategies: interactive video instruction conducted cooperatively, and interactive video instruction conducted individually followed by cooperative learning sessions. This chapter will report the differences between these two treatments in terms of the three dependent measures: achievement, amount of invested mental effort, and attitudes. There were no significant differences between the two treatments in achievement, amount of invested mental effort, attitudes toward interactive video instruction, and attitudes toward language learning. There was a statistically significant difference in attitudes toward cooperative learning, however, and the differences were contrary to the predicted results.

Treatment Group Equivalence

Initial equivalence of the randomly assigned treatment groups was determined by the USAFA-assigned academic composite scores. The academic composite is calculated by the admissions department upon acceptance to USAFA, and consists of a composite of high school class ranking, high school grade point average, and either Scholastic Aptitude Test

(SAT) or American College Test (ACT) score. A t-test performed on the scores of the two treatment groups revealed no statistically significant difference.

Achievement Measures

The hypothesis that the individual interactive video/cooperative treatment would score higher on achievement measures was not realized in this study. Table 4.1 reports the means, standard deviations, rank sums, and two-tailed p value of types (different vocabulary words used), and Table 4.2 reports T-unit tokens (length of sentences/utterances), on each of the three dialogue construction worksheets completed by subjects in the study. None of the differences between the treatment groups was statistically significant.

Inspection of the data revealed that the assumptions required for the Wilcoxon Rank Sum Test were in place, with one exception. The data on types for Dialogue 2 did not meet the homogeneity of variance requirement, therefore the Robust Rank Order Test was used to statistically evaluate the differences between the means. It should also be noted that upon initial examination of the T-unit length data on Dialogue 1, kurtosis was unacceptably high due to an outlying data point. One of the cooperative/interactive video groups had scored more than double the mean, 10.18 versus 4.71 words per T-unit, of the remaining groups. Discussion with the group members and review of their dialogue construction worksheet

Table 4.1

Mean Scores of Types on Dialogue Worksheets

Dialogue Worksheet 1

		Types		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	20	43.25	11.59	465.5	
Cooperative/ Interactive Video	21	46.76	8.76	524.5	.48

Dialogue Worksheet 2

		Types			
Treatment	n	Mean	SD	Robust Rank Order	p
Individualized Video/Cooperative Learning	22	43.54	15.93		
Cooperative/ Interactive Video	22	42.31	8.05	.24	

Dialogue Worksheet 3

		Types		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	20	51.50	18.77	425	
Cooperative/ Interactive Video	21	48.90	15.64	436	.89

Table 4.2

Mean Scores of T-Unit Lengths on Dialogue Worksheets

Dialogue Worksheet 1

		T-Unit Lengths		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	20	4.70	.60	392	
Cooperative/ Interactive Video	21	4.88	.76	469	.46

Dialogue Worksheet 2

		T-Unit Lengths		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	22	5.75	1.29	495.5	
Cooperative/ Interactive Video	22	5.62	.99	494.5	.99

Dialogue Worksheet 3

		T-Unit Lengths		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	20	5.47	0.62	407.5	
Cooperative/ Interactive Video	21	5.66	0.81	453.5	.74

revealed that one of the group members had more advanced German than his placement examination score had indicated. This team's dialogues were discarded from the analysis of the of the dialogue worksheets despite the fact that a sensitivity study revealed that removal of the data did not substantially alter the results.

Table 4.3 reports the type totals, or total German vocabulary used, for all three dialogues. The mean difference between groups of only 6 words indicated that the vocabulary used by students did not statistically differ between treatment groups.

Table 4.3

Mean Scores of Total Types used on Dialogue Worksheets

		Types		Wilcoxon	
Treatment	n	Mean	SD	Rank Sums	p
Individualized Video/Cooperative Learning	18	95.66	20.38	312.5	
Cooperative/ Interactive Video	20	102.20	16.80	428.5	.13

Achievement was also measured with an instructor-developed exam, Graded Review 1, administered at the conclusion of the study. The results of

Graded Review 1 are reported in Table 4.4. Reliability of this instrument was determined with two methods. On the first three portions of the test (multiple choice and cloze), a Kuder-Richardson 21 procedure indicated a reliability coefficient of .73. The last two portions of the test were scored by two raters, with an inter-rater correlation of .91, determined with Spearman's Rank Order correlation. A t-test on the scores revealed no significant differences between the means.

Table 4.4

Mean Scores on Graded Review 1

Dialogue Worksheet Totals

Treatment	n	Mean Percentage	SD	t	p
Individualized Video/Cooperative Learning	45	79.52	11.17		
Cooperative/ Interactive Video	44	80.90	9.22	.528	.161

Amount of Invested Mental Effort

The hypothesis that AIME would be higher for the individual interactive video instruction/cooperative learning treatment was also not supported by

this study. Responses on each question ranged from 1 (low effort) to 5 (high effort), and a composite score was calculated for each subject by averaging their responses to the five questions. Scores on the post-experiment questionnaire were virtually identical between the two groups, with a non-significant mean difference of .05. The means, standard deviations, and two-tailed t-test results are reported in Table 4.5. Reliability of this instrument was determined by a coefficient Alpha reliability procedure, which yielded a coefficient of .74.

Levene's test for equality was also used to test homogeneity of variance. The findings were not significant (F=.033, p=.855), further supporting the assumption that the subjects were members of the same population, and that the treatment did not differentially affect variance.

Table 4.5
Comparison of Means on Amount of Invested Mental Effort Questionnaire Measure

Treatment	n	Mean	SD	t	p
Individualized Video/Cooperative Learning	45	3.87	.498		
Cooperative/ Interactive Video	44	3.82	.501	.53	.59

Attitude Measures

The hypotheses that attitudes toward interactive video instruction and cooperative learning would be higher for the individual interactive video instruction/cooperative learning treatment were also not supported by this study. The numerically converted scores ranged from 1 (less positive attitudes) to 5 (more positive attitudes), with 3 indicating neutrality. All attitude scores were above 3, indicating generally positive attitudes. Composite scores were calculated for attitudes towards interactive video instruction, cooperative learning, and language learning. The results are reported in Tables 4.6, 4.7, and 4.8, respectively. The differences in means on attitudes toward interactive video instruction and language learning were not significant. The mean on attitudes toward cooperative learning was significantly higher for the cooperative interactive video treatment, ($M = 3.82$, $SD = .617$), $t(44) = -3.09$, $p = .003$. However, the difference was contrary to the hypothesis.

Explained Variance

Coefficients of determination (R^2) were calculated to determine the explained variance of the effect of assignment to either level of the dichotomous independent variable. The proportions of variance explained, or the correlation between treatment and the one dependent variable in which there was a significant difference (attitudes toward cooperative learning),

Table 4.6
Comparison of Means on Attitude Toward Interactive Video Instruction

Treatment	n	Mean	SD	t	p
Individualized Video/Cooperative Learning	45	3.87	.398		
Cooperative/ Interactive Video	44	3.89	.547	-.21	.83

Table 4.7
Comparison of Means on Attitude Toward Cooperative Learning

Treatment	n	Mean	SD	t	p
Individualized Video/Cooperative Learning	45	3.41	.610		
Cooperative/ Interactive Video	44	3.82	.617	-3.09	.003*

*$p < .05$

Table 4.8
Comparison of Means on Attitude Toward Language Learning

Treatment	n	Mean	SD	t	p
Individualized Video/Cooperative Learning	45	3.55	.470		
Cooperative/ Interactive Video	44	3.72	.554	-1.47	.14

were less than 1 percent based on adjusted R^2 values and are therefore not reported.

Results of Opinion Questionnaire

The opinion questionnaire solicited open-ended interpretive comments on the effectiveness of the teams, the interactive video instruction and the language laboratory, and the instructional strategies used in the respective treatments. A review of the responses revealed there were some general differences of opinion as well as some similarities. The responses were organized first by treatment group, then coded into one of the following primary areas: (a) cooperative learning problems, (b) cooperative learning effectiveness and advantages, (c) effect of cooperative learning or interactive video instruction on learning language, and (d) positive and negative comments regarding instructional strategies. Salient comments and general trends are discussed below.

Cooperative Learning Problems

Few of the subjects indicated that there were problems with their cooperative groups, and the number of complaints was approximately equal for both treatment groups. The complaints were generally of two types: conflict of personalities or conflict of ability levels. Four subjects specifically stated that they did not get along with their partners and that the lack of rapport impeded the group's ability to work effectively. Six subjects stated that the difference in ability levels was a hindrance to the group. Specific

comments regarding cooperative learning problems were: "The team thing is a good idea, but it stinks for the person who is doing better in the subject;" "Groupwork bogs down when you have to wait on your partner to finish a lesson;" and "I do not like groupwork because it ends up not being a 50-50 split." The small number of problems cited supports the finding of generally positive feelings toward cooperative learning realized in the attitude questionnaire.

Cooperative Learning Effectiveness and Advantages

Comments between treatments regarding the effectiveness and worth of cooperative learning were also very similar, despite one treatment having 50 minutes of cooperative time versus only 20 minutes for the other. The comments supported the results of the attitude questionnaire, with the overwhelming majority of subjects stating that their teams were effective, that the responsibility for task completion was shared, and that learning benefited from being in a cooperative environment. The most often cited advantages to groupwork, across treatments, and some specific examples of comments were:

1. Having a greater sum of knowledge was the most often cited advantage to cooperative learning: "We compliment each other's knowledge, making our cumulative knowledge greater than if we worked alone;" "Group work is definitely a plus because you can get interest and input from others;" and "We can combine knowledge to answer or create dialogues."

2. Having someone with whom to practice speaking German: "We help guide each other through vocabulary and pronunciation;" Group work is better because you have someone to talk to in German;" and "The group work allowed us to practice saying words like we normally would."

3. Having someone available to provide help when it is needed: "Group work is essential because we have the option of discussing problems we encounter instead of raising your hand and waiting for a professor to help;" "We can accomplish more as a team as we have each other to rely on for help;" and "Working in a group makes learning fun and easier, and you have someone to help you understand if you don't."

Subjects in the cooperative/interactive video treatment also noted the importance of a partner in keeping each other awake. Five of the subjects specifically stated that they were able to better stay awake due to the presence of their partners. On the contrary, five subjects in the individual interactive video instruction treatment commented that they would have benefited from having a partner who helped them stay awake.

Effectiveness of Instructional Treatments

Differences between the two treatment groups were most apparent in opinions regarding the effectiveness of the instructional strategies. All but two of the subjects in the cooperative/ interactive video treatment expressed positive feelings toward the instructional strategy. The two who were not pleased with this strategy cited the lack of controlling the pace of instruction

as the primary disadvantage. Positive comments highlighted the ability to discuss the material with their partner during the video presentation. Comments included: "We help each other understand German words/phrases by thoroughly going through each language video lesson and making sure we can translate every word said," and "The video helps me with pronunciation and the team helps me to reinforce the German I have learned."

On the contrary, in the individualized video treatment, the number of positive and negative responses was equally split. Negative opinions centered on not having enough time with their partners, not having access to the video during the cooperative period, and not being able to sufficiently recall the video instruction during the cooperative sessions. These opinions are reflected in the following comments: "I don't like the 1/2 individual, 1/2 group setup--we can do individual stuff on our own, but in class we should utilize all the time we have;" "I think that instead of working together the last 20 minutes, we should be able to work together the whole time to more effectively understand the videos;" and "I don't like the way the group time works--we can't learn what we need in 30 minutes with the video." Those who positively commented on this treatment cited greater concentration when alone and individualized learner control of the video. Comments included "I think the time spent apart is good in that one can think on his own for a period of time then get with his partner to discuss what he obtained from the lesson;" "Working alone and then having to answer questions in a group makes me

concentrate and work harder when I am alone;" and "Doing the (interactive video) lab without a partner is much easier as there are no arguments and you can learn at your own pace." The bipolarity of opinions in the individualized treatment may account for the significantly higher attitudes toward cooperative learning by the cooperative interactive video treatment found in the attitude questionnaire.

Effectiveness of Using Interactive Video Instruction

Opinions on the use of interactive video instruction supported those on the attitude questionnaire, with the highest positive ratings received and virtually no differences in ratings between treatments. Subjects across treatments opined that the instruction supported the classroom and that the interactivity afforded by the program positively affected learning. Comments included "The language learning center is instrumental to my learning process; it allows me to go over and hear what they are saying;" and "The lab gives you a chance to hear real German speakers." Only one subject commented negatively, stating that "I don't think I learn as much in the lab as I do in class."

Effect of Cooperative Learning and Interactive Video Instruction on Learning Language

Despite the differences of opinion regarding the effectiveness of the treatment, virtually all subjects stated that the combination of interactive video and cooperative learning, regardless of specific structure, positively affected

language learning. Opinions cited in the previous sections reflect this sentiment, in addition to the following comments: "I like the group work in the lab because we can learn from each other while at the same time learning from the videos;" and "I am learning German faster than any language I have taken."

CHAPTER 5

SUMMARY AND DISCUSSION

Cooperative learning and interactive video instruction are two educational methods that have achieved prominence in today's classrooms. Cooperative learning, when correctly implemented, can increase academic achievement as well as student enjoyment. Interactive video instruction broadens the educator's repertoire by combining graphic information with computer-based capabilities. The ever-increasing use of these methods, coupled with research-proven testimony to their effectiveness, warrants continuing examination of instructional strategies that serve to maximize the educational benefits provided. This study compared two such strategies, interactive video instruction conducted cooperatively, versus individualized interactive video instruction and cooperative learning conducted in sequence. This concluding chapter: (a) summarizes the findings of this study; (b) discusses probable causes for the results; (c) presents potential limitations of the findings; (d) makes specific recommendations, based on the findings, to advance educational practice; and (e) provides suggestions for future research.

Summary

None of the expected significant differences were found between the two levels of the independent variable. For the first dependent variable, achievement, students who received interactive video instruction followed by cooperative learning, and those receiving interactive video instruction cooperatively, were statistically equivalent. No differences were found on the types and t-unit lengths on the dialogue construction worksheets, or on the post-study unit examination. For the second dependent variable, amount of invested mental effort, there were also no statistically significant differences between the two treatments. For the third dependent variable, attitudes, there were no differences in attitudes toward interactive video instruction or language learning. Attitudes toward cooperative learning were significantly higher ($p < .05$) for the cooperative interactive video instruction treatment, which was contrary to the pre-experiment prediction.

Discussion

Achievement

Numerous reasons may explain why subjects in the individualized video treatment failed to outperform those in the cooperative interactive video treatment as hypothesized. First is the increased opportunity for promotive/ interaction time available to the subjects in the cooperative interactive video group, and the opportunity to resolve problems as they occurred. Although both groups had a total time on task of 50 minutes during each session, the

time available with their partners for the individualized video instruction group was only 20 minutes. Johnson and Johnson (1990) cite the necessity of having sufficient promotive time for cooperative learners to provide assistance, exchange information and resources, and challenge each other. With the requirement to complete assigned tasks during cooperative sessions, promotive time may have been insufficient. Several subjects specifically stated in their opinion questionnaires that the amount of time available with their partners was inadequate.

Continuous availability of their partners may also have been a benefit to the cooperative interactive video treatment. Johnson and Johnson's (1990) definition of effective promotive interaction includes partners providing each other feedback. Johnson and Johnson (1993) also recognized that "the most powerful and effective source of feedback is other people " (p. 136). When individual learners encountered problems, they either received delayed feedback from their partners (once in their cooperative sessions), which may not be as effective as immediate feedback (Dempsey, Driscoll & Swindell, 1993), or they may have forgotten about the problem by the time the cooperative session began. Several of the subjects also commented on this issue, indicating that they would have preferred to have their partner's feedback at the time it was needed. Finally, subjects together at the workstations may also have helped each other with regard to selective

attention by helping partners identify key aspects of the instruction that could benefit language acquisition.

Although the individual video treatment provided subjects the advantage of individualized learner control with the video instruction, this advantage may have been counterbalanced by more promotive time in the cooperative video treatment. This notion is further supported in the context of language instruction by the interactionist theory of language acquisition and the Vygotskian notion of social interaction. According to interactionist theory, language acquisition improves when the language to which learners are exposed is modified to suit the learner during the course of interaction. Although students in creating dialogues in teams did provide simplified input to each other (since they lacked the proficiency to do otherwise), their asking for clarification or restatement was done in English. The subjects did interact in the target language, minimally at first, but progressively more as the study went on and their German language abilities improved. However, after reaching the limits of their vocabulary and grammatical structures, the students then often scaffolded further conversation for each other in German by discussing the language in English. According to Donato (1994), a social context in which learners co-construct communication may also lead to language acquisition. Despite the level of interactivity offered by the video instruction, this type of modified interaction in German and discussion about the language in English could only occur between learners.

A second potential reason that the advantages of individualized interactive video may have been counterbalanced was the lack of access to the video during the cooperative sessions. Several subjects in the individual treatment stated that despite the depth of their concentration, they were not able to recall all of the information from the video that was required for task completion, the oral reviews and text worksheets, during the cooperative sessions. This problem was similar to not having a partner during the video session: feedback available from the video was not forthcoming when it was needed, but was delayed or not received at all.

The factors cited above are closely related to a third possible explanation for the individualized video instruction treatment not achieving higher than the cooperative interactive video treatment: the experience level of subjects in the study. Due to the high academic standards required for entrance to USAFA, the student body has proven academic capability. Additionally, 99 percent of the entrants have had some language training at the secondary level. These high standards and level of experience indicate that cadets in general possess the developed metacognitive and learning strategies (Weinstein & Mayer, 1986) required for academic success. While the subjects in the individualized video treatment followed the structure established by the treatment, those in the cooperative interactive video treatment, with access to both cooperative partners and the video instruction

during the entire 50 minute sessions, had the flexibility to structure their time and develop strategies that were best suited to themselves and their team.

A final reason for finding no differences between the two groups is the lack of variability possible. Although the subjects are heterogeneous socially and economically, they are relatively homogeneous academically, again due to the high admission standards. Therefore, the variance possible may be constrained by a ceiling effect. This effect is further amplified by the nature of the primary achievement measure, which allowed subjects only 20 minutes in which to construct their dialogues, and the limits of second language acquired by the subjects in only two weeks of study prior to the beginning of the experiment.

Effectiveness of Both Treatments. Though the two treatment groups did not differ significantly in terms of achievement, observation of the subjects in the experiment and similar students not participating in the study revealed some pronounced differences. Foremost was the higher level of interaction between students, and between students and the interactive video instruction. Students who were not part of the study were assigned to the workstation in pairs and were only provided guidance on the use of the workstation. They were not provided instruction on how to interact with their partners. As a result, interaction was minimal or nonexistent.

Although no empirical data were collected to compare students in the experiment to a control group, comments on the opinion questionnaires and

discussions with the students indicated that both experimental treatments were effective. Of the 89 subjects participating, 10 indicated that they had learned significantly more language in the first few weeks in the course than they had in one or two years of previous language study. One student commented "I've learned more in two weeks of German than I did in two years of French in high school."

Comments from the instructors also indicated the value of both treatments. Two of the course instructors stated that they believed students had already acquired as much language by the end of the study (the 28th of 84 days of instruction) as they had in the entire first semester during previous years, and the difference was attributable to the experimental treatments. One of the instructors further noted that the greater interaction resulted in a doubling of time the learners spent using the language. Although the scores on the instructor developed exam, Graded Review 1, did not indicate exceptional performance with a mean of 80.2 percent, it should be noted that the exam was modified over previous exams to compensate for the learners higher achievement.

Abductive reasoning suggests that the causes for the observed differences between those participating and those not, and the comments cited above, are most likely attributable to the experimental intervention. Abductive reasoning is post hoc analysis of results and hypothesizing or providing a best explanation that accounts for the data, or why the results

occurred (Josephson & Josephson, 1994). Both treatments were possibly more effective than no treatment due to structuring the environment by providing specific tasks to be accomplished, assigning specific roles to the subjects for those tasks, and developing specific time guidelines, which consequently resulted in deeper engagement of the content. Two other explanations were possible, but not as probable. First is the Hawthorn effect (Sprinthall & Sprinthall, 1990), which suggests that research subjects expend greater effort as a result of being studied. However, this effect would probably have diminished with each achievement measure over the five weeks of the intervention. The second possible explanation is that the subjects worked harder due to reinforcement, which was provided by feedback from the numerous achievement measures used during the study. This explanation is less probable due to the subjects being first year military cadets, who continuously receive feedback on all aspects of military life and are probably not susceptible to the effects of reinforcement .

Amount of Invested Mental Effort

The failure to realize greater amounts of invested mental effort by subjects using interactive video alone is possibly attributable to the sample used, first year military cadets. Workloads in all phases of Academy life are intentionally increased for first year students in an effort to eliminate those who cannot successfully manage their time. As a result, first year cadets average 5 and 1/2 hours of sleep per night. This lack of sleep was a

significant confounding factor in the study. Although several of the students who worked alone claimed in the opinion questionnaire that they expended greater effort when working with the video, an equal number stated that they had difficulty staying awake because of not having a partner. Several of the students working with the video cooperatively, on the contrary, stated that the presence of their partners provided motivation to remain alert, and that their partners often awoke them.

The suggestion was made in chapter 2 that AIME could potentially decrease when there was competition for cognitive resources, which could consequently result in interrupted processing continuity and the missing of detail from the video (Park & Hannafin, 1992). AIME was expected to be higher for the individuals working with video because of possible competition of cognitive resources that a partner might furnish. The questionnaire revealed that AIME was not higher, possibly because of a limit of attentiveness imposed by subject fatigue.

A final reason to expect higher AIME was the potential for off-task behavior among pairs of students working cooperatively with video. Observation indicated that off-task behavior was virtually non-existent, possibly due to the structure imposed by the treatment, which required subjects to stay on task in order to complete the required assignments.

Attitudes

The failure to achieve the expected outcomes on attitudes may be explained by several design features of the individualized treatment, and is closely related to the rationale provided for the achievement measures. First, the treatment did not allow subjects sufficient time to complete the assigned tasks. Many of the subjects expressed frustration at having to complete the text worksheets within the 20 minute cooperative sessions. Task overload precluded interactivity or promotive time.

Task overload may also have inhibited the development of a sound cooperative working relationship. An essential element of group processing is that sufficient time be allowed for the processing to occur (Johnson & Johnson, 1993). This latter explanation is similar to findings cited by Chang and Smith (1991), who believed that the brevity of their study, two 50 minute sessions, precluded development of a productive cooperative procedure. Although this study was considerably longer, the pressure to complete the tasks may have also served to prevent relationship development. Several student comments support this explanation: "we should be able to work the whole time to more effectively understand the videos;" and "I don't like the way the group time works; we can't learn what we need."

A second possible explanation, also related to the rationale for the achievement measures, was disallowing access to the video during the cooperative sessions. Student frustration was strongly evident in the

questionnaires: "filling in the workbooks (text exercises) without the computer isn't very practical" and "I feel that no matter how hard I concentrate on the video, I still can't remember all that they say." Although there is some evidence that suggests that incomplete structures which result in tension among learners are sometimes remembered best, known as the Zeigarnik effect (Shaw & Costanzo, 1970), this did not occur in this study as the achievement results did not differ.

The significantly higher attitudes of the cooperative interactive video treatment did support the findings of several other studies (Crooks, et. al, 1995; Klein & Pridemore, 1992; Mevarech, et. al., 1987; Simisek & Hooper, 1992) that cooperative learners generally have better attitudes toward cooperative learning. In this study, the reason why may be explained by the lack of frustration due to not having to work under the constraints cited above; they had time to complete their tasks, time to develop their cooperative relationships, and their partners were available for immediate feedback. Another plausible explanation is having perceived control over their instructional strategy. As previously discussed, the cooperative interactive video group was free to structure their time as they wished since both their partners and the video were available during the entire instructional sessions. When learners perceive control they "(1) satisfy their need to feel competent, (2) attribute positive results to themselves, and (3) enhance their self-efficacy (Burger, in Hoska, 1993, p.122). The learners in the individualized video

treatment, on the contrary, may have felt a degree of helplessness due to the lack of perceived control.

Limitations

Prior to drawing inferences from the outcomes of this study, limitations which may threaten validity should be considered. These limitations stem from the nature of the military environment and pre-existing attitudes towards cooperative learning and interactive video.

External validity may be limited due to stringent acceptance standards for attending the U. S. Air Force Academy, as previously discussed. Additionally, the demanding physical and psychological requirements of succeeding as a military cadet draws entrants with high motivation for success. Generalizability of the results, therefore, may be limited to populations with profiles similar to those of the cadets.

Internal validity may have been affected by the competitive nature of the Academy's environment. Cadet career options, both during their tenures at the Academy and upon graduation, are decided by performance. This performance is measured by grade point averages, as well as military and athletic performance. Despite the fact that teamwork is emphasized, military cadets are often extremely competitive. Research has shown that in competitive situations, students may resist facilitating the performance of others, thereby reducing the efficacy of collaborative work (Johnson & Johnson, 1991).

Validity of attitudes measured may also be threatened by preexisting attitudes towards cooperative learning and interactive video instruction. Despite the length of this study, cooperative learning may be a stable trait, not necessarily influenced by one experience but molded by years of academic experience (Hall, Iiyoshi & Supinski, 1995). The college level subjects in this study had experience with both cooperative learning and interactive video instruction, which may have impacted upon their attitudes at the conclusion of the experiment. Several subjects mentioned their previous cooperative learning experiences in the opinion questionnaires. The design may better have determined attitudes if they were measured before the study with the results analyzed as a covariate. The experience level also warrants caution in generalizing the results beyond learners of this type and age level.

Implications and Recommendations for Educational Practice

Based on the findings of the study, and observation of the treatments in general, the following recommendations are made for educational practice:

1. The outcome of this study supports the continued use of cooperative learning with interactive video instruction. In terms of achievement, the results indicate that learners working cooperatively with interactive video instruction perform at least as well as those working individually. This finding reinforces the recommendation of numerous researchers (Chang & Smith, 1991; Dalton, 1990; Simisek & Hooper, 1992) to

install two position interactive video workstations with their inherent lower costs.

2. The results also suggest that cooperative learning be conducted in accordance with guidelines developed by Johnson and Johnson (1990). While all five guidelines are necessary, particularly crucial is allowing sufficient time for promotive interaction and the development of interpersonal relationships. This recommendation supports those of Chang and Smith (1991), who found that insufficient time may have precluded the potentially positive effects of cooperative learning from occurring. Also important is conducting periodic cooperative process reviews. As this study showed, learners will interact more effectively when the quality of their interaction is discussed and problems are openly discussed and resolved. Finally, the importance of positive interdependence, both for the means available (the interactive video) for learning and the expected outcomes (the achievement measures), are necessary for interaction to occur.

3. The results also support those researchers who advocate the use of cooperative learning to enhance second language acquisition (Donato, 1994; Krashen & Terrell, 1983; Porter & Long, 1985). Better attitudes toward cooperative learning may lead to more interaction within cooperative groups, in both the target language and the native language discussing the target language, and consequently increased language acquisition.

4. Observations of the study participants and comments from instructors and subjects suggest that when using both cooperative learning and interactive video, the role of each in the learning process must be defined and a structure for use established. The lack of purpose and structure may explain why gains in achievement were not realized in much of the research that combined this method and technology-based instruction (Carrier & Sales, 1987; Crooks, Klein, Jones, & Dwyer, 1995; Mitchell, 1993; Orr & Davidson, 1993). The amount of structure should follow the guidelines established by Cohen (1994), with more complex tasks requiring less structure, and less complex tasks requiring more. Guidance on structure should include when and how long to use video; what information from the video instruction is essential; when to interact with cooperative partners, and how the interaction should occur. The maturity of learners must also be considered, as this study showed that mature learners will develop their own structure when needed. Finally, advisement feedback, that which embeds guidance on promotive interaction within the instruction, is recommended where feasible (Hooper, 1992).

Suggestions for Future Research

The findings of this study clearly suggest that further research is required to determine how individual attitudes affect the outcomes of cooperative learning when used with interactive video instruction. Aptitude treatment interaction research has generally focused on ability, and has been

inconclusive (Dalton, Hannafin and Hooper, 1989; Hooper and Hannafin, 1988; and Signer, 1992). However, very little research has examined attitudes toward cooperative learning and/or interactive video instruction, and the impact of these attitudes on achievement. The bipolarity of opinions of the individualized treatment in this study suggests that preconceived notions and attitudes about the effectiveness of cooperative learning may impact upon performance. Such research may provide insight into how learners, particularly mature learners, are best grouped when using technology-based instructional environments.

Research is also needed that will support the development of interactive video and computer software designed specifically for cooperative learning. Such research should include: (a) determining the correct mix of interaction between technology and cooperative partners; (b) how to increase AIME when learners use technology collaboratively; (c) how to pace lessons to provide for group interaction; (d) how groups can control interactivity with the technology; and (d) how to foster the development and use of cooperative learning strategies.

The acknowledged importance of interaction in the language acquisition process warrants more in-depth, qualitative study of the interaction patterns of cooperative groups and technology-based instruction. Mevarech and Light (1992) have recognized the need to identify the specific contributions of the social support group members provide, and the cognitive

scaffolding that both the technology and group members furnish. Identification of these factors could provide insight into how social relationships in groups develop and how effective groups develop strategies in using the technological medium, and would further the research done by King (1990) on how to promote more, and more in-depth, interaction. Despite the necessity of interaction in language acquisition, research in this area has been inadequate.

Further research is needed to identify how video material and cooperative learning can best promote the development of integrative motivation, or motivation that exists when the learner wishes to identify with another ethnographic group (Larsen-Freeman & Long, 1991). Larsen-Freeman and Long state that a linear relationship exists between attitude, motivation, and the amount of language acquired. The combination of authentic context provided by video, and the positive attitudes that may result from cooperative learning, provide an environment with the potential to increase motivation to learn language. How to increase motivation through more positive attitudes toward instruction is also an area that has not been adequately researched.

In conclusion, the author has found this area of research to be an interesting blend of theory with practice that has high potential payoffs for educators. Future research may tease out the variables that will give

guidance to practitioners as they can make the best use of cooperative groups when learning with technology-based instructional environments.

APPENDIX A

SUBJECT INSTRUCTION SHEETS

PLEASE BRING THIS INSTRUCTION SHEET WITH YOU TO THE LLC ON RECITATIONS 4 TO 13

Student Names:

Group: Cooperative/Simultaneous Seating in Lab: **Under German 130**

Instructions: You will work at the workstation for the entire 50 minutes with your partner. You must keep the same partner for the next 10 recitations. During these 10 lab days, you will complete one of three tasks, as shown below, and the tasks (except for the dialogue worksheets) may be done at any time during the 50 minutes. Follow the instructions carefully.

Text worksheets - These are the worksheets assigned in your study guide. Work on them together: fill out one group member's first (one group member suggests an answer-the other comments). Then simply transfer to the other member's book. Rotate the responsibility for suggesting an answer and commenting.

Oral reviews - One group member orally describes the events of the video to the other member. This should be a detailed description - who was in it (names), what they did, where they were, and any new words that you learned. Do this in German to the extent possible.

Dialogue worksheets - You and your partner will construct a written dialogue using all the German you have learned. A subject will be given to you to start, and you may continue the dialogue in any direction/with any subject you wish. Try to make your sentences as long as possible (but don't just string words together with "und") and use as many different words as possible (these are part of the grading criteria). If you feel you have written something down that's incorrect, don't erase - just line through and write above. If need more space use the back of the form. This task will be done on recitations 5, 7, 11, and 13, and only during the last 20 minutes of the lab session. You may not use the workstations while you are preparing the dialogues.

Schedule:

M-4/Aug 18: Text worksheets	M-5/Aug 22: Dialogue Worksheet
M-6/Aug 24: Text Worksheets	M-7/Aug 28: Dialogue Worksheet
M-8/Aug 30: Text worksheets	M-9/Sep 1: Text Worksheet
M-10/Sep 6: Text Worksheets	M-11/Sep 8: Dialogue Worksheet
M-12/Sep 12: Oral Review	M-13/Sep 14: Dialogue Worksheet

PLEASE BRING THIS INSTRUCTION SHEET WITH YOU TO THE LLC ON RECITATIONS 4 TO 13

Student Name: **Partner:**

Group: Individual/Sequential Seating in Lab: **Under German 131**

Instructions: You will work at the workstation for 30 minutes individually. For the remaining 20 minutes, you will team up with your cooperative partner (the same partner for the next 10 recitations). During these 10 lab days, you will complete one of three tasks, as shown below, during the 20 minute cooperative session. Also, **during the 20 minute cooperative session, you are not allowed to use the workstation.**

Text worksheets - These are the worksheets assigned in your study guide. Do not complete these during the 30 minutes you are working alone. Work on them when you get into your cooperative group. Fill out one group member's first (one group member suggests an answer - the other comments) then simply transfer to the other member's book. Rotate the responsibility for suggesting an answer and commenting.

Oral reviews - One group member orally describes the events of the video to the other member. This should be a detailed description - who was in it (names), what they did, where they were, and any new words that you learned. Do this in German to the extent possible.

Dialogue worksheets - You and your partner will construct a written dialogue using all the German you have learned. A subject will be given to you to start, and you may continue the dialogue in any direction/with any subject you wish. Try to make your sentences as long as possible (but don't just string words together with "und") and use as many different words as possible (these are part of the grading criteria). Please make the dialogue legible. If you feel you have written something down that's incorrect, don't erase - just line through and write above. If you need more space use the back of the form. This task will be done on recitations 5, 7, 11, and 13. Remember. you may not use the workstations while you are preparing the dialogues.

Schedule:

M-4/Aug 18: Text worksheets	M-5/Aug 22: Dialogue Worksheet
M-6/Aug 24: Text Worksheets	M-7/Aug 28: Dialogue Worksheet
M-8/Aug 30: Text worksheets	M-9/Sep 1: Text Worksheet
M-10/Sep 6: Text Worksheets	M-11/Sep 8: Dialogue Worksheet
M-12/Sep 12: Oral Review	M-13/Sep 14: Dialogue Worksheet

APPENDIX B

COOPERATIVE PROCESS REVIEW INSTRUCTIONS AND OPINION QUESTIONNAIRE

For the second time, you and your partner discuss how well you feel you are working as a team during the last few minutes of today's lab session. Have you shared responsibilities for:

-providing answers for text worksheets
-providing dialogue and filling in dialogue worksheets
-just doing the work called for

Do you think your team is effective? If not, what would make it better? What do you think of group work in general? Do you like the way you've been doing group work in the lab? Please provide responses below. Be honest. Use the back if necessary.

APPENDIX C

DIALOG CONSTRUCTION WORKSHEETS

Names_____

Dialogue Construction Worksheet 1

You and your partner are to develop a written dialog using the language you have acquired in German 131 thus far. This dialog should represent a conversation between you and your partner similar to the subject in the video instruction you viewed at the beginning of this hour. For example,

Student 1: Wie geht es Ihnen?
Student 2: Sehr gut, danke. Und Ihnen?
Student 1: Auch gut, Danke. Wie heissen Sie?
Student 2: Ich heisse John. Und Sie?

Use as many words different words as possible, make your sentences as complete as possible, and continue the dialog as long as you can. When done, you may, as a team, go back and add words to the sentences, and you make any corrections needed. Begin the dialogue on the subject listed below, but you may lead into a discussion of any topic you desire.

The Subject for this dialog is: Names and Introductions

Names_____

Dialogue Construction Worksheet 2

You and your partner are to develop a written dialog using the language you have acquired in German 131 thus far. This dialog should represent a conversation between you and your partner similar to the subject in the video instruction you viewed at the beginning of this hour. For example,

Student 1: Wie Geht es Ihnen?
Student 2: Sehr gut, danke. Und Ihnen?
Student 1: Auch gut, Danke. Wie heissen Sie?
Student 2: Ich heisse John. Und Sie?

Use as many words different words as possible, make your sentences as complete as possible, and continue the dialog as long as you can. When done, you may, as a team, go back and add words to the sentences, and you make any corrections needed. Begin the dialogue on the subject listed below, but you may lead into a discussion of any topic you desire.

The Subject for this dialog is: Family and Friends

Names_____

Dialogue Construction Worksheet 3

You and your partner are to develop a written dialog using the language you have acquired in German 131 thus far. This dialog should represent a conversation between you and your partner, similar to the subject in the video instruction you viewed at the beginning of this hour. For example,

Student 1: Wie Geht es Ihnen?
Student 2: Sehr gut, danke. Und Ihnen?
Student 1: Auch gut, Danke. Wie heissen Sie?
Student 2: Ich heisse John. Und Sie?

Use as many words different words as possible, make your sentences as complete as possible, and continue the dialog as long as you can. When done, you may, as a team, go back and add words to the sentences, and you make any corrections needed. Begin the dialogue on the subject listed below, but you may lead into a discussion of any topic you desire.

The Subject for this dialog is: All About My Home

APPENDIX D

GRADED REVIEW 1

Listening

(Ten points per question, 100 points total)

1. According to what you have just heard, which German is the oldest? (2206-3588)
A) Sacha B) Ivanka C) Nada D) Julia

2. According to what you have just heard, Sonja (3975-4134)
A) has been learning English since she was eight
B) has been learning English for eight years
C) goes to college
D) goes to the gym

3. Jan-Oliver (16655-13952)
A) is 5 years old and has a birthday on the fourth of July
B) is 5 years old and has a birthday on the fourteenth of April
C) is 4 years old and has a birthday on the fifth of April
D) is 5 years old and has a birthday on the fourth of July

4. Svenja ist _____ Jahre alt, hat _____ Haare, _____ Augen, und ist _____ groß. (20958-

5. Ali ist _____ Jahre alt, _____ haare, _____ Augen, und ist _____ groß (20350-20930)

6. Constance ist ist _____ Jahre alt, hat _____ Haare, _____ Augen, und ist _____ groß. (21830-22149)

7. Fill in the missing blanks in German (34403-34785)

Hast du Geschwister? Einen Bruder. Kannst du ihn Beschreiben?
Er ist _____ Jahre alt, hat _____ Haare, _____ Augen, und ist manchmal

_____, und manchmal _____.

8. Fill in the missing blanks in German (35109-35424)

Hast du _____ ? Einen _____. Kannst du ihn beschreiben?

Er ist _____ und _____ und _____ und _____ Jahre alt.

10. Fill in the missing blanks in German (36207-36530)

Und er ist _____ Jahre alt, hat _____ Augen, _____ Haare

trägt eine _____ und ist zwei _____ groß. Also ziemlich groß? Ja, _____

Extra credit (5 points)
Sonja ist _____ groß.

Culture

(Five points per question, 50 points total)
Each question is worth ten points.

1. You may use the informal "du" when addressing _____.
    a. your teacher
    b. your classmate
    c. an elderly salesclerk
    d. the mayor

2. When you walk a dog in Germany, you _____
    a. must have your dog on a leash.
    b. must have a muzzle on your dog.
    c. must have a pooper scooper with your .
    d. must have a license for your dog.

3. The Christmas holiday in Germany lasts how many days?
    a. A week.
    b. One day.
    c. Two days.
    d. All weekend.

4. In Germany, the zip code _____ the name of the city.
    a. follows
    b. precedes
    c. goes below
    d. goes above

5. East and West Germany were officially reunited in _____.
    a. 1985
    b. 1990
    c. 1992
    d. 1994

Vocabulary

(Ten points per blank, 100 points total)

Fill in the missing words from the choices below. You have more words than you'll need. Savor the pain.

Svenjas Familie

Das _____ mein Vater. Er ist _____ groß, hat blonde Haare und grüne Augen. Er ist _____ und er arbeitet im Hafen. Das ist meine Mutter. Meine Mutter ist Hausfrau aber sie _____ auch halbtags als Sekretärin. Meine Mutter ist 1,56 _____, hat braune Haare und grüne Augen und sie _____ eine Brille. Was sind dar für Tiere? Das _____ Wüstenrenmäuse, mongolische. Warum _____ du sie gern? Ach, die sind unheimlich _____. Die beißen nicht und stinken nicht und muß man auch nur _____ im Monat saubermachen.

	sein		magst
	habe		Schwester
	ist		arbeitet
	Polizist		sind
	Augen		bin
	zeimlich		klein
	trägt		niedlich
	einmal		haben

Gisting/Reading

(Ten points per sentence, 100 points total)

Write in good English what the underlined sentences mean?

Der Hamburger Hafen

Wie heißen Sie? Wolfgang Wichmann. (6859-11000)
Was ist Ihr Beruf? Wasserschutspolizist im Hamburger Hafen.
Auf dem Wasser gibt's heute viel zu sehen. (1)
Viele Schiffe unt unterwegs. (2)
Im Hafen sind Segelschiffe und Kriegschiffe. (3)
Dieses Segelschiff kimmt aus Norwegen.
Das ist die Alexander von Humboldt, ein Windjammer für junge Leute.
Und jetzt etwas ganz Besondered: das Schlepperballett. (4)
Zum Abscluß gibt's ein großes Feuerwerk. (5)

(1)_____

_____

(2)_____

(3)_____

_____

(4)_____

(5)_____

_____

Alis Wohnzimmer

An der Wand hängt eine Zeichnung von mir. (1)
Hier steht mein E-Klavier. Das ist unser Radio. Ein Bild aus dem Iran. (2)
Unser Fernseher. Das sind meine Goldfische. (3)
Wir haben drei Goldfische. Wir haben sie schon seit zwei Jahren. (4)
Ich füttere einmal am Tag. (5)
und alle zwei Wochen mache ich das Aquarium sauber.

(1)_____

_____

(2)_____

(3)_____

_____

(4)_____

(5)_____

_____

Writing
(At least 100 points)

As a minimum (for a "C" or a "B"), you should answer the following questions (or follow the instructions) in German in a good paragraph (e. g., all the sentences are not S-V-O).

To excel (for an "A"), you should use the above sentences as the basis for a dialog--all in German--between you and German you have recently met. As an excellent student, your sentences should be longer (und, aber) and contain greater variation (S-V-O; O-V-S).

(Note: a clever strategy suggested by several intelligent cadets is to leave spaces between each answer so that you can fill in the questions in German when you have time.)

(Note: I have have no fear. I am stronger than Arnold. Ich leide, deshalb bin ich.)

1. What is you name?
2. How old are you?
3. What do you like to do?
4. Describe yourself and your family?
5. What do your mother, father, and siblings do?
6. Compare your mother and father to each other.

(Meine Mutter ist...)

7. Compare yourself to a parent or a sibling.

(Ich ...)

9. Describe your German friend?
10. Compare yourself to your German friend?

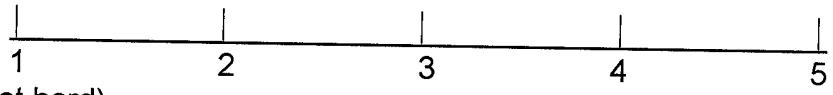
APPENDIX E

AMOUNT OF INVESTED MENTAL EFFORT QUESTIONNAIRE

During the Video Session, I worked (Circle One): Alone
In a Group

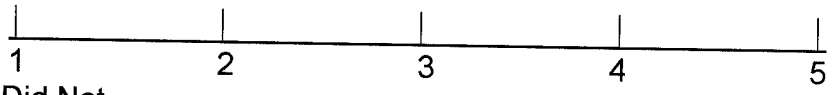
Your responses in no way will impact upon the grade you receive in this course, so please answer the following questions as honestly as possible. **Circle the number** that best describes your level of effort:

1. How hard did you concentrate while doing the interactive video lesson?



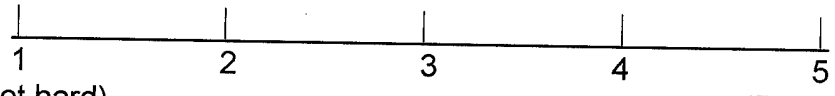
(Not hard) (Extremely Hard)

2. How much did the lesson make you think?



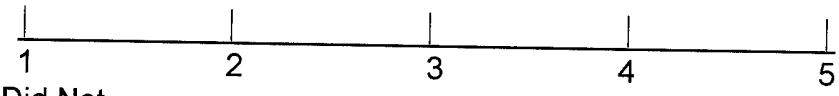
(It Did Not Make Me Think) (A great deal)

3. How hard did you try to understand the lesson?



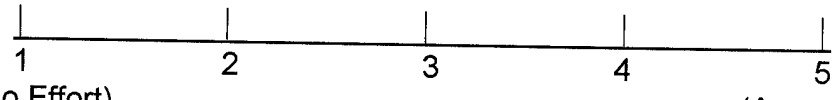
(Not hard) (Extremely Hard)

4. How much did you try to remember what you saw in the lesson?



(I Did Not Try At All) (I Tried Very Hard)

5. How much effort did you put into comprehending the interactive video lesson?



(No Effort) (A great deal)

APPENDIX F

ATTITUDE QUESTIONNAIRE

During the Video Session, I worked (Circle One): Alone
In a Group

Your responses in no way will impact upon the grade you receive in this course, so please answer the following questions as honestly as possible. Please read and think about each question carefully; many are similar, but not the same. **Circle the answer** that best describes your feelings or attitudes.

1. I think that learning is easier with interactive video.
Strongly Disagree Disagree Undecided Agree Strongly Agree

2. I enjoy working with interactive video.
Strongly Disagree Disagree Undecided Agree Strongly Agree

3. I think is better to use interactive video individually.
Strongly Disagree Disagree Undecided Agree Strongly Agree

4. I prefer learning language from interactive video than from a teacher.
Strongly Disagree Disagree Undecided Agree Strongly Agree

5. I enjoy being able to choose the options offered with interactive video instruction.
Strongly Disagree Disagree Undecided Agree Strongly Agree

6. I think it is easier to learn a language with interactive video.
Strongly Disagree Disagree Undecided Agree Strongly Agree

7. I am happier when I am in the interactive video lab than when I am in class.
Strongly Disagree Disagree Undecided Agree Strongly Agree

8. I feel more comfortable working in a small group than working alone.
Strongly Disagree Disagree Undecided Agree Strongly Agree

9. I can learn more language when I work in a small group.
Strongly Disagree Disagree Undecided Agree Strongly Agree

10. I enjoy language class.
Strongly Disagree Disagree Undecided Agree Strongly Agree

11. I enjoy working with other cadets to learn language.
Strongly Disagree Disagree Undecided Agree Strongly Agree

12. I think that learning is easier when working in groups.
Strongly Disagree Disagree Undecided Agree Strongly Agree

13. Cooperative learning should be used more often.
Strongly Disagree Disagree Undecided Agree Strongly Agree

14. I put forth a great deal of effort in the cooperative session (that occurred after the interactive video presentation).
Strongly Disagree Disagree Undecided Agree Strongly Agree

15. I feel that I strongly contributed to the cooperative session (that occurred after the interactive video presentation).
Strongly Disagree Disagree Undecided Agree Strongly Agree

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BIOGRAPHICAL SKETCH

Stanley B. Supinski is a Major in the U. S. Air Force. He was born in New Britain, Connecticut, on September 2, 1954. Following is a summary of his educational accomplishments and military career:

Education:

Doctor of Philosophy (expected), Instructional Systems Design, Florida State University, Tallahassee, Florida, 1996

Master of Arts, National Security Affairs, U.S. Naval Postgraduate School, Monterey, California, 1988

Bachelor of Science, Liberal Arts, University of New York, Albany, New York, 1982

Professional Military Education:

Squadron Officer School, Maxwell A. F. B., Alabama, 1989

Air Force Air Intelligence Training School, Denver, Colorado, 1983, 1976

Defense Language Institute, Russian Course, Monterey California, 1979

Military Career Highlights:

Dates	Unit/Location	Title
Jun 91 - Jun 93	United States Air Force Academy, Colorado Springs, CO	Instructor of Russian
Aug 88 - Jun 91	Det 11, European Special Activities Area, Munich, Germany	Operations/Intelligence Officer
Apr 86 - Jun 87	HQ, AFSAC Ft Belvoir VA	Executive Officer to the Commander, Air Force Human Intelligence
Dec 83 - Apr 86	Det 21, AFSAC Ft Belvoir VA	Team Chief, Forces Debriefing Team

Jan 80 - Apr 83	Det 11, European Special Activities Area, Munich, Germany	Linguist/Human Resources Debriefer
Oct 76 - Nov 78	18th Tactical Reconnaissance Squadron, Shaw AFB SC	Imagery Intelligence Interpreter

Major Supinski married Jennifer Sue Wood on September 24, 1976. They have two children, Erin, born in 1980, and Sara, born in 1982.