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James C. Greene

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C. G. Gentry
Major professor

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THE EFFECTS OF SMALL-GROUP AND INSTRUCTOR-LED DISCUSSIONS ON THE ACADEMIC ACHIEVEMENT OF FIELD-DEPENDENT COMMUNITY COLLEGE TELECOURSE STUDENTS

By

James Christopher Greene

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ABSTRACT

THE EFFECTS OF SMALL-GROUP AND INSTRUCTOR-LED DISCUSSIONS ON THE ACADEMIC ACHIEVEMENT OF FIELD-DEPENDENT COMMUNITY COLLEGE TELECOURSE STUDENTS

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The basic purpose of the experiment was to determine if opportunities for personal (face-to-face) interaction with their field-dependent peers and with their telecourse instructor would significantly improve the academic performance of field-dependent telecourse students.

A mixed group of field-dependent and field-independent subjects made up the sample of sixty-two telecourse students that was drawn from the population of two-hundred and twenty who had taken the "group-embedded-figures test" (GEFT) and a "Local Government" pretest at the orientation sessions that were held at the outset of the 1987 Winter term at Lansing Community College. Nine field-dependent and eleven field-independent subjects were randomly assigned to an "individual study" condition. Ten field-dependent and ten field-independent subjects were randomly assigned to a "small-group discussion" condition. Ten field-dependent and twelve field-independent subjects were randomly assigned to an "instructor-led discussion" condition.

To measure the effects of the three conditions (treatments) upon the posttest achievement of the field-dependent and field-independent subjects, analysis of covariance (ANCOVA) procedures were used to test eight hypotheses. The "Local Government" pretest served as the covariate. The results of hypothesis testing indicated that, after adjusting for the effects of the covariate, significant differences were found when comparing the

overall posttest performance of field-dependent and field-independent subjects with the latter group outscoring the former. No significant differences were found between the three experimental conditions overall and no significant differences were found when considering the effects of interaction between field-dependent and field-independent subjects in the three experimental conditions. After adjusting for the effects of the covariate, significant differences were found for field-dependent subjects when comparing their performance in the "instructor-led discussion" and "small-group discussion" conditions with the latter group showing a higher mean score.

Generally, responses to a scaled measure of attitude administered after the experiment indicated that both field-dependent and field-independent students were favorably disposed toward taking part in telecourse discussion sessions.

To

Darcy

Moira, Michael and Matthew
whose understanding, laughter and love continue to sustain me.

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CHAPTER I: THE PROBLEM

INTRODUCTION

Several researchers have determined that students whose cognitive style is described as being field-independent perform significantly better in the telecourse format than do students whose cognitive style is described as being field-dependent. Other investigators have concluded that field-dependent individuals are more interpersonally oriented than those who are field-independent. It has been suggested that involving field-dependent students in instructional activities which require social interaction would improve their performance in distance education programs. The purpose of this research was to evaluate the effects upon learning of providing field-dependent telecourse students with opportunities for personal interaction with their telecourse teacher and their field-dependent "classmates."

The acceptance of television as a means of making formal instruction more widely available has come gradually. In the 1950s and 1960s, despite several instances of measurable success, educational experimentation with the medium produced generally unimpressive results. However, in the 1970s, appraisals of both the style and substance of instructional tv began to improve. In that decade, the telecourse, with its high quality video segments and tightly structured design, greatly enhanced the image of televised teaching. In the 1980s, with program acquisition procedures developed and student support services structured, hundreds of postsecondary institutions have adopted the telecourse as a method of extending their offerings to distant learners. Today, given the size of enrollments and the satisfaction of students, it seems reasonable to conclude that the "...telecourse (should) be considered an example of the successful use of technology

in instruction" (Purdy, 1986a, p. 27).

Lansing Community College has offered credit-generating telecourses for over eight years. It began its commitment to this form of instruction in 1979 when it used its leased cable television channel to transmit the video components of a telecourse entitled, *THE GROWING YEARS*. In 1981, the College was able to expand its telecourse efforts when it was granted free access to air time on WKAR-TV, the Public Broadcasting Service affiliate in East Lansing. Over the next five years, using both cable and broadcast channels, the number of telecourses offered and the number of students enrolling in them increased substantially. In the 1985-1986 academic year alone, thirty-one sections of eleven different telecourses were offered and one thousand one hundred and thirteen students signed up for them (*TELELEARNING REPORT 1985-1986*, 1987).

Throughout this growth period, a majority of the College's telecourse faculty expressed concern that the learning experience of many telecourse students was incomplete because of insufficient personal interaction among students and between teacher and students. The instructors involved believed that telecourse content could not be mastered without increased opportunities for interpersonal contact. Although they had no empirical evidence upon which to base their views, most of these teachers began to "strongly recommend" that their telecourse students attend biweekly discussion sessions on campus. One instructor went so far as to make attendance at such sessions mandatory.

In their research, Murphy (1982), Tate (1983) and Nelson (1986) considered the effects of differences in students' cognitive styles upon academic achievement in a telecourse. Their findings indicate that individuals whose cognitive styles are described as being field-independent perform significantly better in telecourses than do individuals whose cognitive styles are described as being field-dependent. The cognitive style dimension of field-independence/field-dependence "... denotes (an individual's) tendency to articulate figures as discrete from their backgrounds... as opposed to a countertendency to experience events globally in an undifferentiated fashion" (Messick, 1976, p. 14)). In

light of the concern raised by telecourse faculty members at Lansing Community College regarding insufficient personal contact in the telecourse format, it is of interest to note that one of the characteristics attributed to field-dependent people is that they are more socially oriented than their field-independent counterparts and are more likely to prefer personal interaction when clarifying ambiguities (Witkin and Goodenough, 1977).

Since the work of Murphy (1982), Tate (1983) and Nelson (1986) suggests that field-dependent telecourse students do not perform as well as those who are field-independent and since Witkin and Goodenough (1977) have noted that field-dependent people are more inclined to be socially interactive than those who are field-independent, a decision was made to investigate the consequences of placing field-dependent telecourse students in instructional settings where interpersonal activities were used. Thus, in general terms, the purpose of this research was to determine if opportunities for face-to-face interaction with their field-dependent peers and with their telecourse instructor would improve the academic performance of field-dependent telecourse students.

PROBLEM STATEMENT

For some adult learners, the telecourse represents their sole means of gaining access to postsecondary educational opportunities (Brey and Grigsby, 1984). Family responsibilities, work schedule conflicts, transportation difficulties and physical handicaps are but some of the reasons why these particular students select the telecourse as their way to "go to school." For others, the telecourse is an attractive option primarily because it is a more convenient way to earn credits or to obtain information (Brey and Grigsby, 1984; Brock, 1985; Purdy, 1986b). Reading assigned materials and watching video tapes at home, in the workplace or at the local library are the preferred modes of study for these types of learners. Whether the rationale for enrollment is attributed to necessity or choice, it seems clear that the telecourse has been recognized by many as a viable means of receiving

college level instruction (Scully, 1980; Brey and Grigsby, 1984; Purdy, 1986b).

Despite this acceptance, telecourses have not been free of criticism. In fact, from the early 1970s to the present day, telecourses have been subjected to disapproval for a variety of reasons (Luskin, 1983; Smith, 1983). For some observers the major failing is thought to be structural. Their belief is that in affording limited personal contact between teachers and students, the telecourse format is inherently flawed. Purdy (1986b) states that, "For many, especially college faculty members, the greatest problem with telecourse instruction is that it tends to separate the teacher from students and students from other students, thus impersonalizing the educational process" (p. 4). Everett (1981) appears to represent the view of many students, teachers and administrators when he says:

> From Plato's Symposium on (and no doubt much earlier) effective education has involved both the transmittal and critical examination of knowledge, a process that requires as its catalyst a spontaneous intellectual and human exchange. The knowledge transmitted by an instructor, whether in the classroom or on television, only begins that process; the communication, discussion and debate that follow, not only between the instructor and student but between student and student as well, is what makes for a truly meaningful learning experience. The television screen, even when abetted in the future by two-way communication, cannot simulate such an environment. It can only supplement classroom teaching (p. 39).

In light of these observations, the approach taken by telecourse producers in basing the development of their instructional packages on an individualist theory of knowledge and education is striking. "According to (this) traditional, Cartesian theory of knowledge, a person can quite effectively learn alone. All (that is) really needed in order to learn is a source — a teaching instrument — which may be a book, a television screen or nature itself" (Bruffee, 1982, p. 27). Purdy (1986b) adds that, "according to this perspective, education requires a communication process, but communication does not always need to take the form of discussion with other people. While social relations, such as those involved in discussions, are often useful, they are not essential to learning" (p. 5).

Those creating and marketing telecourses maintain that their product is designed to

appeal to mature learners and to promote the growth of student autonomy. While an individual's acquisition of self-directed learning skills is certainly important, it cannot be assumed that all telecourse students have the maturity, time, willingness or capacity to develop them. In other words, while some students may prefer the opportunity for independent work that the telecourse affords, others may find that distance from campus, teacher and classmates inhibits or undermines their ability to succeed. Thus, an asset for one is another's liability. If the isolation experienced by some telecourse students prevents them from accomplishing their academic goals, should not strategies be designed to accomodate their needs? Purdy (1986b) writes that, " ... if personal interaction between students and scholars is established as an important part of the educational process, those interactions can be provided even in distance learning situations .... (Telecourses) challenge faculty and administrators to ... provide new kinds of support services for students who like and can profit from this new form of instruction" (p. 11).

Dealing with the depersonalizing effects of distance on students and learning is not the exclusive concern of American schools offering telecourses. In other countries whose educational institutions have long-established commitments to distance or correspondence education, a variety of means have been proposed to add an interpersonal dimension to the teaching-learning process. Seminars, supplemental audio cassettes as well as individual and conference phone calls have all been utilized in an attempt to bridge the gap between instructor and students (Orton, 1978; Daniel and Marquis, 1979; Peruniak, 1984; Millard, 1985). Many such efforts have been made to reduce the attrition rates experienced by these schools. Peruniak (1984) reports that, " ... high on the list of reasons for failure and withdrawal in distance education is loneliness that brings discouragement to students studying on their own" (p. 108). Orton (1978) observes that, " ... research has shown that the use of telephone and other methods of making personal contact with correspondence students results in measurable improvements in students' completion rates" (p. 80). Interestingly, in spite of these findings, as well as evidence in this country

of considerably higher attrition rates for home study courses (such as telecourses) when compared with normal on-campus courses (*ITV Close-Up: The First Six Years*, 1978), very little research is available which documents effective methods of making the telecourse a more personalized learning experience for students who need or want it to be so. The use of telecourses at Lansing Community College seems to be typical. Although the institution's telecourse instructors either require or strongly encourage student participation in group discussions on campus, no systematic efforts have been made to analyze the impact of such sessions on academic performance.

Recent studies have considered the influence of the cognitive style dimension of field-dependence/field-independence on the achievement and attitudes of telecourse students (Murphy, 1982; Tate, 1983; Nelson, 1986). In each of these investigations it was concluded that field-independent students received higher grades and were more satisfied with the telecourse experience than their field-dependent counterparts. The characteristics of field-independent individuals appear to match well with what some educators would describe as the "ideal" telecourse student profile. That is, "field-independent people ... are likely to have a nonsocial orientation.... (and to) prefer more solitary impersonal situations.... (They) are more concerned with ideas and abstract principles.... (In sum), they are high in cognitive restructuring skills as well as in personal autonomy and low in social sensitivity and social skills" (Witkin, Moore, Oltman, Goodenough, Friedman, Owen and Raskin, 1977, p. 198). By contrast, "field-dependent people are high in social sensitivity and social skills and low in restructuring skills and personal autonomy.... (They) prefer interpersonal situations in which they are involved with others.... (and) show greater skill in getting along with others probably as a consequence of their social characteristics" (Witkin, Moore, Oltman, Goodenough, Friedman, Owen and Raskin, 1977, p. 198). Based upon these descriptions, the findings of Murphy (1982), Tate (1983) and Nelson (1986) seem not surprising.

Field-dependence has been considered as a means of explaining the high drop-out

rates associated with distance learning. Thompson (1984) writes, "If field-dependent learners are not well suited to distance education programs such as correspondence study, can we modify these instructional programs so as to better accomodate such persons? The... research suggests that such persons might benefit from increased opportunities for interaction with their instructors and with other students" (p. 290). Murphy (1982), Tate (1983) and Nelson (1986), in the concluding remarks of their investigations, suggest that study groups should be made available for field-dependent telecourse students to provide them with support and opportunities for social interaction. In other of their recommendations, they go so far as to state that field-dependent students should be encouraged to enroll in traditional forms of learning and to avoid telecourses. However well intentioned it may be, this latter advice cannot be considered practical. As noted previously, individuals enroll in telecourses out of necessity as well as by choice. It is likely that many field-dependent students, despite the warnings of academic counsellors, would still choose the telecourse as their best or only educational option.

If, as the research implies, field-dependent students are indeed less likely to be successful in the telecourse format, would opportunities for personal interaction among themselves and with their instructor significantly enhance their academic performance? Moreover, if field-independent students are well suited to the isolating nature of the telecourse, is it appropriate to require their involvement in group discussions?

PURPOSE OF THE RESEARCH

The value of personal contact in the distance education context has been discussed (Orton, 1978; Daniel and Marquis, 1979; Peruniak, 1984; Millard, 1985) and the higher academic achievement of field-independent telecourse students as compared to their field-dependent counterparts has been documented (Murphy, 1982; Tate, 1983; Nelson, 1986). However, it appears that no experimental research has been conducted which

attempts to assess the effects of personal interactions between teacher and learners and among learners themselves upon the academic performance of telecourse students with field-dependent cognitive styles. In an effort to resolve this problem, methods of experimental and statistical control were employed to analyze the effects of three particular instructional strategies upon the academic performance of both field-dependent and field-independent students enrolled in telecourses at Lansing Community College during the 1987 Winter term.

Specifically, the basic purposes of the research were:

1. to determine if field-dependent telecourse students who were given an opportunity either to interact personally with their teacher or to interact personally with one another, would receive higher posttest scores than other field-dependent telecourse students who were given no opportunities for personal interaction;

2. to determine if field-independent telecourse students who were given an opportunity either to interact personnally with their teacher or to interact personally with one another, would receive higher posttest scores than other field-independent telecourse students who were given no opportunities for personal interaction;

3. to determine if the overall posttest performance of field-independent telecourse students would be superior to the overall posttest performance of field-dependent telecourse students;

4. to determine if the differences in posttest performance for field-dependent and field-independent telecourse students would vary depending upon their working alone, with one another in small (identical cognitive style) groups or with their instructor in a group.

SIGNIFICANCE OF THE PROPOSED RESEARCH

As noted, despite the flexibility it offers, the telecourse, with the interpersonal gap it can create between teacher and learners, may compromise the educational experience of field-dependent people. Those working in the area of educational technology must be aware of this possibility and commit themselves to developing strategies that will make the telecourse a more effective mode of instruction for all students. If the proponents of technology-based solutions to educational problems can assist in creating ways of measurably improving learning outcomes, the importance of the role they play in the design and delivery of instructional materials will be enhanced. In discovering more about the relationship of cognitive style to telecourse achievement, educational technologists will be in a better position to develop means of accomodating the individual needs and preferences of distant learners.

Questions have been raised that have particular relevance to the research proposed herein. For example, "What are the factors which account for student success and failure in distance learning? What is the proper role of two-way communications given the subject matter (and) the needs and characteristics of learners.... How many seminars should be held and should they be compulsory or voluntary? Which kinds of students need personal contact the most, the least? How can study groups be used effectively" (Wiesner, 1983, p. 220). In addition, it has been suggested that:

> ...the extreme diversity within the learning population of distance learning institutions calls for differential treatment on a variety of levels. Attempts to individualize courses, provide varying degrees of tutorial support to individual students within courses, present instructional materials using a variety of methods and media, etc., may be viewed as attempts to cope with the large differences that exist between learners even within the same course. The search for effective differential treatment procedures, with an attempt to determine the types of students they are effective for, must continue (Coldeway, 1982, p. 92).

It has been observed as well that "... institutions offering telecourses must identify students for whom distance learning is inappropriate and either help them to learn new study techniques or direct them to other, more supportive instructional situations" (Purdy, 1986b, p. 10).

Thompson (1984) has said that ..."(in distance education programs) the selective application of (adjunctive) support systems may be warranted if future research demonstrates that field-dependent students derive significantly greater benefit from them" (p. 290). Murphy (1982), Tate (1983) and Nelson (1986), who have investigated the impact of the cognitive style dimension of field-dependence/field-independence upon telecourse student achievement, have concluded that individuals who are field-independent perform better in the telecourse format than do their field-dependent peers. Each of them has recommended that further research be conducted in an effort to evaluate methods of improving the academic performance of field-dependent telecourse students.

Therefore, the significance of the proposed research is that: first, it will use experimental design and statistical control procedures to evaluate the effects of three experimental conditions on the posttest performance of samples of telecourse students with both field-dependent and field-independent cognitive styles; second, it will generate data which can be used in deciding whether institutions offering telecourses should actively involve themselves in advising telecourse students of the implications of the match of particular cognitive styles to the structure of the telecourse; and third, it will contribute to the study of the effects upon learning of using small-group and instructor-led discussions in distance education programs.

THEORETICAL AND CONCEPTUAL FOUNDATIONS

Messick (1976; 1984) has discussed the importance of matching individualized instruction to learners with individual differences. In paricular, he has noted that

cognitive style is an essential factor to be considered in the determination of the optimal link between strategies and students. Witkin's work with the cognitive style dimension of field-dependence/ field-independence has been used to ascribe certain cognitive capabilities and personality preferences to individuals. Those identified as field-dependent are said to be low in cognitive restructuring ability and high in interpersonal skills while those identified as field-independent are said to be high in cognitive restructuring ability and low in interpersonal skills (Witkin and Goodenough, 1977; Witkin and Goodenough, 1981; Witkin, Moore, Oltman, Goodenough, Friedman, Owen and Raskin, 1977). In the experiment described herein, it is this tendency of field-dependent individuals to be socially oriented that is especially pertinent.

Witkin's theories of field-dependence/field-independence have been used by several researchers to assist in evaluating student performance in telecourses. In comparing the academic achievement of field-dependent telecourse students to their field-independent counterparts, Murphy (1982), Tate (1983) and Nelson (1986) found the performance of field-independent learners to be superior. However, in none of these three studies was a methodology employed that attempted to accomodate the social orientation of field-dependent individuals by allowing telecourse students with field-dependent cognitive styles to engage in "small-group" or "instructor-led" discussions prior to being tested.

Bruffee (1982) maintains that, "The theory of learning that educational... television (producers)... implicitly assume is the traditional Cartesian, individualist theory that knowledge is information" (p. 27). According to this view, "a person can quite effectively learn alone.... Discussion with other people may enhance learning somewhat by giving the individual mind, to which the information is being transferred, a chance to use or explain that information.... But the social relations involved in discussion are not essential to learning according to this theory" (Bruffee, 1982, p. 27). In his discussion of the importance of using collaborative or group learning sessions with instructional television programs, Bruffee (1982) challenges the appropriateness of the Cartesian theory and

states that, "we must accept and begin working out the educational implications of the view that knowledge is a social artifact and learning a social process" (p. 31). This perspective parallels that of Stanford and Roark (1974) who observe that " ...human interaction is the single most important ingredient in education.... Our position is based upon three principles... (1) education is a social process, (2) significant learning occurs through interaction and (3) education must include self-knowledge and self-understanding" (p. 2). In regard to this last principle, McCombs (1985) maintains that self-knowledge and self-understanding "result from peer interactions" (p. 162).

In considering the views of Roueche and Snow (1978) regarding the importance of teacher-student contact in learning systems designed for individual use, McCombs (1985) says that, "instructors are a necessary augmentation to individualized methods of instruction because they can help students accept themselves and develop positive attitudes about themselves.... Sophisticated instructional 'gadgetry' can hinder the teaching/ learning process when used without skillful human resources, particularly when dealing with high-risk students" (p. 161). In the Final Report of the Study Group on the Conditions of Excellence in American Higher Education, the authors maintain that, "the narrative evidence we have examined suggests that most of our current uses of computers, other forms of progammed instruction, language laboratories, and televised instruction isolate the learner from the teacher and the teacher from the assessment process" (*Involvement in Learning: Realizing the Potential of American Higher Education*, 1984, p. 29). The Group recommends that, "Learning technologies should be designed to increase, and not reduce, the amount of personal contact between students and faculty on intellectual issues" (*Involvement in Learning: Realizing the Potential of American Higher Education*, 1984, p. 29).

In his review of the literature relating to attrition rates in distance education programs, Thompson (1984) notes that a number of researchers have identified student characteristics that seem to be associated with a preference for independent study. He

suggests that the differences between students who are successful and unsuccessful in independent study programs are very similar to the personality traits associated with the cognitive style dimension of field-dependence/field-independence (Thompson, 1984). In reporting that " ...field-independent people appear to be more suited than field-dependent people for instructional methods such as correspondence study," Thompson (1984, p. 289) draws a conclusion that parallels those of Murphy (1982), Tate (1983) and Nelson (1986). In summing up his findings, Thompson (1984) poses a question and offers an answer. He asks, "If field-dependent learners are not well suited to distance education programs such as correspondence study, can we modify these instructional programs so as to better accomodate such persons" (Thompson, 1984, p. 290)? He replies, "The research ...suggests that such persons might benefit from increased opportunities for interaction with their instructors and with other students" (Thompson, 1984, p. 290).

RESEARCH QUESTIONS

The questions asked in this experiment are presented in general form as:

1. Does the opportunity for social interaction in either "small-group discussion" or "instructor-led discussion" groups improve the posttest performance of field-dependent telecourse students?

2. Does the opportunity for social interaction in either "small-group discussion" or "instructor-led discussion" groups improve the posttest performance of field-independent telecourse students?

3. Regardless of their working in "individual study," "small-group discussion" or "instructor-led discussion" groups, do field-independent telecourse students achieve higher overall posttest scores than field-dependent telecourse students?

4. Are differences in posttest scores constant for field-dependent and field-independent telecourse students depending upon their working in "individual study,"

"small-group discussion" or "instructor-led discussion" groups?

These general questions are posed as research and statistical hypotheses in Chapter III.

DEFINITION OF TERMS

COGNITIVE STYLES — "...stable attitudes, preferences, or habitual strategies determining a person's typical modes of perceiving, remembering, thinking, and problem solving.... their influence extends to almost all human activities that implicate cognition, including social and interpersonal functioning" (Messick, 1976, p. 5).

DISTANCE EDUCATION — "...a learning system where the teaching behaviours are separate from the learning behaviours. The learner works - alone or in a group - guided by study material arranged by the instructor who together with the tutors is in a location apart from the students, who however have the opportunity to communicate with a tutor/tutors with the aid of one or more media such as correspondence, telephone, television, (or) radio. Distance education may be combined with various forms of face-to-face meetings" (Keegan, in quoting Flinck, 1980, p. 16).

FIELD-DEPENDENCE / FIELD-INDEPENDENCE — A dimension of cognitive style structured as a continuum which describes individuals' consistent modes of approaching the environment in global, as opposed to analytical, terms. Field-independent individuals tend to articulate figures as discrete from their backgrounds, have a facility in differentiating objects from embedding contexts, demonstrate competence in analytical functioning and have impersonal orientations. Field-dependent individuals tend to experience events globally in an undifferentiated fashion, show less competence in analytical functioning and have greater social orientations (Messick, 1976).

INDIVIDUAL STUDY — A situation in which a learner works independently, without interacting with classmates. In an instructional format such as the telecourse in

which learning typically takes place at a distance from peers, teacher and campus, students most often engage in individual study.

INSTRUCTOR-LED DISCUSSION — A situation in which learners in a classroom setting are presented with course related information in an expository fashion by a teacher. Dialogue between teacher and students may characterize this kind of learning.

SMALL-GROUP DISCUSSION — A situation in which learners work collaboratively in resolving course related issues. In this setting, a teacher provides direction at the outset of an instructional exercise but allows the student group to pursue its own solutions to the problems that are posed.

TELECOURSE — "...a complete instructional system that presents a body of knowledge through the use of sight, sound, color, movement, and print. Basic components of a telecourse, in addition to the television programs themselves, usually include a main textbook, a student study guide (or a text-study guide combined), tests, a faculty manual, and arrangements for interaction between students enrolled in the telecourse and the faculty supervising the course" (Hewitt and Lee, 1979, p. 3).

LIMITATIONS OF THE RESEARCH

The subjects utilized in this experiment were a sample of students drawn from the population of students who enrolled in telecourses at Lansing Community College in the Winter term of 1987. Whatever inferences are made about this particular population are based upon the posttest scores of the sample of students involved in the experiment. It should be understood that while certain findings may suggest the presence of similar tendencies or capacities in the universal population of telecourse students, no totally valid assumptions can be made regarding this larger group based upon the performance of the sample subjects at Lansing Community College.

Since the research conducted took the form of a "one shot" experiment using

random assignment of subjects to treatments, there may be some question concerning the naturalness of the telecourse environment in which the three conditions of learning were constructed and analyzed. In particular, it should be recognized that the "individual study" or control condition which is described in detail in Chapter Three does not represent a recreation of the instructional setting in which telecourse students, working independently, would be likely to be found.

Finding inducements to enhance subject participation in experimental research can be difficult. Despite the provision of several attractive incentives, the number of individuals taking part in this experiment was disappointingly low. While a smaller sample size does not make statistical analysis impossible, the accuracy of the inferences made using fewer subjects becomes limited.

The pretest and posttest questions used in the experiment required that subjects recall information presented in a particular telelesson. Consequently, the tests measured achievement that Bloom (1956) in his taxonomy of educational objectives would describe as being exclusively at the "knowledge" or first level of learning.

The monitors working in both the "small-group discussion" and "instructor-led discussion" conditions which are described in detail in Chapter Three were given no specific training relating to effective methods of facilitating group collaboration. In the small-group setting, the monitor observed and played no active role in group interactions. In the instructor-led setting, the monitor, who was the instructor for the *American Government Survey* telecourse, conducted the session in the way he would have with his own telecourse students.

As is reported in Chapter Three, the reliability coefficients generated for the pretest and the posttest were relatively low. These estimates should be taken into account when considering the results of the experiment.

ORGANIZATION OF THE RESEARCH

A review of the literature that is related to the focus of this research is presented in the second chapter. In the third chapter, the design of the experiment is presented. Included are statements of the research and null hypotheses, the method used in selecting the sample of interest, information concerning the testing of sample subjects and the procedures followed in conducting the experiment. The results of the experiment are reported in the fourth chapter. In the fifth chapter, the results are discussed, conclusions are stated and recommendations based upon the research findings are offered.

CHAPTER SUMMARY

In this chapter, the purpose of the experiment was introduced. It was described as being an attempt to determine if opportunities for face-to-face interaction with their field-dependent peers and with their telecourse instructor would improve the academic performance of field-dependent telecourse students. The cognitive style dimension of field-dependence/field-independence was briefly discussed and the interpersonal orientation of field-dependent individuals was noted.

The significance of the research to those working in the fields of instructional technology and distance education was mentioned. The efforts of researchers investigating the cognitive style dimension of field-dependence/field-independence, telecourse student achievement and the social nature of the learning process were cited as comprising the theoretical and conceptual foundations of the inquiry. The issues addressed in the experiment were stated as four general research questions and definitions were offered in an effort to clarify the meaning of terms that were used frequently throughout this report. Finally, a number of limitations related to the research were presented.

CHAPTER II: REVIEW OF THE LITERATURE

INTRODUCTION

In this chapter, three areas of research are reviewed. The focus of the first section is upon the role played by television and telecourses in higher education. The evolution of educational television is given brief consideration and the emergence of the telecourse as an alternative to campus-based instruction is described. In addition, the issue of insufficient interpersonal contact in the telecourse format is addressed.

In the second section, attention is given to the role played by face-to-face interaction in traditional and distance education. The importance of personal contact in the teaching-learning process is discussed and a number of studies are summarized in which the effectiveness of small-group or collaborative learning activities is evaluated. In conclusion, the debate concerning the place of seminars and other forms of personal interaction in distance education programs is described.

In the third section, the term cognitive style is defined and the cognitive style dimension of field-dependence/field-independence is discussed. A description is provided of Witkin's efforts to differentiate the perceptual capacities and personal tendencies of field-dependent and field-independent people. An analysis is presented of the interpersonal orientations of individuals with field-dependent and field-independent cognitive styles. Finally, studies are cited in which researchers have evaluated the effects of different instructional methods on the attitudes and achievement of field-dependent and field-independent students.

TELEVISION AND TELECOURSES IN HIGHER EDUCATION

The use of television by American colleges and universities is not new. Credit is usually given to the University of Iowa for being the first institution to produce and broadcast educational programs in the 1930s (Wood and Wylie, 1977). A small number of other universities are said to have televised instructional materials in the late 1940s (Wood and Wylie, 1977). In the 1950s and 1960s, with an increasing demand for higher education and a decreasing supply of teachers and classrooms, many more postsecondary institutions began to experiment with the medium as a means of reaching students in both on- and off-campus settings (Wiesner, 1983; Purdy, 1983a). In some instances the experimentation was rewarding. Full scale closed-circuit systems were built and campus-based instructional television was effectively utilized by a number of schools. A few universities operating their own stations began broadcasting classes to the residents of their local communities. Hundreds of institutions offered credit for courses carried on the commercial networks' *Sunrise Semester* and *Continental Classroom* programs (Purdy, 1983a).

One of the most successful ventures of this early period was the Chicago TV College. Begun in 1956 with considerable financial support from the Ford Foundation's Fund for the Advancement of Education, the TV College was established to provide a credible academic alternative for individuals living in the Chicago area who were unable to participate in conventional campus-based study (Zigerell, 1979). Described as "a bold new departure in extending educational opportunity... (It) showed that a junior college program (could) be offered effectively on open-circuit television... without any sacrifice of instructional quality" (Zigerell and Chausow, 1983a, p. 50). Wood and Wylie (1977) note that "Exhaustive testing and research... confirmed repeatedly that the TV (College) students (did) as well, or better than, students taking the same courses on campus" (p. 52). However, despite this success and the success of projects such as the Columbia

Broadcasting System's *Sunrise Semester*, television generally failed in the 1950s and early 1960s to establish itself as a widely accepted form of postsecondary instruction (Purdy, 1983a).

Several explanations of this lackluster performance have been offered. For institutions not owning television stations, increasingly limited access to air-time on both educational and commercial outlets posed problems. The competition by broadcasters to attract and maintain the largest viewing audiences possible pushed instructional presentations into unappealing time slots and in some cases off the air (Zigerell, 1979; Purdy, 1983a). Even for schools holding their own broadcast licenses, pressure increased to serve the diverse interests of their communities by carrying cultural, dramatic and fine arts programming. In these instances as well, educational telecasts were relegated to a non-priority status in regard to scheduling (Zigerell,1979). The paucity of available series, wide variation in course quality and inconsistencies in production standards added to these difficulties (Purdy, 1983a). With viewers becoming accustomed to increasingly more sophisticated production techniques, it became more difficult for educators to convince broadcasters of the value of televising programs in which one professor seated at a desk addressed one camera for thirty minutes. In the mid 1960s, in a general summary of the first fifteen years of higher education's utilization of television, Murphy and Gross (1966) noted that, "The most conspicuous result of television teaching has been an incidental byproduct: The medium has displayed in public what had heretofore gone on behind too many closed classroom doors — uninspiring teaching" (p. 10).

In the years following this less than flattering appraisal, attitudes toward the utilization of television by institutions of higher education began to change for the better. The 1967 publication of the Carnegie Commission Report on Educational Television initiated the process of improvement. In the last two of the twelve points made in, *Public Television: A Program for Action*, the Commission recommended federal legislation to increase support for instructional television programming and the utilization of "extensive

and innovative studies intended to develop better insights into the use of television in formal and informal education" (Wood and Wylie, 1977, p. 346). Of even greater long-term consequence to educators was the Commission's recommendation that a nationwide, noncommercial television network be established. This advice, as well as other suggestions found in the Commission's Report strongly influenced the Congress in its formulation and passage of the Public Broadcasting Act of 1967 (Wood and Wylie, 1977). This legislation created the Corporation for Public Broadcasting (CPB) and made possible, through the auspices of the CPB, the development of the Public Broadcasting Service (PBS) (Purdy, 1983a). Wood and Wylie (1977) observe that "The essence of the PBS operation... was that it would be a station-operated interconnection, a true 'mutual' (television) network.... Its functions were to select, schedule and distribute network programming (nationally) over the interconnection" (p. 68).

To the dismay of many postsecondary educators, in the years immediately following its creation, the Public Broadcasting Service allocated very little air-time to instructional presentations. The early emphasis, with the exception of progams such as *Sesame Street* and *The Electric Company*, was upon cultural and public affairs programming (Wood and Wylie, 1977). However, in 1975, PBS broadcast a series nationally that revived the hopes of those seeking a realization of the wide-scale instructional potential of the network. The telecast of *The Ascent of Man*, a carefully designed and beautifully photographed sequence of programs dealing with the biological and cultural evolution of the human race, was used in conjunction with print materials prepared by the University Extension, University of California at San Diego and Miami-Dade Community College (Hewitt and Lee, 1979). In just two airings, this instructional package was "used by an estimated forty thousand students in four hundred and twenty institutions throughout the United States" (Purdy, 1983a, p. 34). The broadcast of this series was followed by the national airing of *The Adams Chronicles* which, when it was first offered, was used by fifteen thousand credit-earning students enrolled in three hundred institutions (Purdy,

1983a). The series that followed these two had equally good success. Purdy (1983a) notes that "*The Age of Uncertainty* in 1977, *The Long Search* in 1978 and the first selection of *The Shakespeare Plays* in 1979 continued demonstrating that high-quality series broadcast over PBS, when combined with appropriate well-designed print materials, could provide relatively low cost courses for higher education institutions to offer for credit" (p. 34).

The success of these series was shared. Educators were pleased with the academic soundness of the programs and the enrollments generated by them. Moreover, affiliation with a national television network encouraged them to believe that new students, especially working adults and homemakers unable to attend campus-based courses, could be recruited and that the decline anticipated in college enrollments during the 1970s and 1980s could be averted (Wiesner, 1983). Broadcasters were impressed with the production quality of the programs as well as the size and favorable reaction of the general audiences. To be sure, both educators and broadcasters experienced problems in putting these courses into operation (Purdy, 1983a). Additionally, it is accurate to say that at times communication between the two groups was less than satisfactory (Munshi, 1980). However, the results of the cooperation that made possible the airing of these series represented progress in the efforts of colleges and universities to use TV effectively.

By the early 1980s, the relationship between public broadcasters and postsecondary educators had improved considerably. With the creation of its own Adult Learning Service (ALS) in 1981, the Public Broadcasting Service committed itself to a partnership with higher education that would allow both parties "to serve better the communities that all are pledged to serve" (Brock, 1983, p. 350). Lawrence Grossman, president of PBS in 1982, maintained that there were mutual benefits to be derived from the arrangement. He told educators that "There is great opportunity here—for you and for us. The revolution in television holds great promise for helping colleges and universities to find solutions to some of the problems of serving adult learners, full and part time, on and off campus, in

ways that meet their needs and fit their schedules.... Your new students are our new audiences.... And (they are) rapidly, dramatically growing audiences" (Grossman, 1983, p. 342). The results of the Adult Learning Service's initial efforts have been impressive. In explaining the function and performance of the operation, Dee Brock, a PBS vice president and Director of the ALS observes:

> This service delivers quality college credit television courses via satellite to local partnerships of public television stations and the colleges and universities in their communities. These partnerships then deliver the courses to local students, primarily over open-circuit broadcast channels. The result is that in just four years over 900 colleges in collaboration with 280 public television stations have offered over 10,000 class sections of PBS Adult Learning Service television courses, and almost a third of a million students have enrolled in those courses to earn college credit (Brock, 1985, p. 3).

The "quality college credit television courses" to which Brock refers are not comparable to the instructional programs that were televised in the 1950s and 1960s. Her reference is to what are today commonly called telecourses. While the term "telecourse" is not new (Wood and Wylie, 1977), the design and polish of the contemporary version are. Zigerell (1979) writes that "...the producers of the 1950s and early 1960s had brought meager resources to their televised 'talking face' lecture courses. The present generation of producers know how to produce something beyond a ' course on television.' They have, indeed, devised a distinctive kind of learning experience, aimed at both the off-campus, non-traditional learner and the student studying on campus" (p. 5). When considering the structure of "today's" telecourse, "we are dealing with a self-contained system of instruction, employing, wherever appropriate, the video medium, tutorial contacts, and a method of administrative support... (It) is the result of the efforts of a team of content specialists, instructional designers, script writers, and television professionals" (Luskin and Zigerell, 1978, p. 45). Surprisingly, while it so clearly demonstrated the effectiveness of using a national television network for postsecondary instruction and while its production quality was exceptionally high, a series such as *The Ascent of Man*

should not, in the strictest sense, be defined as a telecourse (Zigerell, 1983).

Experts describe series like *The Ascent of Man, The Long Search* and *The Shakespeare Plays* as "national" television courses. "A 'national' course is one in which an academic institution 'wraps' objectives, readings, and other study and test materials around an existing series of high-quality instructional programs produced by independent producers, commercial networks or stations, and networks such as the Public Broadcasting Service (PBS) and the British Broadcasting Corporation (BBC)" (Hewitt and Lee, 1979, p. 4). These "wrap-around" courses, as they are sometimes called, utilize print materials that are prepared after the production of the video series they are intended to accompany. In reacting to the design of these courses, Zigerell (1983) says that "...the video content had been determined without regard to formal instructional presentation. Useful as they (were), the print materials at times appeared an afterthought, with the primary print reference, the text ...little more than (a) readable and well illustrated transcript of program narrative. Collections of additional readings had to be gathered together hastily by people who had no contact with the program content designers" (p. 19).

The telecourse, as Zigerell (1983) and others would define it, is structured more systematically than the "national" course and is characterized by a variety of integrated components that have been developed simultaneously to correspond specifically with the content of the video segments. Hewitt and Lee (1979) state that "...a telecourse is a complete instructional system that presents a body of knowledge through the use of sight, sound, color, movement and print. Basic components of a telecourse, in addition to the television programs themselves, usually include a main textbook, a student study guide (or a text-study guide combined), tests, a faculty manual, and arrangements for interaction between students enrolled in the telecourse and the faculty supervising the course" (p. 3). These instructional packages, described as "syndicated" telecourses, differ from the "national" television courses in that the academic institutions that sponsor their development produce the televised components as well as most, if not all, the print

materials that comprise them (Hewitt and Lee, 1979). The word "syndicated" refers to the fact that the institutions producing these series own the rights to the video segments of the telecourses and may air these programs locally on PBS or commercial stations or lease them to other postsecondary schools around the country for transmission over TV channels or other delivery systems (Hewitt and Lee, 1979).

The "syndicated" telecourse, the focus of interest in this research, was first used in the early 1970s. In 1972, three community college districts which were to become leaders in the production and distribution of telecourses began their efforts (Hewitt and Lee, 1979). The creation of *As Man Behaves* by the Coast Community College District in California, *American Government* by the Dallas County Community College District in Texas and *Man and His Environment* by the Miami-Dade Community College District in Florida marked a serious commitment on the part of these entities to reassert the value of television as a means of providing postsecondary instruction (*ITV Close-Up: The First Six Years*, 1978; Munshi, 1980). It should be noted that in the mid-1970s and later, the popularity of "national" television courses such as *The Ascent of Man* enhanced the visibility and credibility of these just mentioned series as well as the many other "syndicated" telecourses that were to be produced and successfully marketed in the 1980s.

Because of their being targeted to serve the non-traditional adult learner and because of their topical emphasis upon first- and second-year college level survey courses, telecourses, in their initial stages of utilization, had been offered predominantly by community and junior colleges (Luskin and Zigerell, 1978; Middleton, 1978). However, in more recent years, an increasing number of four-year schools have begun making telecourses available in order to reach out "to older learners who (have) become more attractive as enrollments of students of conventional age decline" (Zigerell, 1983, p. 19). To some degree, this expanded use of telecourses was facilitated by a 1981 grant of one hundred and fifty million dollars from Walter Annenberg to the Corporation for Public Broadcasting (Scully, 1981). Annenberg's gift has made possible the production of

telecourses "appropriate for upper division and even graduate or professional level credit" (Purdy, 1986a, p. 33).

Information about students from both two- and four-year schools who have been enrolling in telecourses has been published recently by researchers who conducted two separate studies in 1984 (Purdy, 1986a). A summary of the findings of the *Telecourse Student Survey 1984* (Brey and Grigsby, 1984) and *Research on Student Uses of the Annenberg/CPB Telecourses in the Fall of 1984* (The Annenberg/CPB Project, 1985) provides an excellent profile of non-traditional learners from across the country who have chosen the telecourse as a way of meeting their educational needs. In her abridgement of the results of the two investigations, Purdy (1986a) says that:

> 1. Over two thirds of the students were female, although the percentage varied from state to state and from course to course;
> 2. Only 23 percent of the students were of traditional college age, eighteen to twenty-two years old. Almost half of the students were thirty or older;
> 3. Approximately two thirds of the students were married or divorced. Over half had at least one dependent;
> 4. About eighty percent were employed, over half employed full-time;
> 5. About 20 percent were enrolled only in the television course and were new students drawn to the college by the television course. 40 percent were enrolled for ten or more credit hours, and for two thirds of the students, this was their first television course;
> 6. Eight out of every ten students intended to view the television programs at home. This was especially true for students who were older, female, married, and not concurrently enrolled in on-campus courses;
> 7. The educational backgrounds of telecourse students varied widely, both in type of course and type of institution offering the course. Overall, 20 percent were enrolled in their first semester of college, while another 20 percent had already earned at least an associate degree, even though most of the sample came from two-year institutions;
> 8. In the Annenberg/CPB sample, almost half of the students indicated that they hoped to achieve a master's or doctoral degree. More than a third hoped to complete a bachelor's degree;
> 9. Over half the students enrolled in the telecourse because an on-campus section of the course would conflict with their work or leisure time (pp. 30-31).

With the exception of number eight listed above, the results of an investigation completed by Thornton and Greene (1985) revealed that the profile of students enrolling in telecourses at Lansing Community College was basically the same as that which emerged from the national studies.

Reports indicate that students generally find their experience with telecourses to be favorable. In the Dallas County Community College District, ninety percent of the students surveyed responded that their involvement with the telecourse had been positive. Among the course features that were identified as being especially attractive were convenience, the quality of the video programs, on-location scenes, a helpful study guide, clearly stated objectives, good graphic displays and the assistance of the on-campus instructor (*ITV Close-Up: The First Six Years*, 1978). Convenience was cited by the majority of those responding to the Annenberg/CPB survey as well. Moreover, "Eight out of ten students indicated that they would recommend (the) course (the telecourse in which they had enrolled) to a friend. (And) nine out of ten students reported that they would take another telecourse" (The Annenberg/CPB Project, 1985, p. 12). The results of attitudinal research conducted at Lansing Community College were similar. Ninety-four percent of the students who answered a telecourse questionnaire said that convenience was the most important reason for their having enrolled. Seventy-six percent stated that they believed the telecourse was an effective instructional method for them and eighty-one percent said that they would enroll in another telecourse if it met their educational needs (*Telelearning Report 1985-1986*, 1987).

The amount of research that has been undertaken to evaluate the instructional effectiveness of the telecourse is relatively small. By contrast, the number of studies that have been conducted to measure the performance of students receiving "televised instruction" is large. In regard to this more general research, Purdy (1983b) observes that "Most of these studies... focused on television versus lecture or other media for presenting particular information to a captive audience, usually in the classroom" (p. 268). In

summaries of the findings of these many investigations, the conclusion consistently drawn has been that when compared to more traditional forms of teaching, television appears to be just as effective a means of instruction (Reid and MacLennan, 1967; Chu and Schramm, 1973; Campeau, 1974). In what is perhaps the most comprehensive analysis to date of telecourse effectiveness, researchers presenting a three year review of the performance of Chicago's TV College state that "...television instruction is a thoroughly effective means of extending college opportunities to at-home students in all the subject areas explored in the experiment" (Zigerell and Chausow, 1983b, p. 281). Purdy (1978) says that "The research at Chicago was extensive, sophisticated, and accounted for such variables as students' entering education, sex and age difference, and held the same course objectives for TV and campus courses" (p. 2). She (Purdy, 1978) maintains that the conclusions drawn by the Chicago investigators parallel those drawn by telecourse researchers working in the Coast Community College District in California and the Dallas County Community College District in Texas.

Wiesner (1983) suggests that such conclusions are inappropriate. He notes that "In comparing the telecourse with classroom instruction, researchers have overlooked the *experience* of distance learning (and)... have not examined the communications process, the key element in this type of learning" (Wiesner, 1983 p. 216). Although not basing their views on empirical evidence, many telecourse teachers — including most of those at Lansing Community College — concur with this criticism. In discussing faculty reactions to favorable reports of telecourse effectiveness, Purdy (1986a) writes that "For some instructors, the findings conflict with their personal conviction that students learn more, and learn more of significance through face-to-face interaction with instructors and other students" (p. 34). In describing the factors that make the telecourse a productive experience for learners, the institutions which produce them invariably cite "discussion sessions" as a key component (ITV *Close-Up: The First Six Years,* 1978; Hewitt and Lee, 1979; Munshi, 1980). Yet Wiesner (1983) claims that these same producers have not

adequately conceptualized the role of two-way communications in the telecourse. He says that "As a result, the college acquiring a pre-packaged U.S. telecourse is likely to be uncertain as to how interactions should occur between instructor and students" (p. 218).

Purdy (1978) says that "Study after study tells us that most (telecourse) students do not want more on-campus sessions or anything that decreases their ability to complete the course at home and at their schedule" (p. 8). In response to this observation, Munshi (1980) states that "Our experience indicates that this is not always true; some students, perhaps but not definitively, located in four-year institutions, do want 'more' discussion sessions" (p. 31). Forty-five percent of the telecourse students questioned at Lansing Community College said that not having consistent personal contact with their instructor kept them from learning as much as they had wanted. Nearly thirty percent of these same individuals indicated that not having personal contact with their "classmates" kept them from learning as much as they had hoped (*Telelearning Report 1985-1986*, 1987).

In the section which follows, consideration is given to the well-established importance of personal contact between teachers and students and among students themselves in traditional instructional settings. In addition, a review of the role played by face-to-face interaction in distance education programs is provided.

FACE-TO-FACE INTERACTION IN TRADITIONAL AND DISTANCE EDUCATION

From the time of Socrates' first use of the dialectic conversation to the present, personal interaction between teacher and learner has been considered an important, if not essential, characteristic of the educational process. Stanford and Roark (1974) say that "...education is essentially a social process. That is, it is not something one acquires; it is something that occurs continually as a result of interaction with other human beings" (pp. vii-viii). Hyman (1974), in his overview of the art and science of teaching, offers

models of interpersonal communication as a means of examining the effectiveness of various instructional practices. Bruner (1977), in discussing his educational theories, observes that "So much of learning depends upon the need to achieve joint attention, to conduct enterprises jointly, (and) to honor the social relationship that exists between learner and tutor..." (p. xiv).

While Hyman (1974) and Bruner (1977) have worked primarily with children in classroom settings, other experts have concerned themselves with the effects of personal teacher-student contact upon adults engaged in both traditional and non-traditional forms of instruction. In evaluating the teaching styles used by highly successful college faculty in a continuing education program, Heath (1980) found that each instructor, despite the method he employed, made opportunities for personal interaction with his students a priority. Beidler (1986), in his analysis of excellence in postsecondary teaching, drew the same conclusion. In reporting his findings, he states that "Learning happens in a variety of ways for each individual. In fact, learning is stimulated by the very variety of the ways, as long as there is the essential component of personal engagement" (Beidler, 1986, p. 60).

DeVito (1986) provides a similar view. He notes that "Teaching can be best understood, described, and improved by treating it as a relational development process. The reasoning is... simple: Teacher-student interaction that assists teaching and learning depends in great part on the development of an interpersonal relationship" (DeVito, 1986, p. 53). He maintains further that "...interpersonal interactions are more influential in changing attitudes and behaviors than are the various media. This finding may reflect the preference of students and teachers for instruction by human beings rather than by media alone" (DeVito, 1986, p. 53). McCombs' work seems to support DeVito's (1986) perspective. In reporting the results of her research, she says that "instructors and the group process can play a critical role in the success of computer-based training.... two of the factors consistently related to successfully implemented self-paced courses were adequate

opportunities for student/instructor interactions and the incorporation of group activities within individualized training" (McCombs, 1985, p.159).

While the research of McCombs (1985), DeVito (1986) and Beidler (1986) indicates that personal teacher-student contact is of crucial importance to the process of learning, others believe that personal interactions among students are of equal, if not greater, significance. Having worked with primary and secondary school students, Schmuck and Schmuck (1975) note that "classroom learning constitutes a transactional process, involving the exchange of a school curriculum between teachers and students and among the students. Thus, teaching and learning transactions are particular kinds of *interpersonal relationships*. How students experience the curriculum is influenced not only by their relationships with the teacher, but also through their contacts with peers" (p. xiii). The premises upon which Schmuck and Schmuck (1975) have based their thinking are derived from John Dewey's emphasis on the social aspects of learning and Kurt Lewin's empirical research on group dynamics (p. 19).

In his analysis of five published methods of conducting cooperative small-group learning in the classroom, Sharan (1980) considered three "Peer-Tutoring" and two "Group-Investigation" approaches. In evaluating both approaches he focused on differential effects on academic achievement, students' attitudes toward cooperation and ethnic relations in desegregated classrooms. With both approachers, across all five methods, Sharan's (1980) general conclusions were, that when compared with traditional teaching practices, opportunities for cooperative learning produced higher academic achievement, more positive attitudes regarding cooperation and improved ethnic relations.

In a review of twenty-eight studies in which both "Peer-Tutoring" and "Group-Investigation" processes were used, Slavin (1980) found that reactions to both cooperative activities and mixed ethnic groupings were very positive. However, concerning academic achievement, he concluded that the results of the investigations, "though usually positive, (seemed) to depend on... particular techniques, settings, measures,

experimental designs or other characteristics" (Slavin, 1980, p. 333). Webb's (1980) findings correspond to Slavin's (1980) latter conclusion. She determined that in comparing achievement in four-person groups, with either mixed ability or uniform ability, to persons working individually, there were no differences in test performance between individual and group settings or between uniform-ability and mixed-ability groups. However, she did discover that learning in mixed-ability groups was beneficial for high-ability and low-ability students and that for medium-ability students, working in uniform-ability groups was best (Webb, 1980).

More recently, Johnson and Johnson (1985) reported the results of an extensive examination of the literature related to group learning. The structure of their analysis was based upon a comparison of what they perceive to be the three basic ways in which students can interact with one another as they learn. The interactive patterns they delineate are: 1. **competitive** in which students compete to see who is the "best" in class; 2. **individualistic** in which students work toward a set goal without paying attention to the efforts of peers; and 3. **cooperative** in which students exhibit concern for each other's learning as well as their own (Johnson and Johnson, 1985, p. 22). Their conclusion, after a review of one hundred and twenty-two studies, was that "cooperative learning experiences tend to promote more learning than do competitive or individualistic learning experiences.... (The) speculation is that the need to talk about information and ideas rather than just think about them is one of the variables contributing to higher achievement" (Johnson and Johnson, 1985, p. 23).

Unlike Johnson and Johnson (1985), Webb (1980), Slavin (1980) and Sharan (1980) who have considered the effects of small-group interaction on elementary and high school students, Bouton and Garth (1983) have studied the impact of small-group learning on adults. Although admitting that the amount of available research on group learning is limited, they maintain that students' achievement, problem solving capacities and interpersonal skills are all enhanced through peer discussion. They characterize

effective learning groups as having two major elements: "first, an active learning process promoted by student conversation in groups; (and) second, faculty expertise and guidance provided through structured tasks" (Bouton and Garth, 1983, p. 73). They point out as well that "it is not sufficient to increase discussion among students, and it is not sufficient to replace listening to lectures with problems for students to work on. Both elements — structured tasks and interaction among peers — seem to be necessary for the true power of learning groups to be realized" (Bouton and Garth, 1983, p. 73).

While agreeing that group discussion is a viable means of learning, Brookfield (1985) cites the difficulty of assessing its true effectiveness. He notes that "There are almost as many definitions of discussion as there are writers who have examined the method" (Brookfield, 1985, p. 56). Consequently, when methods are compared, the comparisons are often based upon dissimilar criteria. However, Brookfield's (1985) analysis demonstrates that two features appear to be central to most writers' concept of discussion. "The first is the idea of purposeful conversation. Group discussion is seen as directed conversation about a topic of mutual interest.... The second... (is) the idea of equal participation.... (for) an activity is a discussion only if a majority of the group's members participate in the verbal exchange" (Brookfield, 1983, p. 57).

Bruffee's (1982) views regarding adult peer learning reflect those of Bouton and Garth (1983). He chooses to describe group discussion as "collaborative learning," a term applied to instructional practises employed at the University of London in the early 1970s. He says that "In collaborative learning, the teacher establishes conditions in which people can learn by working together in semi-autonomous groups of various sizes. The teacher designs appropriate tasks and establishes conventions within which the work will be done. People themselves govern the social relations that pertain while they are learning. That is, the people doing the learning organize the work, do it together, and learn from each other in the process" (Bruffee, 1982, p. 32).

Bruffee recommends that collaborative learning not be limited to use in the

postsecondary classroom. He believes that educational television, if structured appropriately and used in conjunction with group discussion, can be made far more effective. He maintains that television viewing, like learning, is fundamentally a process of social engagement through which individuals are put "in touch with the many communities (they) are members of" (Bruffee, 1982, p. 31). He says that "To make television a medium for collaborative learning would be to capitalize on and maximize the capacity of both television and (peer cooperation) to stimulate focused conversation" (Bruffee, 1982, p. 33). Zigerell's (1979) observations suggest that collaborative learning and televised teaching have already been successfully combined. According to him (Zigerell, 1979), personal contact between teachers and learners and among learners themselves has always been an essential element of the structure of the telecourse. He says that "...the pioneer producers of television courses recognized, as do the new generation of community college producers... that there is no substitute for the human interaction encouraged by tutorial and counseling sessions" (Zigerell, 1979, p. 7).

However, Zigerell's (1979) and Bruffee's (1982) views are not universally accepted. While not dismissing the value of discussion sessions for some telecourse students, Kelly and Anandam (1979) feel that individualized, computer-assisted teacher-student contact should ultimately prevail as the optimal mode of instructional interaction for off-campus learning. In addition, Bååth (1981) and Holmberg (1986) note that some experts feel that including opportunities for face-to-face conversation in distance education is paradoxical. Holmberg (1986) says that "there remains a basic controversy between those who are in favour of as much face-to-face contact as possible, and those who mainly rely on non-contiguous communication. To the former, distance education is merely a substitute for face-to-face interaction when this is not available and learning is seen as something of a social activity. To the latter, learning is basically individual and distance education has considerable potentials of its own, different from, but not inferior to traditional types of education" (p. 78).

Daniel and Marquis (1979) propose that there be a combination of the recognized benefits of both interpersonal and individual learning. Keegan (1986) concurs and states that "A major function of distance systems is to achieve the difficult synthesis between the two: interaction and independence — getting the mixture right. All learning in a distance system is achieved by a balance between the learning activities the student carries out independently and those which involve interaction with other people. The balance between the two is the crucial issue facing distance study systems" (p. 101).

Millard (1985) does not negate the importance of this mixture. However, based upon his work in the United Kingdom, he says that "There is a great deal of evidence to show that Open University students both want and benefit from local contact with their tutor... indeed, it seems that often students request more not less as they become more experienced in the system.... the average attendance at face-to-face tutorials is between 40 and 50 per cent of the finally registered student population" (Millard, 1985, p. 13). While their findings are somewhat similar, Orton (1978) and Peruniak (1984) point out that interactive opportunities such as seminars, although valuable for many, are not necessary for all distant learners. Likewise, Webb (1983), while affirming the worth of group discussions, maintains that the success of instructional strategies depends upon their being appropriately matched to individual learner characteristics. He (Webb, 1983) notes that important work has been undertaken in analyzing the selection of teaching strategies based upon students' cognitive styles.

As mentioned in Chapter I, Thompson (1984) maintains that the cognitive style dimension of field-dependence/field-independence may be an important factor in explaining the relatively high attrition rates that characterize distance education programs. He asserts that field-dependent students tend to "rely on others for guidance and direction.... (and) to have a greater preference than field-independent people for face-to-face... discussion methods (Thompson, 1984, p. 289). Consequently, he speculates that field-dependent individuals may be less suited for success in distance learning formats than their field-

independent counterparts. Thompson (1984) recommends that research be conducted to determine the efficacy of providing face-to-face learning activities for field-dependent students.

In the following section, a description of the cognitive style dimension of field-dependence/field-independence is provided. The patterns of social interaction exhibited by field-dependent and field-independent individuals are discussed and several studies dealing with the effects of various teaching strategies upon field-dependent and field-independent students are reviewed.

INTERPERSONAL ORIENTATIONS OF INDIVIDUALS WITH FIELD-DEPENDENT OR FIELD-INDEPENDENT COGNITIVE STYLES

As stated in Chapter I, cognitive styles are "stable attitudes, preferences, or habitual strategies determining a person's typical modes of perceiving, remembering, thinking, and problem solving.... their influence extends to almost all human activities that implicate cognition, including social and interpersonal functioning" (Messick, 1976, p. 5). In specifying the role played by cognitive styles in the general process of cognition, Messick (1976) says that they "represent consistencies in the manner or form of cognition, as distinct from the content of cognition or the level of skill displayed in the cognitive performance" (p. 5). Likewise, Goldstein and Blackman (1978) observe that "Common to all theory and research on cognitive style is an emphasis on the structure rather than the content of thought. Structure refers to how cognition is organized; content refers to what knowledge is available" (p. 3). Kirby (1979), offering a far less formal analysis, suggests that cognitive styles can be likened to vehicles carrying cargos. She maintains that "The various (cognitive) styles... serve as the vehicles, and the cargo is made up of 'tools' — knowledge, transferable skills, and attitudes that are used to perform tasks in life and work. Picture many vehicles on many roads — all carrying different sets of tools — and

we have a good idea of the situation in real life, in which people carry different job and life skills around and use them in different ways" (Kirby, 1979, p. 35).

It is important to recognize that "Cognitive style has not been conceived and studied as a single entity. Rather, a number of different factors, or dimensions, of cognitive style have been identified and subjected to systematic theoretical and empirical examination" (Ausburn and Ausburn, 1978, p. 338). The number of cognitive styles that have been delineated and the characteristics they encompass vary widely (Ausburn and Ausburn, 1978; Cross, 1976; Kirby, 1979; Messick, 1976). For example, in distinguishing between just two of the nineteen dimensions she considers, Kirby (1979) discusses the cognitive styles of "Scanning/Focusing" and "Leveling/Sharpening." She notes that the former entails an individual's identification of either relevant or irrelevant information in attempting to solve problems, while the latter involves a person's tendency either to assimilate new stimuli into previous categories or to differentiate new information from old (Kirby, 1979, p. 52). The utilization of "either/or" terminology does not imply that the presence of the characteristic represented in one end of the dimension excludes the existence of the other. In quoting Hudson (1968), Messick (1984) points out that "Cognitive styles are not categories or types but dimensions of continuous variation; not pigeon holes but sign posts for characterizing individual propensities; not merely behavioral differences but tendencies or tensions underlying the surface of intellectual life" (p. 61).

Learning more about the consistent ways in which diverse students approach instructional challenges can be of great value to educators. Cross (1976) believes that knowledge of cognitive styles can facilitate the selection of appropriate teaching practises. Messick (1984) maintains that "Cognitive styles... have relevance not only for the course of individual learning in various subject-matter areas, but also for the nature of teacher-pupil interactions and of social behavior in the classroom, family, and peer group" (p. 68). In his consideration of cognitive style differences and relevant instruc-

tional methods, Chickering (1976) directs specific attention to the dimension of field-dependence/field-independence. He says that "effective education depends upon a sound match between the characteristics of the student and the characteristics of the programs and persons the student encounters, and the field-dependence versus field-independence continuum represents a dimension of difference to take into account" (Chickering, 1976, pp. 83-84).

Witkin, Moore, Goodenough and Cox (1977) state that "Among the cognitive styles identified to date, the field-dependence-independence dimension has been the most extensively studied and has had the widest application to educational problems" (p. 1). Messick (1976) describes this dimension as "a consistent mode of approaching the environment in analytical, as opposed to global, terms. It denotes a tendency to articulate figures as discrete from their backgrounds and a facility in differentiating objects from embedding contexts, as opposed to a countertendency to experience events globally in an undifferentiated fashion" (p. 14). He further clarifies the distinction between the field-dependent and field-independent ends of the dimension by saying that "The field-independent pole includes competence in analytical functioning combined with an impersonal orientation, while the field-dependent pole reflects correspondingly less competence in analytical functioning combined with greater social orientation and social skills" (Messick, 1976, p. 14). In the research that Witkin and his colleagues have conducted with this particular cognitive style, they have found that " ...an individual's characteristic way of perceiving (is) consistent from one situation to another, that it (is) not easily altered, and that it (is) stable over periods of years" (Goldstein and Blackman, 1978, p. 174).

Witkin's work with field-dependence/field-independence dates to the late 1940s when he and his associates began laboratory studies of individual variations in perception (Witkin and Goodenough, 1981). The focus of the research was upon the distinction between global and analytical ways of perceiving objects and situations. As noted above, "The field-independent person consistently approaches a wide variety of tasks and

situations in an *analytical* way, separating elements from background. The field-dependent individual approaches situations in a *global* way, seeing the whole instead of the parts" (Cross, 1976, p. 117).

Initially, the means by which Witkin measured people's global and analytical tendencies involved testing their perception of the upright. His use of the "body-adjustment test" (BAT) required that a subject be seated in a small tilted room that could be moved from side to side. The chair on which the subject sat, like the room in which it was positioned, could also be moved, but independently of the room. When given the task of adjusting the chair (and their bodies) from a tilted position to the upright, with the surrounding room in a tilted position, some subjects aligned themselves with the tilted room and reported that they were sitting perfectly straight. Witkin and Goodenough (1981) state that "such subjects were using the external visual field as the primary referent for perception of the upright, essentially to the exclusion of sensations from the body" (p. 9). Other subjects reoriented their bodies very close to the actual (gravitational) upright. For these people, it seemed as if the body, rather than the visual field, served as the primary means of judging the true vertical.

Witkin's "rod-and-frame test" (RFT) required that a subject be seated in a totally darkened room and view a tilted luminous square frame, within which was mounted a luminous rod with a pivot point at the same center as that of the frame. The design allowed the rod to be tilted separately from the frame. The subject's task was to adjust the rod to the upright while the frame was kept in its original tilted position. "Though here it was the position of an external object (the rod) in space rather than the postition of the body itself, that had to be determined, an opportunity was again provided the subject to use body or field as referents. And here again, people differed markedly in the extent to which they relied on one or the other referent" (Witkin and Goodenough, 1981, p. 9). While Witkin and his colleagues found these contrasting tendencies to be of interest, of even greater significance was the fact that " ...there was substantial correlation between

the two tests. People who ignored the tilt of the room also ignored the slant of the frame; these people were described as field-independent. Field-dependent people, on the other hand, relied consistently on the surroundings, the room or the frame, for their orientation" (Cross, 1976, p. 117).

In the early 1950s, with their development of the "embedded-figures test" (EFT), Witkin and his associates began to expand the scope of their analysis of perception. Unlike the "body-adjustment test" (BAT) and the "rod-and-frame test" (RFT), the EFT "did not involve body-field juxtaposition or perception of the upright" (Witkin and Goodenough, 1981, p. 15). It required that a subject, after being shown a simple geometric figure, find that figure within a more complex pattern in which it had been hidden or embedded. To locate the simple shape it was necessary to identify the various components of the complex shape, thereby exposing or disembedding the simpler design. As with the comparisons of the BAT and the RFT, "It was found that subjects who had difficulty separating the sought-after simple figure from the complex design were the ones who could not easily keep body or rod separate from room or frame in the orientation tests — in other words, were the ones who were field-dependent. Conversely, people who were field-independent in the orientation tests found it easy to overcome the influence of the organized complex design in locating the simple figure within it" (Witkin and Goodenough, 1981, p. 15).

Over time, the results of his experimentation encouraged Witkin to hypothesize that his tests were measuring more than variations in perception. Further studies led him to conclude that field-dependent or global characteristics and field-independent or analytical characteristics needed to be conceptualized more broadly as encompassing a range of personality factors (Witkin, 1976; Witkin and Goodenough, 1977; Witkin and Goodenough, 1981; Witkin, Goodenough and Oltman, 1979; Witkin, Moore, Goodenough and Cox, 1977). Witkin, Moore, Goodenough and Cox (1977) state that " ...cognitive styles carry a message about what we traditionally call 'personality.' So, it is a feature of

personality, and not alone of cognition in the narrow sense, that an individual likes to be among people, is particularly attentive to what others say and do, and takes account of information from others in defining his own beliefs and sentiments. It is something of a paradox — but on the surface only — that tests of cognitive style have potential value in assessing what have come to be called 'noncognitive' attributes" (p. 15).

In citing their own research and the efforts of others, Witkin, Goodenough and Oltman (1979) say that "Compared to field-independent people, field-dependent ones favor social over solitary situations; they prefer to be physically close to others in an interactive situation; they are selectively attentive to social sources of information; (and) they are open in expressing their feelings and thoughts" (p. 1131). Cross (1976) observes that " ...field-dependents are 'other-directed' rather than 'inner-directed.' They take thier cues from their environment. In social situations, they tend to be conforming and sensitive to what others think of them" (p. 120). Kirby (1979) in quoting Gatewood (1972) notes that "Field-dependence is closely related to dependence in personal relationships, suggestibility, conformity to conventional norms, and reliance on others for guidance and support" (p. 39). Witkin and Goodenough (1981), in summarizing their analysis of the interpersonal competencies of field-dependent and field-independent individuals maintain that:

> ...evidence from the recent research on social behavior has shown that people who are field-dependent in perception of the upright and limited in disembedding ability have an interpersonal orientation, whereas people who are field-independent and competent in disembedding have an impersonal orientation.... (The) attributes of an interpersonal orientation are likely to put people who show them in good touch with what others may be thinking and feeling. Such an outcome may be adaptive for field-dependent people by giving them ready access to information that may help them structure ambiguous situations, something they are not easily able to do on their own (pp. 43-44).

Despite these findings, relatively few studies have been reported in which different

strategies have been used to match instruction specifically with the social propensities of field-dependent adult students. Of those cited in the following paragraphs, none considered the effects of differential treatments upon the interpersonal orientation of field-dependent learners participating in distance education programs. Although Moore (1976), Murphy (1982), Tate (1983) and Nelson (1986) analyzed the effects of correspondence study and telecourses on the attitudes and academic achievement of field-dependent and field-independent people, their research did not involve matching different instructional methods with the social dispositions of field-dependent individuals. The work of these four investigators is discussed below.

Wallace (1981) used the "group-embedded-figures test" (GEFT) to identify the field-dependent and field-independent members of a population of Basic Medical Specialist students. In comparing group and individual methods of study in a learner-paced lesson, he found significant differences in posttest achievement favoring field-independent students, but he discovered no significant interactions between instructional mode and cognitive style. Miller (1980), after determining field-dependence and field-independence with the GEFT, used an experimental instrument described as the "Instructional Method Preference Inventory" to measure the preferences of field-dependent and field-independent community college students for lecture or discussion methods. His conclusion was that relatively field-dependent individuals prefer the discussion format and relatively field-independent individuals prefer the lecture.

Hahn (1983-84) evaluated three modes of teaching university students how to use a particular program to conduct a computer search of several data bases. She used a conventional lecture, a multimedia package and a computer-assisted method to provide the instruction. After administering the GEFT and a posttest, Hahn (1983-84) found that across all three formats field-independent students performed significantly better than field-dependent ones. However, she reported no significant interaction effects between the three methods and cognitive style.

In an investigation in which the number of interactions between students enrolled in three sections of a PSI (Personalized System of Instruction) course and their proctors was monitored, Jacobs and Gedeon (1981-82) expected to find that field-dependent rather than field-independent individuals would initiate more interpersonal contact. They described student-proctor interactions as being: *specific* to course content; *related* to course content; and *unrelated* to course content. Having used the GEFT to determine field-dependence and field-independence, Jacobs and Gedeon (1981-82) found that field-dependent students initiated significantly more *specific* interactions in all three sections and significantly more *related* interactions in one section. They discovered as well that there were no significant differences in the frequency of *unrelated* interactions. The researchers note that "The results of the study have added meaning since students did not differ in their achievement. Yet, they were shown to differ in one aspect of their instructional behavior, frequency of their social interactions with proctors. This suggests that social behavior may be one way in which students adapt to various instructional settings" (Jacobs and Gedeon, 1981-82, p. 156).

MacNeil (1980) employed discovery and expository methods with college students whose field-dependence or field-independence had been determined by the GEFT. He described the discovery treatment as having " ...a low degree of instructor guidance and an emphasis on student-centered presentation methods such as discussion, role playing, self-paced workbook exercises, and group problem solving" (MacNeil, 1980, p. 355). He characterized the expository treatment as having " ...a high degree of instructor guidance and an emphasis on teacher-centered presentation methods, especially lectures" (MacNeil, 1980, p. 355). The treatment groups were presented information on behavior modification in five instructional sessions. The results of a posttest indicated no significant differences between the discovery and expository methods and no significant interaction effects between cognitive style and instructional mode.

Using the results of both the GEFT and another measure of field-dependence/ field-

independence, McLeod and Adams (1979) compared the effects of small-group and individual instruction on the posttest performance of prospective elementary school math teachers. In both the small-group and individual settings, the instructor gave no formal presentation of material but was available for questions on the information being covered by the subjects. Although, surprisingly, they found a significant interaction between field-independence and the small-group treatment, McLeod and Adams (1979) reported the result to be suspect because of their failure to control statistically for the higher general math ability of the field-independent subjects assigned to that condition. However, in their conclusion they state that "Although small-group instruction did not help students learn any more overall, they (all students) clearly gave it higher ratings than individual work" (McLeod and Adams, 1979, p. 121).

Greene (1979) utilized the GEFT and compared the attitudes of field-dependent and field-independent adults toward participation in a human relations training exercise in loosely structured large groups and tightly structured small groups. Responses to questionnaires administered after each group session indicated that all subjects preferred the small-group over the large-group setting. In addition, when compared to field-independent people, field-dependent individuals were more interpersonally responsive in the small groups and less involved in the large groups. Greene (1979) observes that "The accumulated data depict the field-dependent person as more anxious in ambiguous settings and more attracted to ....joining highly structured social situations" (p. 84).

Moore (1976) compared the attitides of field-dependent and field-independent students toward their participation in "Correspondence Independent Study" and "Self-Directed Independent Study" programs. He used the "embedded-figures test" (EFT) to identify field-dependent and field-independent subjects. In presenting his findings, Moore (1976) reported no significant interaction effects between the two modes of independent study and cognitive style. In other words, he found no difference in student preference for either instructional format based upon field-dependence or field-independence.

In their studies, Murphy (1982), Nelson (1986) and Tate (1983) each used the GEFT to determine subjects' field-dependence or field-independence. Murphy (1982) compared the posttest achievement of field-dependent and field-independent community college psychology students enrolled in a telecourse and a traditional course. In the traditional course, he found no significant difference in performance between the field-dependent and field-independent students. However, in the telecourse, significant differences were found in the posttest scores of the two groups with field-independent students outperforming their field-dependent counterparts. In addition, a significant interaction was discovered between cognitive style and mode of instruction. While field-independent subjects showed no significant difference between their achievement in the traditional lecture-discussion approach and the telecourse, field-dependent subjects scored significantly higher in the traditional course than in the telecourse.

Nelson's (1986) concern was with the academic performance as well as the attrition rates of field-dependent and field-independent community college telecourse students. In regard to overall term grades, Nelson (1986) found significant differences between the two groups which favored field-independent individuals. However, she discovered no significant differences in her analysis of the two groups' attrition rates. In comparing the persistence, achievement and satisfaction of field-dependent and field-independent community college telecourse students, Tate (1983) found significant differences between the two groups. Her results indicated more persistence, higher achievement (in terms of final course grades) and greater satisfaction on the part of field-independent learners.

As mentioned previously, although their research involved analyzing the effects of correspondence education and telecourses on the attitudes and academic achievement of field-dependent and field-independent students, Moore (1976), Murphy (1982), Tate (1983) and Nelson (1986) did not attempt to match different instructional strategies with the social dispositions of field-dependent individuals. In the research design presented in

the following chapter, an effort was made to make such a match.

CHAPTER SUMMARY

This chapter was divided into three parts. In the first section, a short historical account was presented of the use of television by institutions of higher education. It was followed by a description of the relatively recent emergence of the telecourse as an alternative to traditional campus-based instruction. The segment was concluded with a consideration of what some observers believe to be a flaw in the telecourse; namely, the impersonal nature of the format.

In the second section, the importance of face-to-face interaction in classroom settings and in distance education programs was discussed. Studies were cited in which the effectiveness of small-group or collaborative learning activities was evaluated. In summing up this segment, the debate over the use of seminars and other forms of personal interaction in distance education was described.

In the third section, a definition of the term cognitive style was given and the cognitive style dimension of field-dependence/field-independence was discussed. The efforts of Herman Witkin and his colleagues to identify the perceptual capacities and personal tendencies of field-dependent and field-independent individuals were described. Following this, the interpersonal orientations of people with field-dependent and field-independent cognitive styles were analyzed. Lastly, investigations were reviewed in which researchers evaluated the effects of different instructional methods on the attitudes and achievement of field-dependent and field-independent students.

The review of literature related to the impersonal nature of the telecourse, the effectiveness of collaborative learning activities and the interpersonal tendencies of field-dependent and field-independent individuals played an essential role in the conceptualization of the experiment that is described in Chapter Three.

CHAPTER III: RESEARCH DESIGN

INTRODUCTION

The procedures that were followed in carrying out the experiment are presented in this chapter. Included are a description of the independent and dependent variables and statements of both the research and statistical (null) hypotheses. The instruments that were used to measure subject performance are described and the processes used in selecting and testing the sample and in designing the experiment are discussed. The statistical methods that were used in analyzing the results are introduced and a rationale for their selection is provided. In addition, the assumptions to be met in the proper utilization of these methods are considered.

INDEPENDENT AND DEPENDENT VARIABLES

The primary purpose of this research was to determine if certain experimental conditions would significantly enhance the learning of community college telecourse students who possessed field-dependent (as described by Witkin, Goodenough and Oltman, 1979) cognitive styles.

Two independent or predictor variables were manipulated in this experiment (see Table 3.1). The first was the cognitive style dimension of field-dependence/field-independence. As noted in Chapters One and Two, Messick (1976) defines cognitive styles as " ...stable attitudes, preferences, or habitual strategies determining a person's typical modes of perceiving, remembering, thinking and problem solving.... their influence extends to almost all human activities that implicate cognition, including social and

interpersonal functioning" (p. 5). He (Messick, 1976) categorizes field-dependence/field-independence as a dimension of cognitive style structured as a continuum which describes individuals' consistent modes of approaching the environment in global, as opposed to analytical, terms. Field-dependence and field-independence, the two extremes of this continuous dimension, were used as levels of the cognitive style factor.

The second independent variable was a treatment factor. It had three levels. The first level was a "control" condition in which a sample of field-dependent and field-independent telecourse students worked individually for a set period of time in preparation for a posttest. The second level was a "treatment" condition in which a sample of field-dependent and field-independent telecourse students worked in small groups for a set period of time in preparation for a posttest. The third level was a second "treatment" condition in which a sample of field-dependent and field-independent telecourse students worked with a telecourse instructor for a set period of time in preparation for a posttest.

There was one dependent or outcome variable of interest. It was the posttest performance of the students who had been randomly assigned to each of the three experimental conditions.

Table 3.1

Matrix representing the design of the experiment

		EXPERIMENTAL CONDITIONS		
		"Individual Study" (Control)	"Small-Group Discussion"	"Instructor-Led Discussion"
COGNITIVE STYLE	Field-Dependent	$\bar{Y}_{11}$ = S = n =	$\bar{Y}_{12}$ = S = n =	$\bar{Y}_{13}$ = S = n =
	Field-Independent	$\bar{Y}_{21}$ = S = n =	$\bar{Y}_{22}$ = S = n =	$\bar{Y}_{23}$ = S = n =

RESEARCH AND STATISTICAL HYPOTHESES

Eight hypotheses were tested in this experiment to determine the effects of the cognitive style dimension of field-dependence/field-independence and three experimental conditions of learning upon posttest performance. The first hypothesis listed below is of primary interest. It proposes the presence of a statistically significant interaction between the factors of cognitive style and experimental condition. The seven hypotheses that follow the first are of secondary interest. They propose the presence of statistically significant differences between various pairs of group means. The statement of each research hypothesis is followed by its equivalent statistical hypothesis.

1.) Hypothesis (Research):

The difference in posttest scores in each of the three conditions will not be constant for field-dependent and field-independent individuals. That is, when comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students depending upon their participation in "individual study," "small-group discussion" or "instructor-led discussion" groups.

1.) Hypothesis (Null):

Ho: $(\mu_{11} - \mu_{12} - \mu_{13}) - (\mu_{21} - \mu_{22} - \mu_{23}) = 0$

Ha: $(\mu_{11} - \mu_{12} - \mu_{13}) - (\mu_{21} - \mu_{22} - \mu_{23}) \neq 0$

2.) Hypothesis (Research):

When comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students who engage in "individual study."

2.) Hypothesis (Null):

Ho: $\mu_{21} - \mu_{11} = 0$

Ha: $\mu_{21} - \mu_{11} \neq 0$

3.) Hypothesis (Research):

When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

3.) Hypothesis (Null):

Ho: $\mu_{12} - \mu_{11} = 0$

Ha: $\mu_{12} - \mu_{11} \neq 0$

4.) Hypothesis (Research):

When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

4.) Hypothesis (Null):

Ho: $\mu_{13} - \mu_{11} = 0$

Ha: $\mu_{13} - \mu_{11} \neq 0$

5.) Hypothesis (Research):

When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

5.) Hypothesis (Null):

Ho: $\mu_{13} - \mu_{12} = 0$

Ha: $\mu_{13} - \mu_{12} \neq 0$

6.) Hypothesis (Research):

When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

6.) Hypothesis (Null):

Ho: $\mu_{22} - \mu_{21} = 0$

Ha: $\mu_{22} - \mu_{21} \neq 0$

7.) Hypothesis (Research):

When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

7.) Hypothesis (Null):

Ho: $\mu_{23} - \mu_{21} = 0$

Ha: $\mu_{23} - \mu_{21} \neq 0$

8.) Hypothesis (Research):

When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

8.) Hypothesis (Null):

Ho: $\mu_{23} - \mu_{22} = 0$

Ha: $\mu_{23} - \mu_{22} \neq 0$

DESCRIPTION OF RESEARCH INSTRUMENTS

One of the two independent variables that was manipulated in the experiment was the cognitive style dimension of field-dependence/field-independence. The instrument chosen to measure this particular construct was the "group-embedded-figures test" (GEFT). The GEFT was developed by Herman Witkin and his associates (Witkin, Oltman, Raskin and Karp, 1971). It is a more recent version of the "embedded-figures test" (EFT), another of Witkin's measures of field-dependence/field-independence. The EFT was designed for use by an examiner and one subject while the GEFT was designed

to allow for group administration of the EFT format. Both the EFT and the GEFT require that those being tested find and trace over a smaller, simple geometric figure hidden, or embedded, within a larger, complex geometric figure.

The GEFT is structured in a way that prevents subjects from seeing simultaneously the simple form and the complex form which contains it (see Appendix A). This was accomplished by printing the simple forms on the back cover of the GEFT booklet and the complex figures on the booklet pages, so that both simple forms and complex figures cannot be exposed at the same time (Witkin, Oltman, Raskin and Karp, 1971). However, while taking the test, subjects are free to refer to the simple forms on the back cover of the test booklet as often as desired.

The GEFT booklet contains three sections each of which must be completed within a prescribed time period. The first section contains seven easily done items and is intended to serve as a practice orientation to the test. Subjects are given two minutes to finish it. The second and third sections each contain nine items which are of greater difficulty than those found in the first section. Subjects are given five minutes to complete each of these two components. Including time for monitors to provide instructions and "start/stop" signals and for subjects to read directions and disembed figures, the total length of test administration is approximately twenty minutes.

Each correctly traced item receives one point. However, due to their function as a means of familiarizing subjects with the instrument, the items in the first section of the test are not included in the total score. The score for the GEFT is the total number of simple forms correctly traced in both the second and third sections of the test. In order to receive credit for an item, all lines of the simple form must be traced, no extra lines may be added and all incorrect lines must be erased. Items that are omitted in these two sections are scored as incorrect (Witkin, Oltman, Raskin and Karp, 1971). With nine items presented in each of the second and third sections of the GEFT, the maximum score attainable is 18. A subject receiving a score of 0 thru 9 may be considered relatively

field-dependent while a subject receiving a score of 10 thru 18 may be considered relatively field-independent. In measuring the cognitive style dimension of field-dependence/field-independence, the GEFT is measuring a continuous variable. Oltman (1982) notes that, "People vary continuously along the dimension just as they do in height, weight or hair color. The two extreme ends of the dimension, field-dependence and field-independence, are used in discussion for convenience, with no implication that there are two types of people. Field-dependence/independence is a continuum, not a typology" (p. 58).

The pretest that was used in the experiment was a fifteen-item exam with a multiple choice/true-false format (see Appendix B). The fifteen questions were chosen from the forty that comprise the test bank that has been developed for the telecourse lesson on "Local Government." It was this thirty minute telecourse lesson on "Local Government" that was used as an instructional element of the experiment. The "Local Government" program is one of thirty that make up the *American Government Survey* telecourse that has been produced and marketed nationally by the Dallas County Community College District in Dallas, Texas. For the past five years, this particular telecourse has been offered by the Social Science Department at Lansing Community College as the equivalent of the campus-based, SS 104, American Government. It should be noted that in either its telecourse or its traditional format, SS 104, American Government is a course that is required of every LCC student who intends to receive a two-year associate's degree.

Each of the *American Government Survey* telecourse lessons is accompanied by test bank questions which are derived specifically from the stated instructional objectives for the thirty programs in the series (*Telecourse Procedures Notebook for American Government*, 1978). Of the forty test bank items that were prepared for the "Local Government" telecourse lesson, sixteen were based upon information presented in the video tape segment while twenty-four were based upon information presented in the textbook chapter and the workbook exercises.

Eight of the fifteen pretest questions dealt with the overall content of the lesson. That is, eight questions were based upon information found in the textbook chapter and the workbook exercises that cover the topic of "Local Government." These questions dealt in a general, theoretical fashion with the structure and function of local governments. The remaining seven pretest questions were based upon information found in the video tape portion of the "Local Government" lesson. These questions dealt in a specific, pragmatic fashion with the structure and function of Chicago City Government. With its particularized focus on Chicago, the video tape provides excellent examples of the broader concepts that are presented in the lesson as a whole. In the analysis of the data that were generated in the experiment, the pretest was used as a covariate.

The posttest that was used in the experiment was a thirty-item exam with a multiple choice/true-false format (see Appendix C). Nine of the thirty questions were chosen from the group of sixteen test bank items that was taken directly from the video tape component of the "Local Government" telecourse lesson. Twenty-one of the thirty questions were developed by the author after a thorough review of the instructional objectives for the televised segment of the lesson and numerous viewings of the tape itself. Consequently, each of the thirty posttest items dealt with a specific aspect of the structure and function of Chicago City Government rather than a general aspect of the structure and function of local governments throughout the United States. In the design of the experiment described below, the posttest served as the dependent variable.

An additional instrument was developed and administered to the subjects who participated in the experiment. It was designed by the author and took the form of a "Likert-type" or "summated rating" scale (see Appendix D). Kerlinger (1973) describes such measures as, "a set of attitude items, all of which are considered of approximately equal 'attitude value,' and to each of which subjects respond with degrees of agreement or disagreement (intensity). The scores of the items of such a scale are summed, or summed and averaged, to yield an individual's attitude score" (p.496). Since the

instrument neither played a role in the creation of the experimental conditions, nor was used in evaluating their statistical significance, it was not administered during the experiment. Subjects were asked to respond to the scale after they had completed the experiment, including the posttest. The purpose of having subjects complete the scale was to gather more information regarding the attitudes of telecourse students toward their experiences with telecourses. Of particular interest were the attitudes of telecourse students regarding "individual study", "small-group discussion" and "instructor-led discussion" within the telecourse format.

RELIABILITY AND VALIDITY OF RESEARCH INSTRUMENTS

In estimating the reliability of the Group Embedded Figures Test (GEFT) its developers used an internal consistency method. Because the GEFT is a timed test, the method of estimation chosen used the correlation between parallel forms with identical time limits. "Correlations between the nine-item (Second) Section scores and the nine-item (Third) Section scores were computed and corrected by the Spearman-Brown prophecy formula, producing a reliability estimate of .82 for both males (N=80) and females (N=97). These reliability estimates compare favorably with those of the EFT (embedded-figures-test)" (Witkin, Oltman, Raskin and Karp, 1971, p. 28).

In assessing the validity of the GEFT, its developers used the EFT as the criterion measure. One study is cited in which, "subjects were administered the Second Section in its group form and the Third Section as an individually-administered test using the items in their original colored (i.e., EFT) form. Another group was given the Second Section individually (i.e., EFT format) and the Third Section as a group test. The correlations, corrected for reduced test length and combined for the two groups were -.82 for males and -.63 for females" (Witkin, Oltman, Raskin and Karp, 1971, pp. 28-29). Witkin and colleagues note that the reported correlations should be negative because the tests are

scored in reverse fashion. They observe as well that these correlations between the GEFT and the EFT are reasonably high, particularly for men (Witkin, Oltman, Raskin and Karp, 1971).

A more recent investigation was conducted to obtain estimates of the split-half reliability and validity of the GEFT for a number of age groupings across the life span (Panek, Funk and Nelson, 1980). Females ranging in age from seventeen to seventy-two were placed in seven groups (N=175) and administered the GEFT and the portable-rod-and-frame-test (PRFT). The PRFT, like the GEFT, is a measure of the cognitive style dimension of field-dependence/field-independence. It was constructed by Philip Oltman, a co-developer of the GEFT.

"With regard to the split-half reliability of the Group Embedded Figures Test (GEFT), the correlation between Parts II and III for the entire group was .80 and for each age group the correlations ranged from .57 to .90.. These values indicated the split-half reliability is quite adequate across the life span" (Panek, Funk and Nelson, 1980, p. 1172). The internal consistency of the GEFT was evaluated as well. "Estimates of internal consistency... (were) ascertained by observing the correlation between Parts II and III of the GEFT with the Total score, separately. For Part II, there was a significant, positive correlation of .96 obtained between Part II and the Total score overall. For (each) of the age groups this correlation ranged from .89 to .97. With regard to Part III and the Total score, the overall correlation was .95 and ranged from .88 to .98" (Panek, Funk and Nelson, 1980, pp. 1172-1173). In evaluating the construct validity of the GEFT, the correlations between it and the PRFT were used as estimates. "Overall, the correlations between the GEFT and the PRFT were significant and in the expected direction. These coefficients were -.36, -.50, and -.46 for Part II, Part III and the Total score respectively" (Panek, Funk and Nelson, 1980, p. 1173).

The fifteen test bank items of which the pretest was comprised were derived specifically from the stated instructional objectives of the "Local Government" telecourse

lesson (*Telecourse Procedures Notebook for American Government*, 1978). With the appropriate match of the test's questions to the lesson's objectives, the content validity of the pretest was adequately established.

Using the Kuder-Richardson 20 method, an analysis of the reliability of the pretest conducted by the Management Information Systems' Test Scoring Service at Lansing Community College produced an estimate of .39.

Nine of the thirty items that were included in the posttest were taken from the test bank developed for the "Local Government" telecourse lesson. Each of the nine was derived specifically from the stated instructional objectives of that lesson (*Telecourse Procedures Notebook for American Government*, 1978). The remaining twenty-one questions were prepared by the author after repeated viewings of the "Local Government" video tape and a review of the specific instructional objectives for the televised component of that lesson. Following the administration of the posttest, the telecourse instructor for SS104, American Government was asked for his appraisal of the exam's content validity. Based upon his familiarity with the "Local Government" video tape, its written support materials and the posttest items, the instructor noted that the exam questions were appropriately related to the information presented in the tape. Thus, the content validity of the posttest was adequately established.

Using the Kuder-Richardson 20 method, an analysis of the reliability of the posttest conducted by the Management Information Systems' Test Scoring Service at Lansing Community College produced an estimate of .46.

SELECTION OF SUBJECTS FROM THE POPULATION

The sample of subjects who participated in the experiment was drawn from a segment of the population of three-hundred and seventeen students who enrolled in six of the seven telecourses that were offered at Lansing Community College during the 1987

Winter Term. In spite of having registered for a telecourse, only those individuals who completed both the GEFT and the "Local Government" pretest qualified for inclusion in the population. The GEFT and the pretest were administered at each of the telecourse student orientation sessions that were held on the Lansing Community College campus on seven different days in early January, 1987. Telecourse orientation sessions are offered in the period just prior to as well as during the first week of the academic term. They are intended to familiarize enrolling students with aspects of the telecourse which distinguish it from the traditional campus-based class and to provide them with information regarding textbook readings, homework assignments, television schedules and contact with the instructor.

Subjects were selected from only six of the seven telecourses because one of the telecourses— CAS 100, Introduction to Data Processing— utilized a "drop-in" approach which allowed enrolled students to attend orientation sessions on an individual basis at times during the registration period that were convenient for them. The other six telecourses— BUS 118, Introduction to Business, MKT 200, Introduction to Marketing, SS 104, American Government, SA 200, Principles of Sociology, PSY 200, Introduction to Psychology and CD 101/121, Child Development— utilized a group approach to orientation which required that students meet collectively at a specific time in a specific location on the Lansing Community College campus. Consequently, only students who attended orientation meetings for these six telecourses and who completed the GEFT and the "Local Government" pretest were considered for membership in the population.

A total of fourteen orientation sessions were conducted for the six telecourses. One meeting was held for BUS 118. Two were held for MKT 200. Three were held for SS 104. Two were held for SA 200. Four were held for PSY 200 and two were held for CD 101/121. Permission to attend the orientations and to administer the GEFT and the "Local Government" pretest was granted by Lansing Community College's Vice President for Administration, the Deans of the College's Arts and Science and Business Divisions, the

Directors of the Social Science and Management Systems Programs and the instructors for each of the telecourses. Additional approval to test telecourse students and to solicit their participation in the experiment was given by Michigan State University's University Committee for Research Involving Human Subjects (UCRIHS) (see Appendix E).

At each orientation session an oral statement was made which generally described the purpose of the experiment. In the same statement a request was made to telecourse students to complete the GEFT and the "Local Government" pretest. Following the oral statement, a written statement which specifically described the conditions of participation in the experiment was given to each telecourse student (see Appendix F). Having read the written statement, those individuals who agreed to be included in the population completed the "Local Government" pretest. Having finished the pretest, these students then completed the GEFT. In thirteen of the fourteen orientation sessions, the testing for the experiment was carried out after the telecourse instructor had completed his or her presentation. Consequently, those individuals who chose not to be included in the population were free to leave the orientation meeting without failing to hear any of the telecourse instructor's remarks. It should be noted that a number of students did choose to leave the orientation without taking the GEFT or the pretest. In addition, despite the fact that attendance at the orientation sessions is required of those enrolled, a number of telecourse students failed to attend them. Thus, because of orientation session absenteeism and student refusals to participate, the number of individuals comprising the population from which the sample was ultimately drawn was two hundred and twenty. This figure was considerably less than the three hundred and seventeen that had originally registered for telecourses.

SAMPLING PROCEDURES

In creating the sample, the goal was to draw thirty-six field-dependent and thirty-six field-independent subjects from the population of two hundred and twenty telecourse students who had completed both the GEFT and the "Local Government" pretest. The number of field-independent students in the telecourse population was 113, or 51% of the total. Of this group, 60, or 53% were female and 53, or 47% were male. The number of field-dependent students in the telecourse population was 107, or 49% of the total. Of this group, 77, or 72% were female and 30, or 28% were male. The 137 female telecourse students constituted 62% of the population. Of this group, 56% were field-dependent and 44% were field-independent. The 83 male telecourse students constituted 38% of the population. Of this group, 64% were field-independent and 36% were field-dependent (see Figure 3.1).

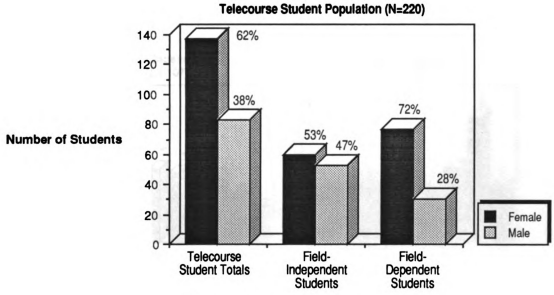


Figure 3.1

Histogram depicting the numbers and percentages of male and female telecourse students with field-dependent and field-independent cognitive styles

A letter asking for participation in the experiment was sent to fifty-four field-dependent and fifty-four field-independent telecourse students (see Appendix G). In an attempt to increase the likelihood of finding a statistically significant interaction between the experimental conditions and the cognitive style dimension of field-dependence/field-independence, those asked to participate were individuals whose scores on the GEFT fell in either of the two extreme ends of the field-dependence/field-independence continuum. Accordingly, the field-dependent students who received scores of 0, 1, 2, 3, or 4 and the field-independent students who received scores of 18, 17, 16 or 15 were contacted. To attain the desired number of fifty-four field-dependent students it was necessary to use only thirteen of the fifteen subjects who received a GEFT score of 4. To achieve the number of fifty-four field-independent students it was necessary to use just three of the twelve subjects who received a GEFT score of 15 (see Figure 3.2).

Despite incentives such as free coffee and rolls, a gift of $15.00 and free child care, the response to the letter was less encouraging than had been expected. As a result, telephone calls were made to twenty-six additional field-dependent and fourteen additional field-independent members of the population. Of the field-dependent individuals

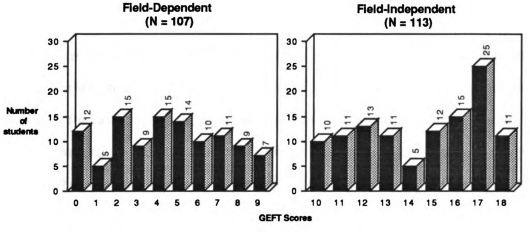


Figure 3.2

Histogram representing group-embedded-figures test (GEFT) scores forfielddependent and field-independent members of the telecourse student population (N=220)

who were phoned, two had received a GEFT score of 4, fourteen had received a score of 5 and ten had received a score of 6. Of the field-independent individuals who were phoned, nine had received a GEFT score of 15 and five had received a score of 14 (see Figure 3.2). In total, eighty field-dependent and sixty-eight field-independent telecourse students were asked to take part in the experiment.

DESIGN OF THE EXPERIMENT

In structuring the experiment, a mixture of field-dependent and field-independent sample subjects were randomly assigned to each of the three experimental conditions.

The first condition served as a control group in which the subjects received and read the written Overview, Instructional (Knowledge) Objectives and TV Focus Questions for the thirty minute video lesson on "Local Government" (Lynch, 1978) (see Appendix H). As was mentioned above, the "Local Government" tape is one of thirty which comprise the *American Government Survey* telecourse series. The "Local Government" program was chosen as an element of the experiment because it is one of several that is not included as part of the *American Government Survey* telecourse as it is taught at Lansing Community College. Since this tape uses the City of Chicago as its focus in explaining multiple tiers of local governmental jurisdiction, instructors in LCC's Social Science Department who teach the telecourse determined that the "Local Government" program would be of no assitance to them in presenting information regarding the functioning of local governments within the state of Michigan. As a consequence, prior to their participation in the experiment and during the period of their attendance at Lansing Community College, no sample subjects would have had an opportunity to view the "Local Government" video tape.

Having completed reading the Overview, the Instructional Objectives and the TV Focus Questions, the mixed group of field-dependent and field-independent subjects was

shown the "Local Government" program. Following the viewing, the subjects were told to review the TV Focus Questions and to "rough out" written responses to them for a minimum period of twenty minutes. Subjects were told to complete this task individually, without discussion. The monitor for this group was told that if subjects asked for more than twenty minutes to finish their review, they were to be granted no more than an additional ten minutes. However, no subjects asked for additional time. At the end of their review period, the subjects, working individually, completed the thirty-item multiple choice/true-false posttest on the material presented in the "Local Government" video lesson. Having finished the posttest, subjects then completed the scaled measure of attitude that was mentioned above.

In the second condition, a mixed group of field-dependent and field-independent individuals was exposed to a treatment. Subjects, like their control group counterparts, were given the same Overview, Instructional Objectives and TV Focus Questions for the "Local Government" lesson. Having read these materials, the subjects watched the same "Local Government" video tape. For the viewing, the subjects were divided into small groups of three and four each. Each small group was composed exclusively of either field-dependent or field-independent individuals. In this small group setting the subjects were told to work collaboratively with their partners in developing answers to the TV Focus Questions. The monitor for this condition was told that the period of small group discussion was to last for a minimum of twenty minutes. If more time were to be requested, a maximum of ten additional minutes was to be provided. However, no small groups asked for additional time. At the end of their discussions, the subjects, working individually, completed the same thirty-item multiple choice/true-false posttest on the material presented in the "Local Government" video lesson. Having finished the posttest, subjects then completed the scaled measure of attitude.

In the third condition, a mixed group of field-dependent and field-independent individuals was exposed to a different treatment. Subjects, like their control and

small-group counterparts, were given the same Overview, Instructional Objectives and TV Focus Questions for the "Local Government" lesson. Having read these materials, the subjects watched the same "Local Government" video tape. Following the viewing, the subjects were led through a discussion of the TV Focus Questions by their monitor who was the instructor for the *American Government Survey* telecourse. The monitor had been told to interact with the subjects for a minimum of twenty minutes. If he needed more time to finish up the discussion, the monitor was instructed to provide no more than an additional ten minutes. The session lasted for approximately twenty-seven minutes. At the end of the discussion, the subjects, working individually, completed the same thirty-item multiple choice/true-false posttest on the material presented in the "Local Government" video lesson. Having finished the posttest, subjects then completed the scaled measure of attitude.

In the days preceding the experiment, each of the three monitors had been briefed regarding his or her responsibilities within the assigned group. On the day of the experiment, the monitors were given a written set of procedures to follow in performing their respective duties (see Appendix I).

The design of the experiment followed the approach described by Campbell and Stanley as, "Design Number 4: The Pretest-Posttest Control Group Design" (Campbell and Stanley, 1966). It is presented as:

Condition 1. R O(1) X(1) O(2)

Condition 2. R O(1) X(2) O(2)

Condition 3. R O(1) X(3) O(2)

NOTATION:

R = Random assignment of subjects to treatments;

O(1) = Fifteen-item multiple choice/true-false pretest (covariate) on "Local Government;"

X(1) = Overview, Objectives and TV Focus Questions; "Local Government" video lesson individual study of TV Focus Questions;

X(2) = Overview, Objectives and TV Focus Questions; "Local Government" video lesson; small-group discussion of TV Focus Questions;

X(3) = Overview, Objectives and TV Focus Questions; "Local Government" video lesson; instructor-led discussion of TV Focus Questions;

O(2) = Thirty-item multiple choice/true-false posttest on "Local Government."

With Campbell and Stanley's (1966) "Pretest-Posttest Control Group Design," evidence of gain scores is of interest. However, the experiment described above was designed to measure as precisely as possible the extent to which the three conditions explained the variation that was expected to be observed in posttest results. Accordingly, the pretest in this design was used as a covariate. It has been noted that "... the analysis of covariance with pretest scores as the covariate is usually preferable to simple gain score comparisons. Since the great bulk of educational experiments show no significant difference, and hence are frequently not reported, the use of this more precise analysis would seem highly desirable" (Campbell and Stanley, 1966, p. 23).

In regard to the eight sources of internal invalidity that are cited by Campbell and Stanley, the "Pretest-Posttest Control Group Design" controls for all of them. In regard to the three applicable sources of external invalidity cited by Campbell and Stanley, it was determined that the use of a covariate as well as the random assignment of subjects to treatments adequately controls for them (Campbell and Stanley, 1966).

DATA ANALYSIS PROCEDURES

In conducting the experiment that is outlined above, a process of random assignment of subjects to treatments was utilized. Kirk (1982) notes that as a method of

experimental control "randomization is used to distribute the idiosyncratic characteristics of... subjects over... treatment levels so that they will not selectively bias the outcome of the experiment.... In other words, randomization provides a basis for obtaining unbiased estimates of treatment effects" (p. 11). In addition to randomization, a covariate was employed. It was used in an effort to reduce the amount of the within group variation that was anticipated being observed as well as to explain more of the between group variation as being attributable to the treatments. The covariate that was used in the experiment was the fifteen-item multiple choice/true-false pretest on "Local Government."

The pretest was selected as the covariate in an effort to statistically control for the impact of pre-experiment variation on the outcome measure. Given the heterogeneous composition of the telecourse student population at Lansing Community College, it was expected that differences would be found among subjects in regard to their prior knowledge of local government issues generally and City of Chicago issues specifically. The use of the pretest as a means of statistically controlling for the effect of these individual differences upon the subjects' posttest performance allowed for greater precision in estimating the effects of the treatments. The statistical control procedure that was used in the experiment was analysis of covariance (ANCOVA).

Analysis of covariance.."involves measuring one or more concomitant variables (also called covariates) in addition to the dependent variable. The concomitant variable represents a source of variation that has not been controlled in the experiment and one that is believed to affect the dependent variable. Through analysis of covariance, the dependent variable can be adjusted so as to remove the effects of the uncontrolled source of variation represented by the covariate" (Kirk, 1982, pp. 715-716). In this experiment, a two factor analysis of covariance was used. One factor or independent variable was cognitive style. Its two levels were field-dependence and field-independence. The second factor or independent variable was experimental condition. Its three levels were "individual study," "small-group discussion" and "instructor-led discussion." The covariate, as

mentioned above, was the fifteen-item multiple choice/true-false pretest on the "Local Government" lesson. Using a two factor analysis of covariance (ANCOVA) procedure, the sources of variation were partitioned as follows:

SOURCE (of variation)

Explained by the Covariate

Unexplained by the Covariate

Factor A "adjusted" (Cognitive Style)

Factor B "adjusted" (Experimental Condition)

Interaction "adjusted" (Factor A by Factor B)

Error (Residual)

Total

Kirk (1982) presents the experimental design model equation for a completely randomized analysis of covariance design (ANCOVA) as:

$$Y_{ij} = \mu + \alpha_j + \beta_w(X_{ij} - \overline{X}..) + \varepsilon_{i(j)} \qquad \text{(p. 727).}$$

The terms of the equation are represented as follows:

$\overline{Y}_{ij}$ is the dependent variable (posttest score) for the ith subject in the jth group;

μ is the population grand mean, across all groups;

α_j is called a "treatment effect" and is the distance of treatment group j from the grand mean;

β_w is a parameter representing the slope of the regression line for Y on X;

X_{ij} is the covariate (pretest score) for the ith subject in the jth group;

$\overline{X}..$ is the sample (pretest) grand mean, across all groups;

$\varepsilon_{i(j)}$ is the residual or error of estimate for the ith subject in the jth group (Porter and Raudenbush, in press).

In using analysis of covariance (ANCOVA), particular sources of variation that have influenced the outcome measure can be adjusted for the effect of the covariate, partitioned and then employed to assist in a more precise explanation of posttest differences. Statistically, this idea can be represented by subtracting the effect of the covariate ($\beta_w(X_{ij} - \overline{X}..)$) from the model equation given above. The difference in the score that results from the removal of the covariate is called the adjusted score. It is this adjusted score that is free of the effect of the covariate.

As with other statistical methods, the appropriate use of the analysis of covariance (ANCOVA) model rests upon certain assumptions. Authors of publications that deal with the application and interpretation of analysis of covariance differ in their appraisals of which assumptions are the most critical to be met and which assumptions are the most robust with respect to violations (Glass, Peckham and Sanders, 1972; Huitema, 1980; Tabachnick and Fidell, 1983). Below, six prominently discussed ANCOVA assumptions are listed and each is briefly considered in light of its relevance to this experiment.

1. **Random Assignment**: In using analysis of covariance (ANCOVA), it is assumed that a process of random assignment of subjects to treatments is employed. "This procedure results in groups of subjects having the same expected values on all characteristics" (Huitema, 1980, p. 99). As noted above, a process of random assignment of subjects to treatments was used in this experiment.

2. **Statistical Independence of Covariate and Treatment**: In using analysis of covariance (ANCOVA), it is assumed that the covariate and the treatments are statistically independent. "It is crucial that the covariable be unaffected by the treatment. Thus, only variables that are measured prior to treatment implementation, or variables which are unarguably impervious to change by the treatment should be considered as covariables" (Porter and Raudenbush, in press). In the case of this experiment, the pretest (covariate) was given several weeks before the administration of the posttest (dependent variable).

3. **Normality**: In using analysis of covariance (ANCOVA), it is assumed that there is a normal distribution of scores for the treatment populations from which the samples have been drawn. Tabachnick and Fidell (1983) state that "Without knowledge of population values, or production of actual sampling distributions of means, there is of course no way to directly test this assumption. However, it has been shown that (ANCOVA) is robust to violations of this assumption, particularly since the central limit theorem suggests that with large samples normal sampling distributions will result even from nonnormal population distributions" (p. 181).

4. **Homogeneity of Variance**: In using analysis of covariance (ANCOVA), it is assumed that the variance of posttest (dependent variable) scores within each cell of the design is a separate estimate of the same population variance. "Because of the robustness of the analysis to violation of this assumption, it is typically unnecessary to formally test for homogeneity of variance..." (Tabachnick and Fidell, 1983, p. 181).

5. **Linearity**: In using analysis of covariance (ANCOVA), it is assumed that the relationship between the covariate and the dependent variable is linear (Porter and Raudenbush, in press). To check this assumption, a Pearson product-moment coefficient of correlation was calculated for the covariate (pretest) and the dependent variable (posttest). The result, along with a scatterplot which graphically depicts the correlation between the two, is reported in Chapter Four.

6. **Homogeneity of Regression**: In using analysis of covariance (ANCOVA), it is assumed that the lines describing the regression of the dependent variable on the covariate for each treatment group (cell) are the same or parallel (Huitema, 1980; Porter and Raudenbush, in press). Tabachnick and Fidell (1983) maintain that the "Lack of homogeneity of regression implies an interaction between independent variables and covariates. This interaction means that the effect of the covariate in adjusting the dependent variable differs for various cells" (p. 183). To check this assumption, tests were conducted using SPSS-X (*Statistical Package for the Social Sciences X*) (1986) on the IBM mainframe at

the Michigan State University computer center. The results of these tests revealed no statistically significant interactions between the covariate (pretest) and the independent variables (cognitive style and experimental conditions). These findings indicate that in each of the six cells of the experimental design, the regression slopes were parallel. This means that the effect of the covariate in adjusting the dependent variable was the same for all treatment groups.

In the first of the eight hypotheses that have been stated, a comparison of three specific cell means to three other specific cell means was proposed. In each of the seven remaining hypotheses, a comparison of two particular cell means was proposed (see TABLE 3.1). These methods of comparing, known as multiple comparison techniques, allow a researcher to contrast subsets of means taken from a larger set of means (Hopkins and Glass, 1978). In the experiment that has been described above, obtaining answers to the research questions of interest involved such specific comparisons. Thus, the utilization of multiple comparisons with the ANCOVA procedure was chosen as the means of individually testing each of the eight statistical hypotheses. As with the test for homogeneity of regression mentioned above, the analysis of the data generated in the experiment was conducted at the Michigan State University computer center using SPSS-X (*Statistical Package for the Social Sciences X*) (1986) on the IBM mainframe.

CHAPTER SUMMARY

In this chapter the steps that were followed in conducting the experiment were presented. The independent and dependent variables were identified and the eight hypotheses of interest were stated in both their research and statistical forms. The instruments that were used to measure subject performance — the "group-embedded-figures test" (GEFT), a "Local Government" pretest and a "Local Government" posttest — were described and assessments of their validity and reliability were discussed. The processes

used in selecting and testing the telecourse student sample were detailed and the design of the experiment was explained. The analysis of covariance (ANCOVA) procedures that were employed in generating the results of the experiment were introduced and a rationale for their selection was provided. Also, the assumptions to be met in the proper utilization of ANCOVA were considered.

CHAPTER IV: DATA ANALYSIS

INTRODUCTION

An analysis of the results of the experiment is presented in this chapter. In the first section a brief rationale for the replication of the experiment is offered. Solicitation of individuals for participation in the replication is discussed and several procedural differences between the first and second experiments are noted. The assignment of subjects to treatments in the second experiment is described and several matrices are shown which provide the means, standard deviations and number of subjects for each cell for the "group-embedded-figures test" (GEFT), the pretest and the posttest. In the second section a matrix which displays the adjusted mean for each cell is presented. In addition, the results of testing each of the eight hypotheses are reported. In the third section the responses to the scaled measure of attitude are given. They are presented in bar graph format.

PARTICIPATION IN THE EXPERIMENT

The experiment was conducted at Lansing Community College on a Saturday morning in January, 1987. Of those asked to participate, either by mail or by phone, forty of the eighty field-dependent subjects and forty-one of the sixty-eight field-independent subjects had agreed to do so. Of the total of eighty-one individuals who had committed to the experiment, fifty-five took part. Twenty-five of the participants were field-dependent and thirty were field-independent.

After listening to introductory remarks made in a large lecture hall, the fifty-five subjects accompanied by their monitors went to separate, designated classrooms to begin the experiment. After having completed the various activities described in Chapter Three, the three experimental groups reconvened as a single body. Then, for approximately thirty minutes the subjects were given a full account of the purpose of the experiment and a description of the role they had played in it. Participants were then thanked, paid and excused.

Because inclement weather was felt to have contributed to some extent to the low turn out and since Kirk (1982), among others, has noted that increasing the size of the sample increases the power of the experimental design, a decision was made to repeat the experiment with a second sample from the same population. In replicating the experimental procedures, the purpose was not to discard the data gathered in the first effort. Rather, the intent was to generate data which could be added to what had been collected initially.

In February, 1987, in an attempt to solicit participation in the repeat of the experiment, phone calls were made to forty members of the telecourse student population. Those contacted were the twenty-six individuals who, having promised to be part of the original experiment, had failed to appear. An additional fourteen subjects were reached who had indicated a desire to be part of the first experiment but had been unable, for a variety of reasons, to attend it. Of these forty who were asked to participate in the second experiment, seventeen agreed to do so. Of this group, nine were field-dependent and eight were field-independent. A letter confirming the date, time and location of the follow-up exercise was sent to these individuals (see Appendix J). At the end of February, 1987, on the date of the replication, seven students showed up. Of this number, four were field-dependent and three were field-indepenent. The second experiment was conducted with these individuals.

Since in the first experiment the smallest number of subjects had taken part in the "instructor-led" condition, five of the seven students participating in the second

experiment were randomly assigned to that condition. Also, because in the first experiment the largest number of subjects had taken part in the "small-group" condition and since the focus of interest within that condition was on the effects of interactive behavior upon clusters of three and four students, no individuals were assigned to this condition in the second experiment. The remaining two subjects were randomly assigned to the "indivdual study" (control) condition.

It should be noted that the individual who had served as the control group monitor in the first experiment was unable to attend the second one. Consequently, a replacement was selected and trained to lead members of the replicated control group through their prescribed activities. The monitor in the "instructor-led" condition was the same person who had worked with that group in the first experiment. Of course, with no assignment of subjects to the "small-group" condition, a third monitor was not needed in the replication. The two monitors working in the second experiment received the same written set of instructions as had been given to the monitors in the first experiment (see Appendix I). In addition, it should be pointed out that while the second experiment was conducted during the same time of day as the first, it was carried out in classrooms other than those used in the first experiment.

In summation, data were ultimately collected and analyzed for a total of sixty-two individuals; twenty-nine of them field-dependent and thirty-three of them field-independent.

Table 4.1 presents the number of field-dependent and field-independent subjects assigned to each cell of the experimental design. It includes the group mean and standard deviation on the GEFT for each cell. It also provides the two row means and standard deviations on the GEFT for the field-dependent and field-independent subjects.

Table 4.1

Group Embedded Figures Test (GEFT) Data
for sample cells (N=62)

		EXPERIMENTAL CONDITIONS			
		"Individual Study" (Control)	"Small-Group Discussion"	"Instructor-Led Discussion"	
COGNITIVE STYLE	Field-Dependent	GEFT $\bar{X}_{11} = 3.22$ $S = 1.898$ $n = 9$	GEFT $\bar{X}_{12} = 2.40$ $S = 2.412$ $n = 10$	GEFT $\bar{X}_{13} = 3.50$ $S = 1.509$ $n = 10$	$\bar{X}_1 = 3.034$ $S = 1.926$
	Field-Independent	GEFT $\bar{X}_{21} = 15.72$ $S = 1.126$ $n = 11$	GEFT $\bar{X}_{22} = 17.10$ $S = .875$ $n = 10$	GEFT $\bar{X}_{23} = 16.83$ $S = 1.000$ $n = 12$	$\bar{X}_2 = 16.545$ $S = .822$

Figure 4.1 shows the distribution of pretest (covariate) scores for the telecourse student sample. The distribution is bimodal indicating that for this particular sample, more subjects achieved scores of 7, 8 and 10 than any other. The pretest cell means and the standard deviations that are shown in Table 4.2 are derived from the data that are presented graphically in this figure.

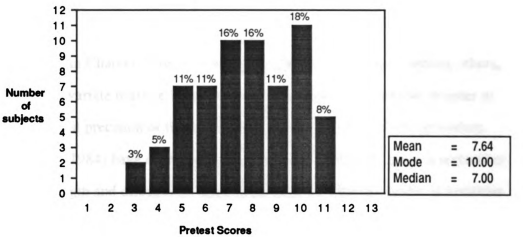


Figure 4.1

A histogram representing pretest scores for sample subjects (N=62)

Table 4.2 presents the number of field-dependent and field-independent subjects assigned to each cell of the experimental design. It includes the group mean and standard deviation on the pretest (covariate) for each cell. It shows the two row means and standard deviations on the pretest for the independent variable of cognitive style and the three column means and standard deviations on the pretest for the independent variable of experimental condition. It also provides the grand mean and standard deviation on the pretest.

Table 4.2

Pretest data for sample cells (N=62)

		EXPERIMENTAL CONDITIONS			
		"Individual Study" (Control)	"Small-Group Discussion"	"Instructor-Led Discussion"	Row means and standard deviations
COGNITIVE STYLE	Field-Dependent	Pretest $\bar{X}_{11} = 8.78$ $S = 2.44$ $n = 9$	Pretest $\bar{X}_{12} = 6.40$ $S = 2.41$ $n = 10$	Pretest $\bar{X}_{13} = 6.10$ $S = 2.13$ $n = 10$	$\bar{X}_{1.} = 7.03$ $S = 2.43$
	Field-Independent	Prestest $\bar{X}_{21} = 8.09$ $S = 1.65$ $n = 11$	Pretest $\bar{X}_{22} = 8.60$ $S = 1.15$ $n = 10$	Pretest $\bar{X}_{23} = 7.83$ $S = 1.99$ $n = 12$	$\bar{X}_{2.} = 8.15$ $S = 1.79$
	Column means and standard deviations	$\bar{X}_{.1} = 8.40$ $S = 2.01$	$\bar{X}_{.2} = 7.50$ $S = 2.06$	$\bar{X}_{.3} = 7.05$ $S = 2.20$	$\bar{X}_{..} = 7.64$ $S = 2.14$

Grand mean and standard deviation

As mentioned in Chapter Three, Porter and Raudenbush (in press), among others, have noted that a covariate must be linearly related to the outcome variable in order to improve the statistical precision of the analysis of covariance (ANCOVA) procedure. Glass and Hopkins (1984) have observed that correlation coefficients allow a researcher to compare the strength and direction of association between different pairs of variables and to measure the degree of linearity between them. Accordingly, a Pearson product-moment coefficient of correlation for the covariate (pretest) and the dependent variable (posttest) was calculated. The coefficient or "r" was determined to be .53. The scatterplot presented in Figure 4.2 graphically depicts the correlation between the two.

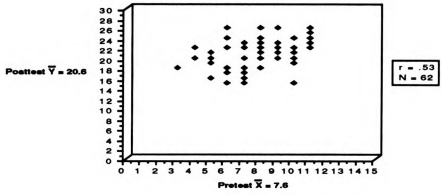


Figure 4.2

Scatterplot of pretest (covariate) and posttest (dependent variable) scores for sample subjects

Using the scatterplot in Figure 4.2 as a visual check, the computed value of .53 for "r" seems reasonable. The correlation between the covariate (pretest) and the dependent variable (posttest) appears to be positive, fairly moderate and linear.

Figure 4.3 shows the distribution of posttest scores for the telecourse student sample. The distribution is slightly positively skewed indicating that for this particular sample, the mean is "pulled" slightly toward the "tail." That is," the mean has the largest value of the three measures of central tendency" (Hopkins and Glass, 1978, p.41). The posttest cell means—both unadjusted and adjusted—as well as the standard deviations that are shown in Tables 4.3 and 4.4 are derived from the data that are presented graphically in this figure.

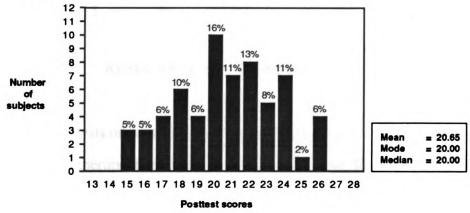


Figure 4.3

A histogram representing posttest scores for sample subjects (N=62)

Table 4.3 presents the number of field-dependent and field-independent subjects assigned to each cell of the experimental design. It includes the group mean and standard deviation on the posttest (dependent variable) for each cell. It shows the two row means and standard deviations on the posttest for the independent variable of cognitive style and the three column means and standard deviations on the posttest for the independent variable of experimental condition. It also provides the grand mean and standard deviation on the posttest. All of the means presented in Table 4.3 are unadjusted for the effects of the pretest (covariate) on the posttest (dependent variable).

Table 4.3

Posttest data for sample cells (unadjusted for the effects of the covariate) (N=62)

		EXPERIMENTAL CONDITIONS			
		"Individual Study" (Control)	"Small-Group Discussion"	"Instructor-Led Discussion"	Row means and standard deviations
COGNITIVE STYLE	Field-Dependent	Posttest $\bar{Y}_{11} = 19.67$ $S = 2.74$ $n = 9$	Posttest $\bar{Y}_{12} = 20.60$ $S = 2.22$ $n = 10$	Posttest $\bar{Y}_{13} = 18.20$ $S = 2.09$ $n = 10$	$\bar{Y}_{1.} = 19.48$ $S = 2.49$
	Field-Independent	Posttest $\bar{Y}_{21} = 21.64$ $S = 3.20$ $n = 11$	Posttest $\bar{Y}_{22} = 21.9$ $S = 2.38$ $n = 10$	Posttest $\bar{Y}_{23} = 21.5$ $S = 2.72$ $n = 12$	$\bar{Y}_{2.} = 21.67$ $S = 2.93$
	Column means and standard deviations	$\bar{Y}_{.1} = 20.75$ $S = 3.09$	$\bar{Y}_{.2} = 21.25$ $S = 2.57$	$\bar{Y}_{.3} = 20.00$ $S = 3.10$	$\bar{Y}_{..} = 20.65$ $S = 2.91$

Grand mean and standard deviation

RESULTS OF HYPOTHESIS TESTING

A two-factor analysis of covariance (ANCOVA) was used to test the eight hypotheses of interest in this experiment. As noted in Chapter Three, one factor was the independent variable of cognitive style with its two levels of field-dependence and field-independence while the other factor was the independent variable of experimental condition with its three levels of "individual study," "small-group discussion" and

"instructor-led discussion." Given these variables, the layout of the experiment took the form of a 2 X 3 design (see Tables 4.1, 4.2, 4.3 and 4.4 for reference). Table 4.4 shows the number of subjects assigned to each cell and the posttest mean for each cell as adjusted for the effects of the covariate. In presenting the results of the experiment, it is this set of means that is utilized. The adjusted means are employed because as Glass and Hopkins (1984) have noted, "To interpret... ANCOVA results properly, one needs to know what the (posttest) mean of each group would have been predicted to be if its covariate mean had been equal to the grand mean on the covariate" (p. 499). In the adjustment of each of these posttest cell means, the effects of the covariate have been removed. This removal decreases the size of error effects and increases the precision of the estimate of treatment effects.

Table 4.4

Posttest means for sample cells (adjusted for the effects of the covariate) (N=62)

		EXPERIMENTAL CONDITIONS		
		"Individual Study" (Control)	"Small-Group Discussion"	"Instructor-Led Discussion"
COGNITIVE STYLE	Field-Dependent	Posttest $\bar{Y}_{11(adj.)} = 19.19$ n = 9	Posttest $\bar{Y}_{12(adj.)} = 21.12$ n = 10	Posttest $\bar{Y}_{13(adj.)} = 18.85$ n = 10
	Field-Independent	Posttest $\bar{Y}_{21(adj.)} = 21.45$ n = 11	Posttest $\bar{Y}_{22(adj.)} = 21.49$ n = 10	Posttest $\bar{Y}_{23(adj.)} = 21.42$ n = 12

The first hypothesis of interest was stated in research form as:

1. The difference in posttest scores in each of the three conditions will not be constant for field-dependent and field-independent individuals. That is, when comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students depending upon their participation in "individual study," "small-group discussion" or "instructor-led discussion" groups.

It was stated in null or statistical form as :

1. Ho: $(\mu_{11} - \mu_{12} - \mu_{13}) - (\mu_{21} - \mu_{22} - \mu_{23}) = 0$

   Ha: $(\mu_{11} - \mu_{12} - \mu_{13}) - (\mu_{21} - \mu_{22} - \mu_{23}) \neq 0$

In the test of this hypothesis as well as in the seven that follow, the level of significance (i.e., the probability of rejecting the null hypothesis when it is true) has been set at .05.

In Table 4.5 an examination of the ANOVA table indicates a significant relationship between the covariate (pretest) and the dependent variable (posttest) for all subjects ($p = .002$). In addition, after adjusting for the effects of the covariate, significant differences are found when comparing the overall posttest performance of field-dependent and field-independent subjects, with the latter group showing a higher mean score ($p = .013$). However, no significant differences are found between the groups (experimental conditions) overall. Likewise, no significant differences are found regarding the effects of interaction between cognitive style and experimental conditions. Accordingly, the null hypothesis is tenable and may not be rejected.

ANOVA table showing the effects of cognitive style (style), experimental conditions (group) and interactions (style by group) with the pretest as a covariate

Table 4.5

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	70.229	1	70.229	10.101	0.002 *
Main Effects	59.472	3	19.824	2.851	0.046 *
Style	46.196	1	46.196	6.645	0.013 *
Group	15.461	2	7.730	1.112	0.336
2-Way Interactions					
Style Group	14.111	2	7.056	1.015	0.369
Residual	382.382	55	6.925		
Total	526.194	61	8.626		

* Indicates statistical significance at the .05 level

The results of this test of the first hypothesis are shown graphically in Figure 4.4.

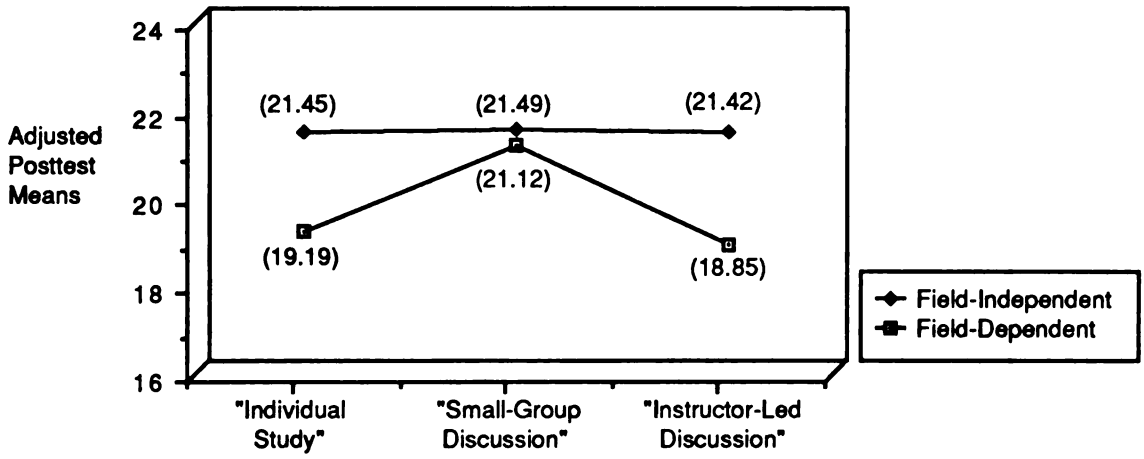


Figure 4.4

Adjusted Posttest Mean Scores
for Field-Dependent and Field-Independent Subjects

The second hypothesis of interest was stated in research form as:

2. When comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students who engage in "individual study."

It was stated in null or statistical form as:

2. Ho: $\mu_{21} - \mu_{11} = 0$

Ha: $\mu_{21} - \mu_{11} \neq 0$

In Table 4.6 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-dependent and field-independent subjects in the "individual study" group. In addition, after adjusting for the effects of the covariate, no significant differences are found between field-dependent and field-independent subjects in this group with regard to posttest scores. Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic

representation of the results of this test of the second hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of cognitive style (style) within the "individual study" (control) group with the pretest as a covariate

Table 4.6

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	20.833	1	20.833	2.658	0.121
Main Effects					
Style	27.655	1	27.655	3.528	0.078
Residual	133.262	17	7.839		
Total	181.750	19	9.566		

The third hypothesis of interest was stated in research form as:

3. When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

It was stated in null or statistical form as:

3. Ho: $\mu_{12} - \mu_{11} = 0$

Ha: $\mu_{12} - \mu_{11} \neq 0$

In Table 4.7 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-dependent subjects in the "small-group discussion" and "individual study" groups. In addition, after adjusting for the effects of the covariate, no significant differences are found between these groups for field-dependent subjects with regard to posttest scores.

Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic representation of the results of this test of the third hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-dependent subjects in the "small-group discussion" and "individual study" (control) groups with the pretest as a covariate

Table 4.7

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	3.766	1	3.766	0.648	0.433
Main Effects					
Group	11.758	1	11.758	2.023	0.174
Residual	93.003	16	5.813		
Total	108.526	18	6.029		

The fourth hypothesis of interest was stated in research form as:

4. When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

It was stated in null or statistical form as:

4. Ho: $\mu_{13} - \mu_{11} = 0$

Ha: $\mu_{13} - \mu_{11} \neq 0$

In Table 4.8 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-dependent subjects in the "instructor-led discussion" and "individual study" groups. In addition, after adjusting for the effects of the covariate, no significant differences are

found between these groups for field-dependent subjects with regard to posttest scores. Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic representation of the results of this test of the fourth hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-dependent subjects in the "instructor-led discussion" and "individual study" (control) groups with the pretest as a covariate

Table 4.8

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	17.087	1	17.087	2.995	0.103
Main Effects					
Group	1.425	1	1.425	0.250	0.624
Residual	91.277	16	5.705		
Total	109.789	18	6.099		

The fifth hypothesis of interest was stated in research form as:

5. When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

It was stated in null or statistical form as:

5. Ho: $\mu_{13} - \mu_{12} = 0$

Ha: $\mu_{13} - \mu_{12} \neq 0$

In Table 4.9 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-dependent subjects in the "instructor-led discussion" and "small-group discussion"

groups. After adjusting for the effects of the covariate, significant differences are found between these groups for field-dependent subjects with regard to posttest scores (p = .028). Accordingly, the null hypothesis is rejected. It should be noted that the difference observed between these two groups on the posttest was in the direction opposite of that tentatively anticipated by the researcher. For a graphic representation of the results of this test of the fifth hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-dependent subjects in the "instructor-led discussion" and "small-group discussion" groups with the pretest as a covariate

Table 4.9

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	8.039	1	8.039	1.750	0.203
Main Effects					
Group	26.686	1	26.686	5.811	0.028*
Residual	78.076	17	4.593		
Total	112.800	19	5.937		

* Indicates statistical significance at the .05 level

The sixth hypothesis of interest was stated in research form as:

6. When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

It was stated in null or statistical form as:

6. Ho: $\mu_{22} - \mu_{21} = 0$

Ha: $\mu_{22} - \mu_{21} \neq 0$

In Table 4.10 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-independent subjects in the "small-group discussion" and "individual study" groups. In addition, after adjusting for the effects of the covariate, no significant differences are found between these groups for field-independent subjects with regard to posttest scores. Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic representation of the results of this test of the sixth hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-independent subjects in the "small-group discussion" and "individual study" (control) groups with the pretest as a covariate

Table 4.10

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	16.886	1	16.886	1.913	0.184
Main Effects					0.978
Group	0.007	1	0.007	0.001	
Residual	158.917	18	8.829		
Total	175.810	20	8.790		

The seventh hypothesis of interest was stated in research form as:

7. When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

It was stated in null or statistical form as:

7. Ho: $\mu_{23} - \mu_{21} = 0$

Ha: $\mu_{23} - \mu_{21} \neq 0$

In Table 4.11 an examination of the ANOVA table indicates a significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-independent subjects in the "instructor-led discussion" and "individual study" groups ($p = .042$). After adjusting for the effects of the covariate, no significant differences are found between these groups for field-independent subjects with regard to posttest scores. Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic representation of the results of this test of the seventh hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-independent subjects in the "instructor-led discussion" and "individual study" (control) groups with the pretest as a covariate

Table 4.11

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	39.104	1	39.104	4.696	0.042*
Main Effects					
Group	0.012	1	0.012	0.001	0.971
Residual	166.537	20	8.327		
Total	205.652	22	9.348		

* Indicates statistical significance at the .05 level

The eighth hypothesis of interest was stated in research form as:

8. When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

It was stated in null or statistical form as:

8. Ho: $\mu_{21} - \mu_{22} = 0$

Ha: $\mu_{21} - \mu_{22} \neq 0$

In Table 4.12 an examination of the ANOVA table indicates no significant relationship between the covariate (pretest) and the dependent variable (posttest) for field-independent subjects in the "instructor-led discussion" and "small-group discussion" groups. In addition, after adjusting for the effects of the covariate, no significant differences are found between these groups for field-independent subjects with regard to posttest scores. Accordingly, the null hypothesis is tenable and may not be rejected. For a graphic representation of the results of this test of the eighth hypothesis, Figure 4.4 may be consulted.

ANOVA table showing the effects of experimental conditions (group) for field-independent subjects in the "instructor-led discussion" and "small-group discussion" groups with the pretest as a covariate

Table 4.12

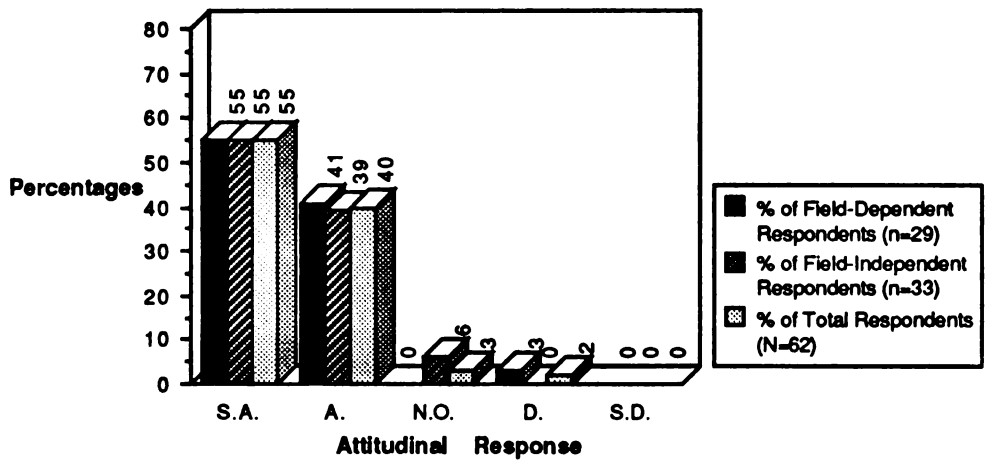
Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Covariate					
Pretest	10.619	1	10.619	1.215	0.284
Main Effects					
Group	0.072	1	0.072	0.008	0.929
Residual	166.082	19	8.741		
Total	176.773	21	8.418		

MEASURES OF ATTITUDE

As noted previously, a twenty-three item scaled measure of attitude was administered to all subjects after the experiment was completed (see APPENDIX X, SCALED MEASURE OF ATTITUDE). The scale employs five response categories including "strongly agree" (S.A.), "agree" (A.), "no opinion" (N.O.), "disagree" (D.) and "strongly disagree" (S.D.). Percentages are provided in each category for field-dependent respondents, field-independent respondents and total number of respondents. Responses made to each of the statements comprising the instrument are presented in bar graph format.

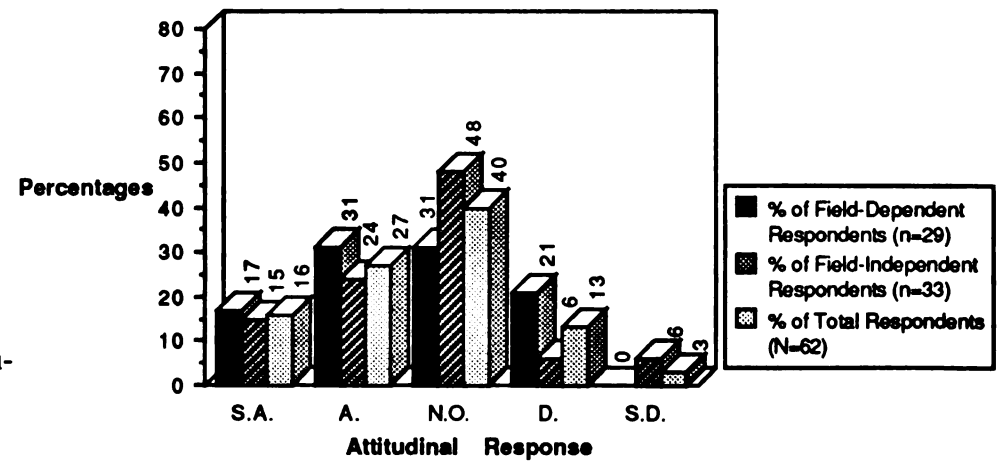
Statement No. 1

I enrolled in the telecourse primarily because I believed it to be a convenient way for me to learn.



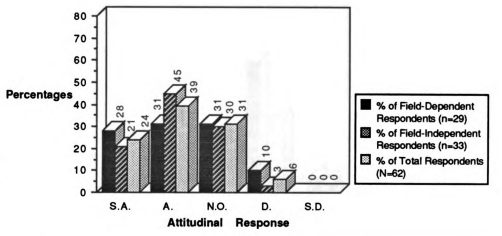
Statement No. 2

Telecourse discussion sessions are important because they allow me to interact personally with my fellow telecourse students.



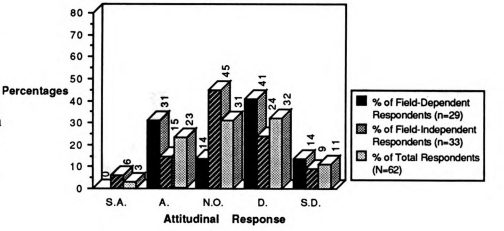
Statement No. 3

Telecourse discussion sessions are important because they allow me to interact personally with my telecourse instructor.



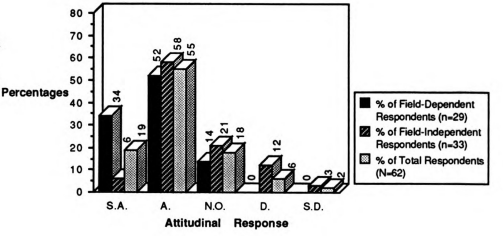
Statement No. 4

Using the phone rather than having face-to-face meetings with my telecourse instructor is an adequate way of discussing issues related to the telecourse.



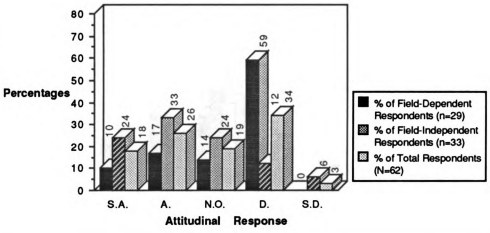
Statement No. 5

To this point in the term I have found the telecourse to be a satisfying learning experience.



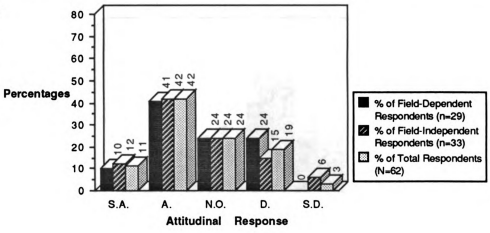
Statement No. 6

I enrolled in the telecourse primarily because I prefer to learn on my own.



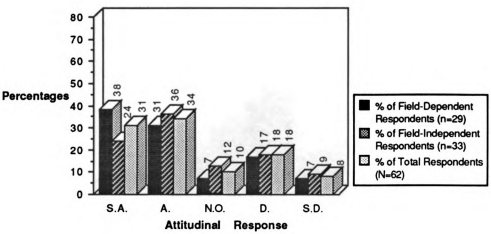
Statement No. 7

I find learning from the telecourse to be equally as rewarding as learning from other more traditional methods of instruction.



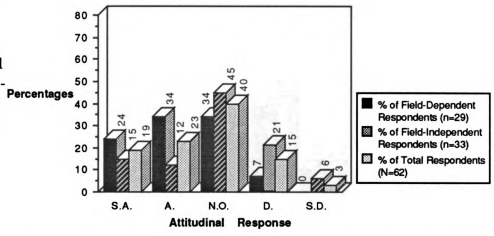
Statement No. 8

If it were possible, I would take more of my classes in the telecourse format.



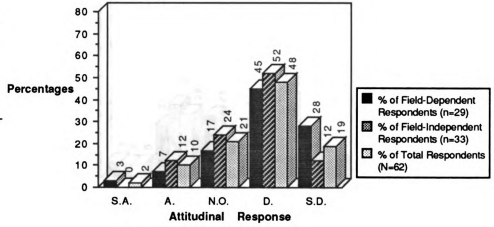
Statement No. 9

If telecourse instructors offered additional optional discussion sessions I would attend them.



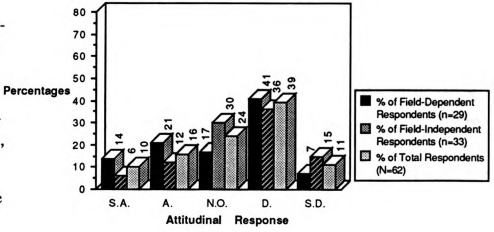
Statement No. 10

I enrolled in the telecourse primarily because I prefer not to participate in classroom discussions.



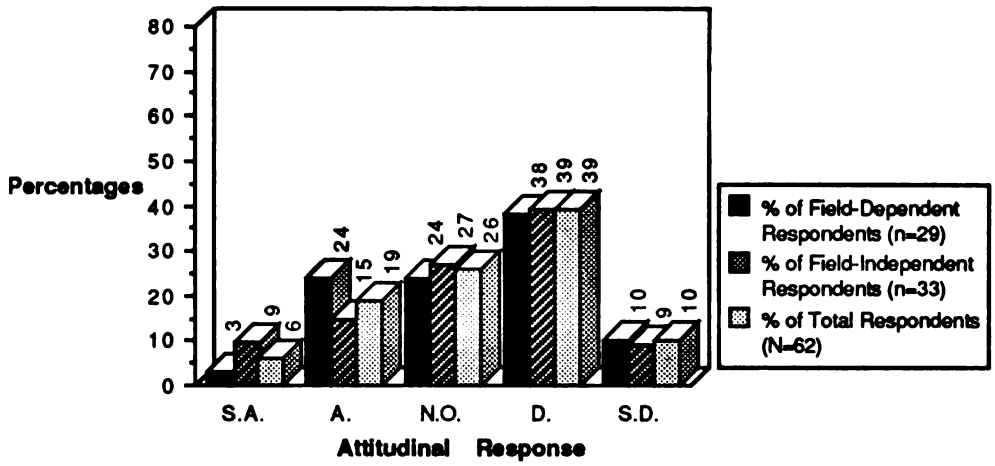
Statement No. 11

If telecourse discussion sessions that are held on the LCC campus were made mandatory for all telecourses, I would no longer be willing or able to enroll in telecourses.



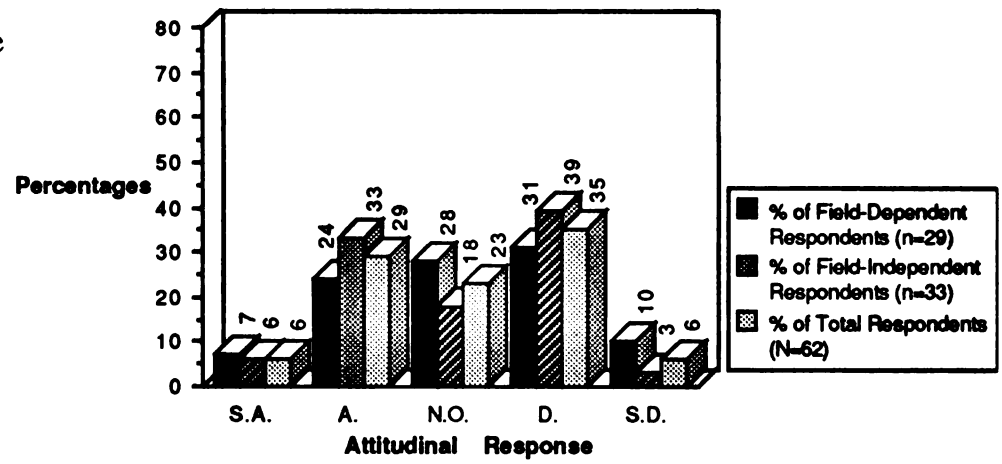
Statement No. 12

Because I prefer classes that require personal interaction with students and teachers, the telecourse is not my first choice as a means of instruction.



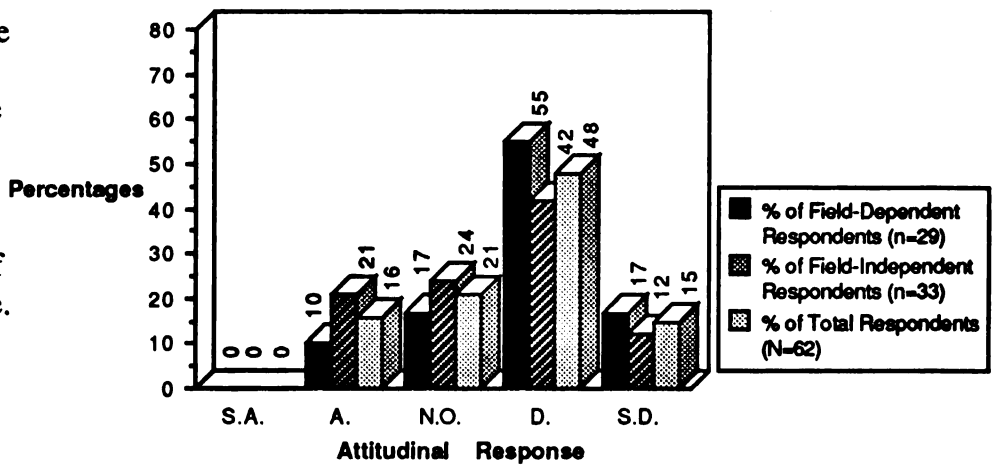
Statement No. 13

Coming to the LCC campus for telecourse discussion sessions is an inconvenience.



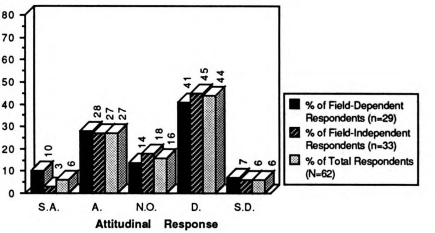
Statement No. 14

Coming to the LCC campus for telecourse discussion sessions is an unnecessary component of the telecourse.



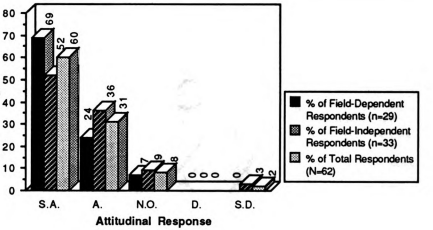
Statement No. 15

I am finding the telecourse to be more difficult than I expected it would be.



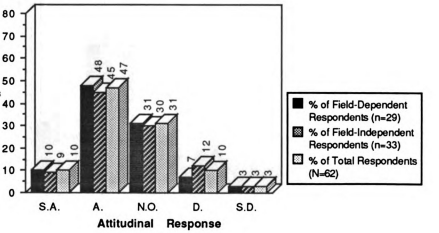
Statement No. 16

Lansing Community College is providing an important service by offering telecourses for credit.



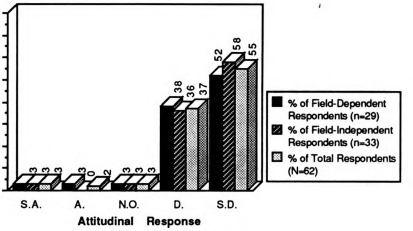
Statement No. 17

The amount of contact (phone and/or face-to-face) that I have with my telecourse instructor is adequate.



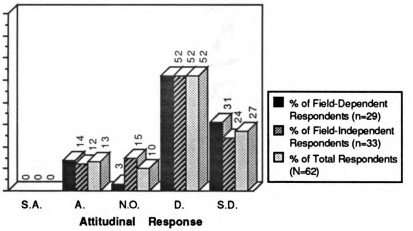
Statement No. 18

It is likely that before the term is over I will drop the telecourse in which I am currently enrolled.



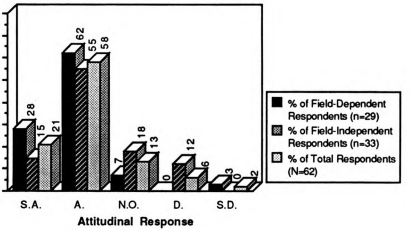
Statement No. 19

I would participate in telecourse discussion sessions where fellow telecourse students, but not the telecourse instructor, were present.



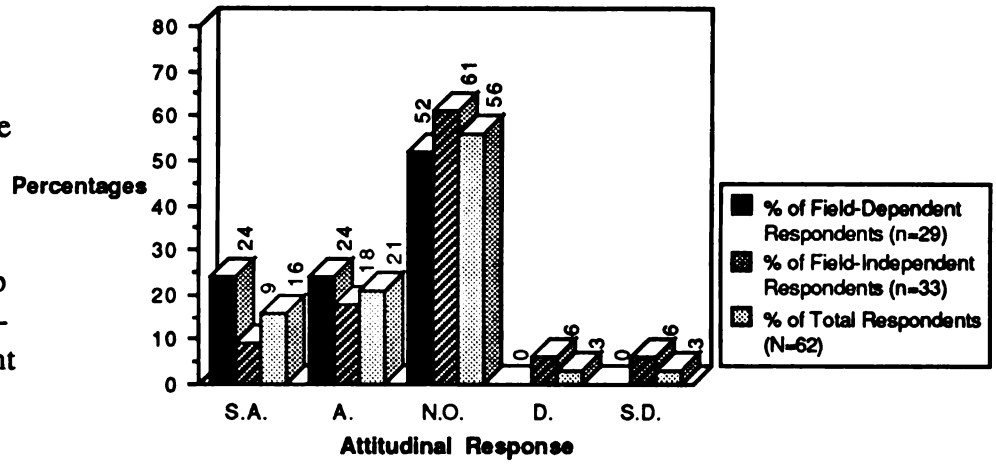
Statement No. 20

I will participate in telecourse discussion sessions where fellow telecourse students and the telecourse instructor are present.



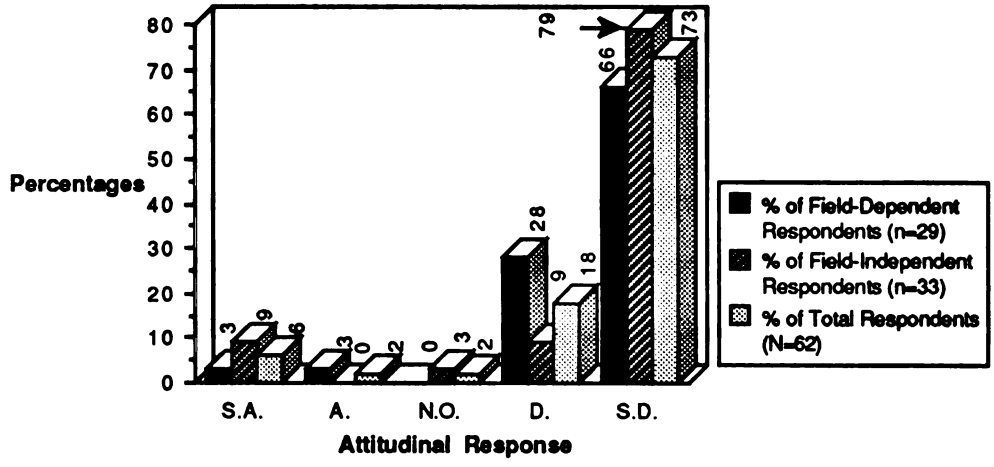
Statement No. 21

To this point in the term I believe that my attendance at telecourse discussion sessions has given me help in understanding the content of the telecourse.



Statement No. 22

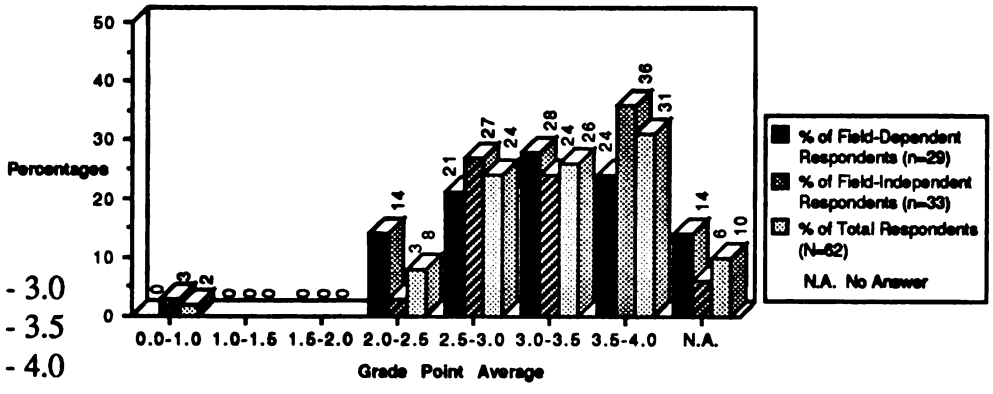
I have already dropped the telecourse for which I had enrolled this term.



Statement No. 23

My Grade Point Average (GPA) at Lansing Community College falls into the following category:

0.0 - 1.0
1.0 - 1.5
1.5 - 2.0
2.0 - 2.5
2.5 - 3.0
3.0 - 3.5
3.5 - 4.0



CHAPTER SUMMARY

In this chapter the results of the experiment were presented. A rationale for the decision to repeat the experiment and a description of the procedures followed in soliciting subject participation in the replication were offered. Also pointed out were several differences between the ways in which the first and second experiments were conducted. In addition, utilizing matrices, the means, standard deviations and number of subjects for each cell were reported for the Group Embedded Figures Test (GEFT), the pretest and the posttest. The posttest cell means adjusted for the effects of the covariate were also given in matrix form. The results of using ANCOVA procedures to test each of the eight hypotheses were presented and responses to the scaled measure of attitude were provided in bar graph format. A synopsis of these results and responses is given below.

The test of the first hypothesis revealed a significant relationship between the pretest (covariate) and the posttest (dependent variable) for all subjects. In addition, after adjusting for the effects of the covariate, significant differences were found when comparing the overall posttest performance of field-dependent and field-independent subjects with the latter group showing higher mean scores. No significant differences were found between the three experimental conditions overall and no significant differences were found when considering the effects of interaction between field-dependent and field-independent subjects and the three experimental conditions. Given these results, the first hypothesis was retained. Results of testing the second hypothesis showed no significant relationship between the pretest (covariate) and the posttest (dependent variable) for field-dependent and field-independent subjects in the "individual study" (control) group. In addition, after adjusting for the effects of the covariate, no significant differences were found between field-dependent and field-independent subjects in the "individual study" group with regard to posttest scores. Given these results, the second hypothesis was retained.

Results of testing the third, fourth and fifth hypotheses indicated no significant relationships between the pretest (covariate) and the posttest (dependent variable) for field-dependent subjects when making pairwise comparisons of the "small-group discussion" and "individual study" groups, the "instructor-led discussion" and "individual study" groups and the "instructor-led discussion" and "small-group discussion" groups. In addition, in hypotheses three and four, after adjusting for the effects of the covariate, no significant differences were found for field-dependent subjects when comparing their posttest performances in the "small-group discussion" and "individual study" groups and in the "instructor-led discussion" and "individual study" groups. Given these results, hypotheses three and four were retained. However, in hypothesis five, after adjusting for the effects of the covariate, significant differences were found for field-dependent subjects when comparing their performance in the "instructor-led discussion" and "small-group discussion" groups with the latter showing a higher mean score. Given these results, hypothesis five was rejected. However, since it was expected that a statistically significant difference in posttest scores would indicate a superior performance by the "instructor-led discussion" subjects, these results were surprising.

Results of testing the sixth and eighth hypotheses indicated no significant relationships between the pretest (covariate) and the posttest (dependent variable) for field-independent subjects when making pairwise comparisons of "small-group discussion" and "individual study" groups and "instructor-led discussion" and "small-group discussion" groups. However, the results of testing the seventh hypothesis revealed a significant relationship between the pretest (covariate) and the posttest (dependent variable) for field-independent subjects when comparing the "instructor-led discussion" and "individual study" groups. In addition, in hypotheses six, seven and eight, after adjusting for the effects of the covariate, no significant differences were found for field-independent subjects when comparing their posttest performances in the "small-group discussion" and "individual study" groups, the "instructor-led discussion" and "individual study" groups

and the "instructor-led discussion" and "small-group discussion" groups. Given these results, the sixth, seventh and eighth hypotheses were retained.

Responses to the scaled measure of attitude indicated that:

1. 96% of the field-dependent and 94% of the field-independent subjects agreed that convenience was a primary reason for enrolling in telecourses;

2. 48% of the field-dependent and 39% of the field-independent subjects agreed that discussion sessions were important because they allowed for interpersonal contact with fellow telecourse students;

3. 59% of the field-dependent and 66% of the field-independent subjects agreed that discussion sessions were important because they allowed for interpersonal contact with the telecourse instructor;

4. 55% of the field-dependent and 33% of the field-independent subjects disagreed that the phone, rather than face-to-face meetings, was an adequate way of discussing telecourse issues with the telecourse instructor;

5. 86% of the field-dependent and 64% of the field-independent subjects agreed (three weeks into the term) that they found the telecourse to be a satisfying learning experience;

6. 59% of the field-dependent subjects disagreed that their enrolling in the telecourse was due primarily to a preference to learn on their own, while 57% of the field-independent subjects agreed that their enrolling was due primarily to such a preference;

7. 51% of the field-dependent and 55% of the field-independent subjects agreed that learning from the telecourse was equally as rewarding as learning from other forms of instruction;

8. 69% of the field-dependent and 60% of the field-independent subjects agreed that, if possible, they would take more telecourses;

9. 58% of the field-dependent and 27% of the field-independent subjects agreed that, if offered, they would attend additional, optional discussion sessions;

10. 73% of the field-dependent and 64% of the field-independent subjects disagreed that they enrolled in telecourses primarily to avoid classroom discussions;

11. 48% of the field-dependent and 51% of the field-independent subjects disagreed that they would be unable to attend mandatory, campus-based telecourse discussion sessions;

12. 48% of the field-dependent and 48% of the field-independent subjects disagreed that the telecourse was not their first choice as a form of instruction because of its providing insufficient personal interaction among students and between teacher and students;

13. 41% of the field-dependent and 42% of the field-independent subjects disagreed that coming to campus for discussion sessions was an inconvenience;

14. 72% of the field-dependent and 54% of the field-independent subjects disagreed that discussion sessions were an unnecessary component of the telecourse;

15. 48% of the field-dependent and 51% of the field-independent subjects disagreed that the telecourse was more difficult than they expected it to be;

16. 93% of the field-dependent and 88% of the field-independent subjects agreed that Lansing Community College was providing an important service by offering telecourses for credit;

17. 58% of the field-dependent and 54% of the field-independent subjects agreed that the amount of phone and face-to-face contact with their telecourse instructor was adequate;

18. 90% of the field-dependent and 94% of the field-independent subjects disagreed (three weeks into the term) that they would drop the telecourse in which they were currently enrolled;

19. 83% of the field-dependent and 76% of the field-independent subjects disagreed that they would participate in discussion sessions with fellow telecourse students without the telecourse instructor present;

20. 90% of the field-dependent and 70% of the field-independent subjects agreed that they would participate in discussion sessions with fellow telecourse students with the telecourse instructor present;

21. 52% of the field-dependent and 61% of the field-independent subjects had no opinion (three weeks into the term) regarding the helpfulness of telecourse discussion sessions;

22. 94% of the field-dependent and 88% of the field-independent subjects had not dropped the telecourse (three weeks into the term);

23. 52% of the field-dependent and 60% of the field-independent subjects had a 3.0 or better Grade Point Average (GPA).

CHAPTER V: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

In this chapter, the results of hypothesis testing are reiterated. The findings are discussed and the conclusions drawn from them are presented. A recommendation is made to conduct research related specifically to the findings reported for the test of each hypothesis. Responses to statements made on the scaled measure of attitude that pertain to the value of telecourse discussion sessions are compared to attendance figures compiled for the discussions that were held during the 1987 Winter term. Several explanations are offered for the paradoxical results of the comparison. Finally, based upon the general implications of the results of the experiment, recommendations are made for additional research.

SUMMARY OF THE STUDY

The basic purpose of the experiment was to determine if opportunities for personal (face-to-face) interaction with their field-dependent peers and with their telecourse instructor would significantly improve the academic performance of field-dependent telecourse students.

The research was limited in a number of respects. First, as with all experiments in which sampling procedures are used, the general inferences drawn from the results of testing telecourse students were considered tentative. Second, the "individual study" or control condition of the experiment was not a replication of the home-based setting in

which one would typically expect to find the telecourse student working independently. Third, despite the provision of incentives, participation in the experiment was somewhat low (N=62). Fourth, the pretest and posttest questions measured student performance at the knowledge rather than the analysis, synthesis or evaluation (higher) levels of learning. Fifth, the students and the instructor involved in the "small-group discussion" and the "instructor-led discussion" conditions were given no structured guidelines to follow to promote participation in focused group conversations. Sixth, the reliability coefficients calculated for the pretest and the posttest were relatively low.

The telecourse has been criticized because of the interpersonal gap it creates between teacher and learner (Purdy, 1986b). Some have said that consistent personal contact between instructor and student is essential for learning (DeVito, 1986; Biedler, 1986). Others have maintained that student-led small-group collaboration is an equally important ingredient of academic success (Bouton and Garth, 1983; Brookfield, 1985). Witkin and Goodenough (1977) and others have noted that field-dependent individuals are inclined to have interpersonal social orientations and to prefer interaction with others when attempting to clarify the ambiguities that may be present in a learning situation. Thompson (1984) has concluded that research should be undertaken to evaluate the instructional effectiveness of providing field-dependent distance education students with opportunities for personal interaction with their instructors and "classmates."

Two independent or predictor variables were manipulated in the experiment. The first was that of cognitive style. The two extremes of the cognitive style dimension of field-dependence/field-independence were used as the levels of this factor. The second independent variable was a treatment factor. It had three levels. The first level was a "control" condition in which a sample of field-dependent and field-independent telecourse students worked individually in preparation for a posttest. The second level was a "treatment" condition in which a sample of field-dependent and field-independent telecourse students worked in small groups in preparation for a posttest. The third level was a second

"treatment" condition in which a sample of field-dependent and field-independent telecourse students worked with a telecourse instructor in preparation for a posttest.

There was one dependent or outcome variable of interest. It was the posttest performance of the telecourse students who had been randomly assigned to each of the three experimental conditions.

A mixed group of field-dependent and field-independent subjects made up the sample of sixty-two telecourse students that was drawn from the population of two-hundred and twenty who had taken the "group-embedded-figures test" (GEFT) and a "Local Government" pretest at the orientation sessions that were held at the outset of the 1987 Winter term at Lansing Community College. Nine field-dependent and eleven field-independent subjects were randomly assigned to the "individual study" condition. Ten field-dependent and ten field-independent subjects were randomly assigned to the "small-group discussion" condition. Ten field-dependent and twelve field-independent subjects were randomly assigned to the "instructor-led discussion" condition.

To measure the effects of the three conditions (treatments) upon the posttest achievement of the field-dependent and field-independent subjects, analysis of covariance (ANCOVA) procedures were used to test eight hypotheses. In brief, the results of hypothesis testing indicated that, after adjusting for the effects of the covariate, significant differences were found when comparing the overall posttest performance of field-dependent and field-independent subjects with the latter group outscoring the former. No significant differences were found between the three experimental conditions overall and no significant differences were found when considering the effects of interaction between field-dependent and field-independent subjects and the three experimental conditions. After adjusting for the effects of the covariate, significant differences were found for field-dependent subjects when comparing their performance in the "instructor-led discussion" and "small-group discussion" conditions with the latter group showing a higher mean score. Since it was expected that a statistically significant difference in posttest scores

would indicate a superior performance by the "instructor-led discussion" group, these results were surprising.

Generally, responses to the scaled measure of attitude indicated that both field-dependent and field-independent students were favorably disposed toward taking part in telecourse discussion sessions.

RESEARCH CONCLUSIONS AND RECOMMENDATIONS

The first research hypothesis was stated as:

> The difference in posttest scores in each of the three conditions will not be constant for field-dependent and field-independent individuals. That is, when comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students depending upon their participation in "individual study," "small-group discussion" or "instructor-led discussion" groups.

The results indicated that:

> There were significant differences between field-dependent and field-independent telecourse students in regard to their posttest performance. Specifically, the field-independent telecourse students as a group achieved higher posttest scores than did their field-dependent peers. However, the results also revealed that these posttest differences were not contingent upon the participation of subjects in the "individual study," "small-group discussion" or "instructor-led discussion" groups. In other words, there was no statistically significant interaction between cognitive style and experimental conditions. In addition, when considering the combined scores of the field-dependent and the field-independent students in each of the experimental conditions, there were no significant differences overall between the three groups in regard to posttest performance.

The finding that field-independent telecourse students achieved higher posttest scores than did their field-dependent counterparts is consistent with the results of the research reported by Murphy (1982), Tate (1983) and Nelson (1986). As noted in Chapters One

and Two, their conclusions (Murphy, 1982; Tate, 1983; Nelson; 1986) like those reported herein, were based upon studies of field-dependent and field-independent community college telecourse students.

Considering the work of those who have investigated and documented the tendency of field-dependent individuals to prefer opportunities for social interaction when clarifying the ambiguities that may be present in a learning situation (Witkin, 1976; Witkin and Goodenough, 1977; Witkin and Goodenough, 1981; Witkin, Moore, Goodenough and Cox, 1977) and given the fact that collaborative activities such as the "small-group discussion" and "instructor-led discussion" conditions were included in the design of the experiment, it was particularly surprising to find no significant improvement in the performance of the field-dependent subjects in the two interactive settings. However, an explanation of this outcome may be found in the systematic design of the telecourse.

In discussing the conclusions drawn from their research, Witkin, Moore, Goodenough and Cox (1977) state that "frequently in learning, the material to be learned lacks clear inherent structure, creating the requirement that the learner himself provide organization as an aid to learning. Field-dependent persons are likely to have greater difficulty in learning such material compared to field-independent persons who are more likely themselves to provide the mediating structural rules that are needed to facilitate learning. On the other hand, when the material to be learned is presented in an already organized form, so that structuring is not particularly called for, field-dependent and field-independent people are not likely to differ in their learning" (p. 21). As described in Chapter Three, prior to watching the video segment, all of the subjects in the experiment were given and told to read over the Overview, Objectives and TV Focus Questions for the "Local Government" telelesson. After viewing the tape, students used these same sources to prepare for the posttest. The ordered structure of these materials, as well as the general organization of the *American Government Survey* telecourse of which they were a part, represent the instructional orientation of those responsible for telecourse development.

By giving emphasis to the systematic packaging of all their course components, telecourse producers may have minimized or even eliminated the ambiguities that otherwise might hamper the learning of field-dependent students. In so doing, the producers may have made it possible for the socially oriented field-dependent student to overcome the problems posed by the characteristic isolation of distance education.

In light of these findings, it is concluded that:

> Attendance at campus-based discussion sessions should be made optional for telecourse students.

While participation in group work should continue to be encouraged, especially in view of what Bouton and Garth (1983), Brookfield (1985), Bruffee (1982), Johnson and Johnson (1985), Sharan (1980) and Slavin (1980) have determined, it should not be made a mandatory element of the telecourse format. If, as is being suggested, the unambiguous design of the telecourse can be relied upon to compensate for its non-collaborative nature, the learning experience of neither field-dependent nor field-independent telecourse students will be undermined by their studying on their own. Moreover, if requiring a telecourse student's involvement in campus-based discussions compromises his or her ability to pursue a college education, it is clearly inappropriate.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing both field-dependent and field-independent telecourse students to course materials that are presented in learning conditions in which students work individually. In one condition the materials should be loosely organized and in the other they should be tightly organized. The outcome of such research may indicate whether the high degree of structure that characterizes the telecourse format is the asset to learning that it appears to be, especially for field-dependent students.

The second research hypothesis was stated as:

> When comparing their posttest scores, significant differences will be found between field-dependent and field-independent telecourse students who engage in "individual study."

The results indicated that:

> There were no significant differences between the posttest scores of the field-dependent telecourse students who took part in the "individual study" condition and the field-independent telecourse students who took part in the "individual study" condition.

Here too, as with the test of the first hypothesis, the results were somewhat surprising. Considering both their impersonal social orientation and their preference to work autonomously in clarifying the ambiguities that may be present in a learning situation (Witkin, 1976; Witkin and Goodenough, 1977; Witkin and Goodenough, 1981; Witkin, Moore, Goodenough and Cox, 1977), it was anticipated that the field-independent subjects in the individual (control) setting would outperform their field-dependent counterparts. Moreover, with no chance to interact personally with their "classmates," it was believed that the field-dependent subjects assigned to this condition would be disadvantaged.

In related research cited in Chapter Two, McCleod and Adams (1979) hypothesized that the performance of field-independent college-level math students would be helped by their being assigned to a condition in which they worked individually and that the performance of similar field-independents would be hindered by their being assigned to a condition in which they worked in small groups. Additionally, McCleod and Adams (1979) expected that the field-dependents in their experiment would achieve higher posttest scores in the group setting than the field-dependents in the individual setting. With regard to attitudes toward instructional method, they believed that their field-independent students would reveal a preference for the individual approach while their field-dependent students would indicate a preference for the small-group approach.

Concerning achievement, these expectations were not met. No significant differences

were found in the posttest performances of the four groups. However, regarding attitude, both field-dependents and field-independents showed a preference for working in the small-group setting. These results suggest that, despite its being preferred over individualized study by both cognitive style groups, collaborative work neither enhances the learning of field-dependent students nor impedes the learning of field-independent students.

As far as the telecourse students in the "individual study" (control) condition are concerned, it is interesting to note that the field-independent students appear to have had no advantage in the non-collaborative setting and that the field-dependent students appear to have been unhampered working autonomously. As with the first hypothesis, these findings imply that, for field-dependent learners, telecourse structure diminishes the essentiality of interpersonal contact.

Thus, while recognizing the instructional efficacy of small-group learning, it is concluded once again that:

> Attendance at campus-based discussions should be made optional for telecourse students.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing both field-dependent and field-independent telecourse students to tightly organized science or math materials in a learning condition in which students work individually. The students chosen to participate should be neither science nor math majors. The outcome of such research may indicate whether the structure of the information presented or the content of the information presented has a more significant impact upon the achievement of field-dependent and field-independent students.

The third research hypothesis was stated as:

> When comparing the scores of field-dependent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

The results indicated that:

> There were no significant differences between the posttest scores of the field-dependent telecourse students involved in the "small-group discussion" condition and the field-dependent telecourse students involved in the "individual study" condition.

These results, like those reported for the tests of the first two hypotheses, were unanticipated. As mentioned previously, in their studies of field-dependent and field-independent people, Witkin (1976), Witkin and Goodenough (1977), Witkin and Goodenough (1981) and Witkin, Moore, Goodenough and Cox (1977), concluded that those described as being field-dependent have interpersonal social orientations. As students, these individuals are said to prefer collaboration with others when clarifying the ambiguities that may be present in a learning situation. Accordingly, it was believed that if field-dependent students were given a chance to interact personally in a small-group setting, their posttest performance would be superior to that of their field-dependent peers who were given no opportunity to collaborate.

Finding no significant differences in the posttest achievement of these two groups suggests that the field-dependents in the individual setting derived greater benefit from the organization of the telecourse than the field-dependents in the small-group setting derived from personal interaction. Nevertheless, given the conclusions reached by Bouton and Garth (1983), Brookfield (1985), Bruffee (1982), Johnson and Johnson (1985), Sharan (1980) and Slavin (1980), concerning the value of small-group discussions, it is inappropriate to conclude that opportunities for collaboration by telecourse students should be eliminated.

However, as stated above, it is concluded that:

> Campus-based discussion sessions should be made optional.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-dependent telecourse students to loosely organized course materials that are presented in a learning condition in which students work individually and in a second learning condition in which students work collaboratively with peers. The outcome of such research may indicate whether group work helps field-dependent students impose structure on ambiguous learning situations.

The fourth research hypothesis was stated as:

> When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

The results indicated that:

> There were no significant differences between the posttest scores of the field-dependent telecourse students who took part in the "instructor-led discussion" condition and the field-dependent telecourse students who took part in the "individual study" condition.

In light of DeVito's (1985) work in which he describes the key to effective education as the development of an interactive teacher-learner relationship, it was anticipated that field-dependent subjects in the instructor-led setting, given an opportunity to interact personally with a teacher as well as their "classmates," would outperform their peers in the individual setting. The presence of an authority (the monitor in the "instructor-led discussion" condition was the person who taught the *American Government Survey* telecourse at Lansing Community College during the 1987 Winter term) to clarify the uncertainties that might have arisen within the context of their experimental condition was expected to give the field-dependents in the instructor-led group a benefit that the field-dependents working in the individual setting would not have.

The absence of significant posttest differences reported in the results of testing this hypothesis implies that the systematic design of the telecourse may have precluded the

need of the instructor-led field-dependents to seek out the assistance of their teacher. Witkin and Goodenough (1977) maintain that "the evidence suggests that field-dependent people make more use of information provided by another when the situation is ambiguous and the other is seen as a source of information that will help remove the ambiguity" (p. 662). In the "instructor-led discussion" condition, due to the process of randomly assigning subjects to treatments, a majority of the subjects had not met the teacher (monitor) before the day of the experiment. This fact, coupled with the unambiguous structure of the telecourse, may explain why the field-dependents in the instructor-led setting failed to achieve higher posttest scores than the field-dependents in the individual setting. Apparently, the benefits of collaboration cannot be experienced in just one meeting. In order to see the instructor as a "source of information that will help remove... ambiguity" (Witkin and Goodenough, 1977, p. 662) and in order to realize the potential of teacher-learner interaction, it seems very likely that telecourse students would have to meet with their teachers on more than two or three occasions throughout an academic term.

Furthermore, it should be noted that although they were not significantly better, the posttest scores of the field-dependent subjects in the "individual study" condition were higher than those of the field-dependent subjects in the "instructor-led discussion" condition. This observation implies that instead of having had no effect upon the learning of field-dependent students in the instructor-led setting, the presence of the teacher may have had a detrimental impact upon their performance. Without knowing the teacher and his style of presentation, the field-dependents in this condition may have been distracted in their efforts to deal effectively with the material covered. Thus, if telecourse students are to be encouraged to participate in discussion sessions, they should be told, first; to come to them often to build a working relationship with their teacher and "classmates" and second; to come to them prepared to engage in dialogue rather than to listen passively to their instructor.

However, in this case it is concluded, once again, that:

> Campus-based discussion sessions should be made optional for telecourse students.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-dependent telecourse students to loosely organized course materials that are presented in a learning condition in which subjects work individually and in a second learning condition in which subjects work in cooperation with a teacher who is present to discuss the course materials. The outcome of such research may indicate whether the availability of a resource person to call upon in clarifying ambiguous elements of a learning situation helps field-dependent students improve their academic performance.

The fifth research hypothesis was stated as:

> When comparing the posttest scores of field-dependent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

The results indicated that:

> There were significant differences between the posttest scores of the field-dependent telecourse students assigned to the "instructor-led discussion" condition and the field-dependent telecourse students assigned to the "small-group discussion" condition.

However, as noted in Chapter Four, the finding that the field-dependents in the small-group setting outperformed the field-dependents in the instructor-led setting was unanticipated. As mentioned above in the discussion of the results of testing the fourth hypothesis, with both the support of "classmates" and the presence of the teacher to assist in giving structure to the potentially ambiguous elements of the telelesson, the field-dependent students in the instructor-led setting were expected to have an advantage over the field-dependent students in the small-group setting.

During the experiment, the ten field-dependent subjects assigned to the "small-group discussion" condition were arranged in two groups of three and one group of four. After

viewing the "Local Government" program, the students were instructed to begin their conversations. Upon being told to do so, the three groups of field-dependent subjects began and sustained an animated twenty minute exchange of information. By contrast, in the instructor-led setting, although the field-dependents and the field-independents could not be distinguished through observation, the amount of effort expended by all students in responding to the teacher's presentation appeared to be marginal. For field-dependent subjects, with no need to rely upon the teacher for clarification of ambiguities, the effect of his presence upon their posttest performance may have been minimal. In fact, given the finding that the achievement of the field-dependent students in the small-group setting was significantly better than that of the field-dependent students in the instructor-led setting, it may once again be implied that for the latter group, interaction with the teacher was detrimental to their performance.

As indicated in reporting the results of testing the fourth hypothesis, it may be that the field-dependent subjects lack of familiarity with the teacher hindered their ability to function optimally in the instructor-led setting. In addition, the possibility that the teacher's presentation of telecourse materials was neither stimulating nor conducive to dialogue should not be overlooked. Finally, without being required to engage in conversation with the teacher or "classmates," the field-dependents in the instructor-led setting may have been denied what appear to be the benefits to be gained by involvement in active discussion.

Thus, it is concluded that:

> Opportunities for student-led small-group conversations be included in each of the optional campus-based discussion sessions that are offered for telecourse students. These sessions should be structured like those described by Bouton and Garth (1983) in Chapter Two.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-dependent telecourse students to loosely organized course materials that are presented in a learning condition in which students work collaboratively

> with peers and in a second learning condition in which students work in cooperation with a teacher who is present to discuss course materials. The outcome of such research may indicate whether, for field-dependent individuals, the availability of a resource person to call upon in clarifying ambiguous elements of a learning situation has a greater or lesser impact on learning than access to small-group discussions.

The sixth research hypothesis was stated as:

> When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "small-group discussion" and those who engage in "individual study."

The results indicated that:

> There were no significant differences between the posttest scores of the field-independent telecourse students who participated in the "small-group discussion" condition and the field-independent telecourse students who participated in the "individual study" condition.

Given the results of the investigation conducted by McCleod and Adams (1979) which were presented in Chapter Two and reconsidered in this chapter in the discussion of the second hypothesis, these findings were not unexpected. In this case it appears that the performance of the field-independent subjects in the individual setting was not aided by their being asked to work autonomously and that the achievement of the field-independent subjects in the small-group setting was not undermined by their being asked to work collaboratively.

During the experiment, the ten field-independent students assigned to the "small-group discussion" condition were seated — as were the field-dependent students — in two groups of three and one group of four. However, it should be noted that unlike the field-dependents who participated actively in the small-group dynamic, the field-independents in this setting appeared more reserved and less inclined to interact. As stated earlier, Witkin (1976), Witkin and Goodenough (1977), Witkin and Goodenough (1981) and Witkin, Moore, Goodenough and Cox (1977) have documented the tendency of field-independent individuals to be impersonal in their social orientations and adept at

imposing structure on the elements of an ambiguous learning situation. A conclusion drawn from their work (Witkin, 1976; Witkin and Goodenough, 1977; Witkin and Goodenough, 1981; Witkin, Moore, Goodenough and Cox, 1977) is that field-independent people are unlikely to choose collaborative methods of learning when individual approaches are available. Yet McCleod and Adams (1979) found that, when given such a choice, both field-dependent and field-independent college-level math students expressed a preference for small-group work.

Bouton and Garth (1983), Brookfield (1985), Bruffee (1982), Johnson and Johnson (1985), Sharan (1980) and Slavin (1980) have argued and demonstrated that collaborative work can be of great value to learners. For telecourse students, perhaps the most productive way to organize campus-based discussions would be to include both field-dependent and field-independent individuals in student-led collaborative groups that would be formed and maintained for each of the sessions. In such an arrangement, the preferences and capacities of the two cognitive style groups would be combined for mutual benefit.

Nevertheless, given the results of testing this hypothesis, it is concluded that:

> Attendance at campus-based discussion sessions should be made optional for telecourse students.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-independent telecourse students to loosely organized course materials that are presented in a learning condition in which students work individually and in a second learning condition in which students work collaboratively with peers. The outcome of such research may indicate whether small-group work hinders field-independent students in their efforts to impose structure on ambiguous learning situations.

The seventh research hypothesis was stated as:

> When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "individual study."

The results indicated that:

> There were no significant differences between the posttest scores of the field-independent telecourse students who took part in the "instructor-led discussion" condition and the field-independent telecourse students who took part in the "individual study" condition.

As was the case with the results of testing the sixth hypothesis, these findings were not surprising. Here too, it seems that the achievement of the field-independent subjects in the individual setting was not enhanced by their being given the chance to work on their own. Also, it appears that the performance of the field-independent subjects in the instructor-led setting was not impeded by their being assigned to work with a teacher and "classmates."

The availability of the teacher in the instructor-led setting was intended to provide subjects with an expert resource to draw upon in resolving whatever difficulties they may have experienced in their experimental condition. However, field-independents, with their impersonal social orientations and tendency to rely on their own analytical abilities, may have felt the teacher's presence to be unnecessary. For even when a learning situation is ambiguous and a person is available who is seen as a relevant source of information to be used in clarifying the ambiguities, field-independent people seem to function with a greater degree of separateness from that person as they attempt to make sense of uncertainties (Witkin and Goodenough, 1977, p. 662).

Consequently, it is concluded, once again, that:

> Attendance at campus-based discussion sessions should be made optional for telecourse students.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-independent telecourse students to loosely organized course materials that are presented in a learning condition in which students work individually and in a second learning condition in which students work in cooperation with a teacher who is present to discuss the course materials. The outcome of such research may indicate whether the availability of a resource person to call

> upon in clarifying ambiguous elements of a learning situation diminishes the performance of field-independent students.

The eighth research hypothesis was stated as:

> When comparing the posttest scores of field-independent telecourse students, significant differences will be found between those who engage in "instructor-led discussion" and those who engage in "small-group discussion."

The results indicated that:

> There were no significant differences between the posttest scores of the field-independent telecourse students involved in the "instructor-led discussion" condition and the field-independent telecourse students involved in the "small-group discussion" condition.

These were the findings that were anticipated. It seems likely that the interactive methods that were employed in both the instuctor-led setting and the small-group setting had no harmful effects on the learning of these subjects. Apparently, when the capacity of field-independent individuals to give structure to the ambiguous elements that may be present in a learning situation is combined with the systematic design of the telecourse, the need for clarification of course materials is negated.

The implication of this last statement is that collaborative activities may neither help nor hinder the academic achievement of field-independent telecourse students.

Thus, it is concluded that:

> Attendance at campus-based discussion sessions should be made optional for telecourse students.

However, as noted by Bouton and Garth (1983), Brookfield (1985), Bruffee (1982), Johnson and Johnson (1985), Sharan (1980) and Slavin (1980), the benefits to be derived from small-group collaboration may be too important to be ignored.

In summation, it is recommended that:

> An experiment be conducted to compare the effects upon learning of exposing field-independent telecourse students to loosely organized course materials that are presented in a learning condition in which students work collaboratively

> with peers and in a second learning condition in which students work in cooperation with a teacher who is present to discuss course materials. The outcome of such research may indicate, for field-independent individuals, whether the availability of a resource person to call upon in clarifying ambiguous elements of a learning situation has a more or less negative impact on learning than access to small-group discussions.

As described in Chapter Four, the sixty-two subjects who participated in the experiment were also asked to respond to statements concerning their attitudes toward telecourses. In the scaled measure of attitude, the instrument used to gather this information, a number of its twenty-three items dealt specifically with campus-based discussions. As detailed below, the responses made to these particular statements do not correspond to the amount of student participation documented for the discussion sessions that were offered during the 1987 Winter term.

Concerning the role of collaborative work in the telecourse format, 59% of the field-dependent and 66% of the field-independent subjects agreed that discussion sessions were important because they allowed for interpersonal contact with the instructor while 48% of the field-dependent and 39% of the field-independent subjects agreed that discussions were important because they allowed for interpersonal contact with fellow students. Although only 27% of the field-independent subjects concurred, 58% of the field-dependent subjects agreed that, if offered, they would attend additional optional discussion sessions. Also, 48% of the field-dependent and 51% of the field-independent subjects disagreed that they would be unable to attend mandatory campus-based discussions. In regard to coming to campus to attend discussions, 41% of the field-dependent and 42% of the field-independent subjects disagreed that it was an inconvenience to do so, while 72% of the field-dependent and 54% of the field-independent subjects disagreed that discussion sessions were an unnecessary component of the telecourse. Finally, 90% of the field-dependent and 70% of the field-independent subjects agreed that they would participate in discussion sessions with fellow telecourse students with the telecourse instructor present.

In two of the six telecourses from which students were selected to participate in the experiment, no attendance was taken at the discussion sessions that were offered throughout the term. In the four other cases, attendance was taken. In CD 101/121 (Child Development) two of the fourteen field-dependent students and none of the four field-independent students attended two or more of the thirty-three discussion sessions that were offered throughout the term. In MKT 200 (Introduction to Marketing) two of the four field-dependent students and four of the six field-independent students attended two or more of the four discussion sessions that were offered throughout the term. In PSY 200 (Introduction to Psychology) three of the twenty-three field-dependent students and none of the thirty-six field-independent students attended two or more of the ten discussion sessions that were offered throughout the term. In SA 200 (Principles of Sociology) three of the fifteen field-dependent students and five of the twenty-four field-independent students attended two or more of the four discussion sessions that were offered throughout the term. It should be noted that these attendance figures do not represent the total enrollment in each of these classes. They are based upon information gathered only from those students who completed the "group-embedded-figures test" (GEFT) at the telecourse orientation sessions. Nevertheless, given the responses to the scaled measure of attitude presented above, these findings were surprising.

Several possible explanations can be offered for these paradoxical results. First, the times during which the sessions were conducted may have been inconvenient for telecourse students. Scheduling may always pose problems for these kinds of learners. Second, in replying to the statements on the attitudinal scale, students may have given "socially acceptable" responses. Since they were all telecourse students involved in a telecourse research project and since they were working in an environment where telecourse faculty and administrators were present, the subjects may have felt compelled to comment favorably on aspects of the telecourse which they perceived to be important to college personnel. Third, having attended perhaps at least one discussion session,

telecourse students may have felt that they were neither helped by the information presented nor by the organization of the meeting as an unrelated sequence of specific teacher answers to specific student questions. Fourth, after having become familiar with the systematic design of the telecourse, many students may have come to the conclusion that discussion sessions would not provide them with any information that was not already available to them.

In summation, it is recommended that research be undertaken to determine which kinds of learning activities are typically employed in telecourse discussion sessions and to evaluate the instructional effectiveness of making student-led small-group collaboration a part of the telecourse discussion session. The outcome of such research may indicate why, as the conclusions reached above imply, instructor-led campus-based discussions are so ineffectual and poorly attended.

RECOMMENDATIONS FOR ADDITIONAL RESEARCH

The recommendations for research made in the previous section were based specifically upon the results of hypothesis testing and responses to the scaled measure of attitude and attendance at telecourse discussion sessions. The recommendations for research made in this section are based upon several more general ideas that emerged during the analysis of the results of the experiment. They are described as follows:

1. Research should be conducted to evaluate the extent to which a student's self-direction affects his or her achievement in the telecourse. Guglielmino (1977) has developed an instrument called the Self-directed Learning Readiness Scale (SDLRS) which is said to measure the degree to which an individual is self-directed. If the results of an investigation indicated that individuals with high levels of self-direction — as determined by their scores on the SDLRS — performed better in the telecourse format than those with low levels of self-direction, appropriate methods could be developed to give members of

this latter group strategies to use in enhancing their telecourse performance.

2. Research should be conducted to evaluate the effectiveness of using a one-way video, two-way audio communication system to provide telecourse students with opportunities for contact with their teacher and "classmates." By using a cable television channel to transmit a live studio-based discussion session to telecourse students who subscribe to the cable service, an academic institution might be able to bridge the gap that can cause learning problems for some distant students. Such a telecast could be structured to include a small audience of students in the studio to engage the instructor in dialogue and a telephone arrangement to allow for student viewers to call in questions and comments. These calls could be heard and responded to by other students watching at home and those present in the studio.

3. Research should be conducted to evaluate the efficacy of presenting field-dependent and field-independent distance education students with instructional methods that deliberately challenge what appear to be their preferred ways of learning. In discussing the potential benefits of mismatching student cognitive style and teaching strategy, Messick (1984) says that "it (mismatching) may be needed when the aim is to promote flexible and creative thinking — obstacles, opposition, conflict and challenge may be necessary to stimulate individual development and creativity" (p. 69).

4. Research should be conducted to evaluate the impact upon learning of training both telecourse instructors and telecourse students to use established techniques for facilitating group discussions. It may be that the instructional potential of collaborative learning is realized most fully through a structured rather than an unstructured approach to focused conversation.

5. Research should be conducted to evaluate the effectiveness of using "small-group" and "instructor-led" discussions to enhance the performance of telecourse students who are asked to process information at what Bloom (1956) would call the analysis, synthesis and evaluation (higher) levels of learning. It may be that collaborative activities are most

effective when they are used to promote learning at a level higher than that of knowledge or simple recall.

6. Research -- of an ethnographic type -- should be conducted to evaluate the instructional methods employed by telecourse teachers and the learning strategies employed by both field-dependent and field-independent telecourse students. It is possible that by closely observing the behaviors of a small number of telecourse teachers and students for an extended period of time, both productive and unproductive patterns of delivering and processing telecourse content can be identified.

CHAPTER SUMMARY

In this chapter, the conclusions drawn from the results of hypothesis testing were discussed. Generally, the findings indicated that the highly organized structure of the telecourse may have diminished or even negated the effects of collaboration upon the learning of field-dependent students. However, the finding that field-dependent students assigned to the "small-group discussion" condition achieved significantly higher posttest scores than field-dependent students assigned to the "instructor-led discussion" condition suggested that telecourse discussion sessions should include opportunities for small groups of students to engage in dialogue. A second implication related to this finding was that the role played by the teacher in the "instructor-led discussion" condition may have been more of a liability than an asset for field-dependent learners. Given the fact that the teacher used in the experiment was basically unknown to the students with whom he worked and the possibility that his unfamiliar style of presentation may have hampered their understanding of lesson content, this conclusion may have considerable merit. An additional finding was that field-independent telecourse students appeared to be neither helped nor hindered by collaboration with their field-independent peers or with their

teacher. Based upon the overall results of hypothesis testing, it was strongly recommended that attendance at campus-based discussions be made optional rather than mandatory.

Following the reporting of the conclusions drawn from the results of testing each hypothesis, a specific recommendation was made for future research. Next, the responses to the statements made on the scaled measure of attitude relating to telecourse discussion sessions were considered in light of the attendance figures compiled for the discussions held on-campus during the 1987 Winter term. The apparently contradictory findings were discussed and a number of explanations for them suggested. Lastly, based upon the more general ideas that emerged from the analysis of the results of the experiment, a number of additional recommendations for research were offered.

Although the results generated by this experiment fell short of clearly establishing the instructional effectiveness of using small-group and instructor-led discussions to enhance the academic achievement of field-dependent telecourse students, they did suggest some new lines of inquiry to pursue. It is hoped that these findings will help those interested in telecourses and distance education programs to refine their thinking and to continue their efforts to remove whatever barriers may stand between distant learners and their academic aspirations.

APPENDICES

APPENDIX A

Letter from Consulting Psychologists Press, Inc.
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Page One of GEFT
Page Two of GEFT
Page Three of GEFT

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GROUP EMBEDDED FIGURES TEST

By Philip K. Oltman, Evelyn Raskin, & Herman A. Witkin

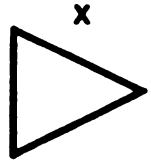
Name _____ Sex _____

Today's date _____ Birth date _____

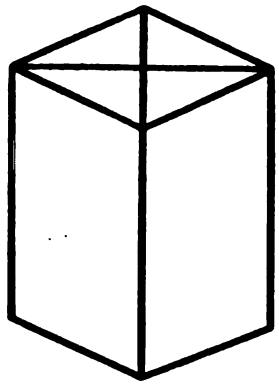
INSTRUCTIONS: This is a test of your ability to find a simple form when it is hidden within a complex pattern.

Here is a simple form which we have labeled "X":

X



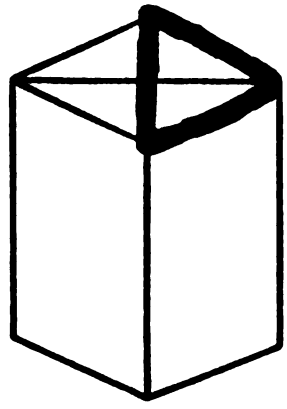
This simple form, named "X", is hidden within the more complex figure below:



Try to find the simple form in the complex figure and trace it *in pencil* directly over the lines of the complex figure. It is the SAME SIZE, in the SAME PROPORTIONS, and FACES IN THE SAME DIRECTION within the complex figure as when it appeared alone.

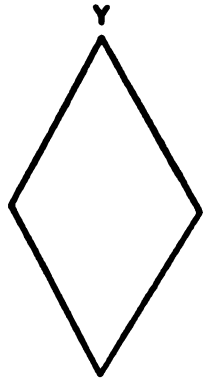
When you finish, turn the page to check your solution.

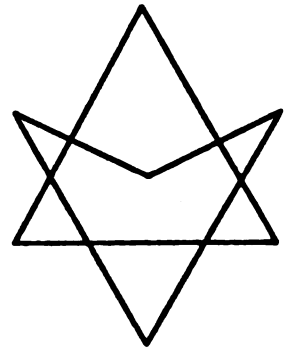
This is the correct solution, with the simple form traced over the lines of the complex figure:



Note that the top right-hand triangle is the correct one; the top left-hand triangle is similar, but faces in the opposite direction and is therefore *not* correct.

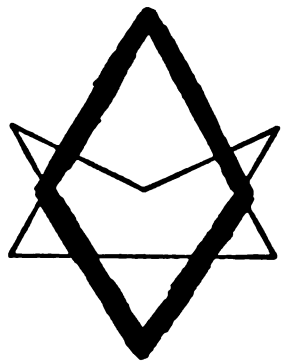
Now try another practice problem. Find and trace the simple form named "Y" in the complex figure below it:





Look at the next page to check your solution.

Solution:



In the following pages, problems like the ones above will appear. On each page you will see a complex figure, and under it will be a letter corresponding to the simple form which is hidden in it. For each problem, look at the BACK COVER of this booklet to see which simple form to find. Then try to trace it in pencil over the lines of the complex figure. Note these points:

1. Look back at the simple forms as often as necessary.

2. ERASE ALL MISTAKES.

3. Do the problems in order. Don't skip a problem unless you are absolutely "stuck" on it.

4. Trace ONLY ONE SIMPLE FORM IN EACH PROBLEM. You may see more than one, but just trace *one* of them.

5. The simple form is always present in the complex figure in the SAME SIZE, the SAME PROPORTIONS, and FACING IN THE SAME DIRECTION as it appears on the back cover of this booklet.

Do not turn the page until the signal is given

APPENDIX B

"Local Government" Pretest

LANSING COMMUNITY COLLEGE
MEDIA DEPARTMENT
TELECOURSE RESEARCH PROJECT

NAME :

STUDENT NUMBER :

COURSE :

DATE :

Please circle the one correct choice in answering the following questions.

1.) In the United States Constitution local governments are assigned

a. no powers.
b. powers equal to the states.
c. less power than states.
d. more power than states.

2.) Local governments have their powers increased by

a. state legislatures.
b. state governors.
c. Congress.
d. The President.

3.) The nature of state/local relations is

a. unitary.
b. federal.
c. confederate.
d. despotic.

4.) The town is the principal rural government in

a. New England.
b. the Midwest.
c. California.
d. the Mid-Atlantic.

5.) American Cities

a. can do anything not expressly forbidden by the state.
b. are completely controlled by state legislative directive.
c. have only those powers conferred on them by their charters.
d. all of these.

6.) Traditional county functions include

a. law enforcement.
b. highway maintenance.
c. welfare.
d. all of these.

7.) The county attorney is

a. appointed by the governor
b. appointed by the legislature.
c. appointed by the state attorney general.
d. none of the above.

8.) Special districts are associated with

a. town meetings.
b. law enforcement.
c. sewage disposal and pollution control.
d. all of these.

9.) Special districts are often created to

a. do a specific job which is not being done.
b. evade established constitutional tax limits.
c. evade established constitutional debt limits.
d. all of these.
e. none of these.

10.) The Chicago Independent School District, the Chicago Metropolitan Sanitary District and the Chicago Park District are all

a. run by the City of Chicago.
b. run by Cook County.
c. special districts.
d. operated by the State of Illinois.

11.) In the past 25 years most special districts have consolidated.

a. true.
b. false.

12.) The City of Chicago has which system of government?

a. mayor-council.
b. commission.
c. council-manager.
d. none of these.

13.) The city council serves as the legislative body in the City of Chicago.

a. true.
b. false.

14.) A county is an administrative unit of

a. cities.
b. states.
c. the United States government.
d. the region.

15.) Special district governments have mushroomed in the last 25 years and have acted to fragment all metro areas.

a. true.
b. false.

APPENDIX C

"Local Government" Posttest

TELECOURSE RESEARCH PROJECT

"LOCAL GOVERNMENT" POSTTEST

NAME

STUDENT NUMBER

PLEASE USE YOUR COMPUTER SCORE SHEET TO FILL IN THE ONE CORRECT CHOICE THAT BEST ANSWERS EACH OF THE FOLLOWING QUESTIONS.

1.) The "grass roots" is

a.) state government.
b.) city government.
c.) special district government.
d.) various units of local government.
e.) none of these.

2.) What political entities are created by the state to do a particular job that existing governmental units will not or cannot do?

a.) counties
b.) cities
c.) special districts
d.) all of these

3.) There are more than 70,000 units of local government in the United States.

a.) true
b.) false

4.) Local governmental units are spread evenly across the United States.

a.) true
b.) false

5.) In Illinois, Cook County--excluding the city of Chicago--comprises 50% of the state's population.

a.) true
b.) false

6.) Chicago city government has long been dominated by

a.) non-partisan groups of central business district merchants.
b.) the Democratic Party.
c.) coalitions of various neighborhood groups.
d.) all of these.

7.) Assigning special committee work to certain members of the County Board, rather than having all Board members sit on all committees, increases the efficiency and effectiveness of County Board actions.

a.) true
b.) false

8.) City governments derive their power from

a.) the U. S. Constitution.
b.) state governments.
c.) city charters.
d.) mayor-council decrees.

9.) When federal funds are allocated to a village or district, providing administrative support for disbursing those funds is the responsibility of

a.) the county board.
b.) the city council.
c.) the legislature.
d.) all of these.

10.) According to a commentator in the telelesson, former Chicago mayor Richard Daly is said to have observed that

a.) "machine politics" solve problems.
b.) the Democratic Party is responsive to the citizen.
c.) special districts create more problems than they solve.
d.) good government is good politics.

11.) Despite treating water from Lake Michigan that is used by millions of Illinois residents, the Metropolitan Sanitary District of Chicago is controlled by the city government of Chicago.

a.) true
b.) false

12.) Special Districts, with their own taxing, borrowing and spending powers

a.) support the activities of county monetary officers.
b.) can demand city payment for services rendered.
c.) keep cities financially stable.
d.) require that county governments itemize their expenditures.

13.) Because of geography and shared political interests, the Chicago city government and the Cook County government often operate as a combined governmental unit.

a.) true
b.) false

14.) When an alderman is confronted by a constituent with a problem that falls outside of the jurisdiction of Chicago city government, he or she encourages that constituent to

a.) contact a state legislator.
b.) write to an influential Illinois Congressional representative.
c.) request a meeting with the city's external affairs committee.
d.) none of these.

15.) Besides county and city governments in Chicago, there are two additional layers of government which have authority in the city. These are called commission councils and special districts..

a.) true
b.) false

16.) In the Chicago City Council, the reason for majority council support for committee decisions is

a.) a powerful mayor.
b.) aldermen who have held office for many years.
c.) the Democratic Party machine.
d.) none of these.

17.) The points of actual contact between citizens and their government are called

a.) the workings of "machine politics".
b.) "grass roots".
c.) constituent inputs.
d.) none of these.

18.) According to commentators in the telelesson, the Chicago city government is somtimes described as

a.) "not responding to people's needs".
b.) "an old machine that has worn out its usefulness".
c.) "too complex to work effectively".
d.) "the last bastion of old city machine politics".

19.) The real power in local government is held only by the top elected officials.

a.) true
b.) false

20.) City services include which of the following?

a.) police and fire protection
b.) maintenance of the county roads
c.) maintenance of district trial courts
d.) collection of the state property tax

21.) The major policy-making body of Cook County as well as other counties in Illinois is known as the

a.) county executive council.
b.) county assembly.
c.) county commissioners court.
d.) county cabinet.

22.) In Chicago city government the mayor-council system operates on a

a.) consensus approach.
b.) legal precedent.
c.) testimony basis.
d.) committee basis.

23.) The more than one hundred governmental entities in Cook County have complete governmental autonomy in that the county commission only acts when one of those entities requests that the commission do so.

a.) true
b.) false

24.) Special District governments are often created to

a.) do a specific job that existing governmental units cannot do.
b.) assist the mayor-council system in resolving special problems.
c.) evade established constitutional tax and debt limits.
d.) a and c.
e.) none of these.

25.) Within the city limits of Chicago proper, there are some twenty general and special purpose governments operating.

a.) true
b.) false

26.) Most citizens of the United States live under which of the following layers of government?

a.) state
b.) county
c.) city
d.) all of these

27.) Several states are mentioned in this telelesson as having large numbers of local governmental units. The state with the largest number of local governments is

a.) New York.
b.) California.
c.) Illinois.
d.) Texas.
e.) none of these.

28.) County governments are extensions of

a.) special districts.
b.) constitutional charters.
c.) state governments.
d.) legislative orders.

29.) Because it must relate to so many other governmental agencies, the Chicago Board of Education does not operate as a form of special district government.

a.) true
b.) false

30.) In Chicago, the responsibility of maintaining productive citizen contact at the precinct and ward levels falls primarily upon the

a.) alderman.
b.) mayor.
c.) city supervisor.
d.) all of these.

APPENDIX D

Scaled Measure of Attitude

TELECOURSE RESEARCH PROJECT

ATTITUDINAL INFORMATION

NAME

STUDENT NUMBER

PLEASE CIRCLE OR CHECK THE ONE CHOICE THAT BEST DESCRIBES YOUR RESPONSE TO EACH STATEMENT.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1.	2.	3.	4.	5.

1.) I enrolled in the telecourse primarily because I believed it to be a convenient way for me to learn.

1. 2. 3. 4. 5.

2.) Telecourse discussion sessions are important because they allow me to interact personally with my fellow telecourse students.

1. 2. 3. 4. 5.

3.) Telecourse discussion sessions are important because they allow me to interact personally with my telecourse instructor.

1. 2. 3. 4. 5.

4.) Using the phone rather than having face-to-face meetings with my telecourse instructor is an adequate way of discussing issues related to the telecourse.

1. 2. 3. 4. 5.

5.) To this point in the term I have found the telecourse to be a satisfying learning experience.

1. 2. 3. 4. 5.

6.) I enrolled in the telecourse primarily because I prefer to learn on my own.

1. 2. 3. 4. 5.

7.) I find learning from the telecourse to be equally as rewarding as learning from other more traditional methods of instruction.

1. 2. 3. 4. 5.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1.	2.	3.	4.	5.

8.) If it were possible, I would take more of my classes in the telecourse format.

1. 2. 3. 4. 5.

9.) If telecourse instructors offered additional optional discussion sessions I would attend them.

1. 2. 3. 4. 5.

10.) I enrolled in the telecourse primarily because I prefer not to participate in classroom discussions.

1. 2. 3. 4. 5.

11.) If telecourse discussion sessions that are held on the LCC campus were made mandatory for all telecourses, I would no longer be willing or able to enroll in telecourses.

1. 2. 3. 4. 5.

12.) Because I prefer classes that require personal interaction with students and teachers, the telecourse is not my first choice as a means of instruction.

1. 2. 3. 4. 5.

13.) Coming to the LCC campus for telecourse discussion sessions is an inconvenience.

1. 2. 3. 4. 5.

14.) Coming to the LCC campus for telecourse discussion sessions is an unnecessary component of the telecourse.

1. 2. 3. 4. 5.

15.) I am finding the telecourse to be more difficult than I expected it would be,

1. 2. 3. 4. 5.

16.) Lansing Community College is providing an important service by offering telecourses for credit.

1. 2. 3. 4. 5.

17.) The amount of contact (phone and/or face-to-face) that I have with my telecourse instructor is adequate.

1. 2. 3. 4. 5.

18.) It is likely that before the term is over I will drop the telecourse in which I am currently enrolled.

1. 2. 3. 4. 5.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1.	2.	3.	4.	5.

19.) I would participate in telecourse discussion sessions where fellow telecourse students, but not the telecourse instructor, were present.

1. 2. 3. 4. 5.

20.) I will participate in telecourse discussion sessions where fellow telecourse students and the telecourse instructor are present.

1. 2. 3. 4. 5.

21.) To this point in the term I believe that my attendance at telecourse discussion sessions has given me help in understanding the content of the telecourse.

1. 2. 3. 4. 5.

22.) I have already dropped the telecourse for which I had enrolled this term.

1. 2. 3. 4. 5.

23.) My Grade Point Average (GPA) at Lansing Community College falls into the following category:

0.0 -- 1.0 ( )
1.0 -- 1.5 ( )
1.5 -- 2.0 ( )
2.0 -- 2.5 ( )
2.5 -- 3.0 ( )
3.0 -- 3.5 ( )
3.5 -- 4.0 ( )

APPENDIX E

Letter from Michigan State University's University Committee on Research Involving Human Subjects (UCRIHS) Granting Approval to Conduct Research

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

December 30, 1986

Mr. James C. Greene
509 W. Jefferson Street
Grand Ledge, Michigan 48837

Dear Mr. Greene:

Subject: Proposal Entitled, "The Effect of Small-Group and Instructor-Led Discussions on the Academic Achievement of Field-Dependent Community College Telecourse Students"

I am pleased to advise that I concur with your evaluation that this project is exempt from full UCRIHS review, and approval is herewith granted for conduct of the project.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to December 30, 1987.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

Henry E. Bredeck, Ph.D.
Chairman, UCRIHS

HEB/jms

cc: Dr. Castelle Gentry

APPENDIX F

Informational Statement Presented to Students at Telecourse Orientation Sessions Describing Conditions of Participation in the Experiment

LANSING COMMUNITY COLLEGE
1987 WINTER TERM TELECOURSES

STUDENT PARTICIPATION IN TELECOURSE RESEARCH PROJECT

Before beginning the activities I have just described, I want to take a few moments to read over with you some information of which you should be aware:

1.) Your decision to take these two brief tests today is voluntary. You are free to discontinue your participation in the testing process at any time. However, only those telecourse students who have completed today's two tests will be eligible for selection into the sample of telecourse students who will receive $15.00 as participants in the research project which will be carried out on Saturday, January 31, 1987;

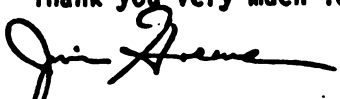
2.) Your decision to participate or not to participate in today's testing will have no influence upon your instructor's grading of your performance in the telecourse for which you have enrolled;

3.) All individual results of testing will be kept in strict confidence. In determining which people will be chosen for inclusion in the sample of telecourse students as well as in my overall reporting of the findings of the research project, each of you will remain anonymous. Neither your telecourse instructors nor other Lansing Community College faculty members or administrators who are not part of the "telecourse research team" will have access to your individual test results. However, group scores on tests will be used in explaining the results of the research;

4.) In addition to being an Associate Professor in the Media Department at Lansing Community College, I am a doctoral student in the College of Education at Michigan State University. My analysis of the results of the telecourse research project will serve as a key element in the completion of my doctoral dissertation;

5.) Having read and understood the information presented above, your participation in today's testing implies your consent to be considered for selection into the telecourse student sample and to have your individual test results included in the reporting of group test results.

Thank you very much for your time, patience and participation.



Jim Greene
Associate Professor
Media Department
Lansing Community College

APPENDIX G

Letter Asking for Participation in First Experiment

Lansing Community College
P.O. Box 40010
Lansing, MI 48901-7210

January 20, 1987

Dear Telecourse Student:

Please accept this letter as your invitation to take part in the Media Department research project that was described briefly at your telecourse orientation session.

On Saturday, January 31, 1987 from 9:30 AM to 12:00 noon you and approximately eighty other telecourse students who have agreed to participate will meet in the amphitheatre (room 170) of the Arts and Sciences building here on the Lansing Community College campus. As was mentioned at your orientation, your involvement will require that you view a thirty minute telecourse lesson and answer a number of multiple-choice questions based upon the content of that lesson. In return for your assistance you will be offered free coffee and rolls, a gift of $15.00 and a complete explanation of the issues that are being addressed in the project. The explanation will include a discussion of the results of the Group Embedded Figures Test -- one of the two exams you were kind enough to take at your orientation meeting. In addition, for those of you who need it, free child care will be available on the LCC campus on the day of the project.

Please take a moment to provide the information that is asked for on the accompanying sheet. Kindly return the completed form in the envelope that has been enclosed. Getting this information back to me as quickly as possible will ensure your inclusion in the project. Remember, to receive your $15.00 gift you must notify me of your intention to participate and you must complete the activities that are scheduled for January 31, 1987.

In closing, let me remind you that it is only through the cooperation of intelligent, considerate people like you that the Media Department is able to conduct research that will help make the telecourse a more effective learning experience for those who choose it as a means of furthering their education at Lansing Community College.

I will look forward to hearing from you in the very near future. Thank you for your time and support.

Sincerely,

Jim Greene
Associate Professor
Media Department

TELECOURSE RESEARCH PROJECT

PARTICIPANT INFORMATION

Name_____ Soc. Security No._____

Street_____

City_____ Zip Code_____

Phone_____

I will participate in The Telecourse Research Project on Saturday, January 31, 1987 from 9:30 AM to 12:00 noon.

Yes ( ) No ( )

I will need child care in order to participate in The Telecourse Research Project.

Yes ( ) No ( )

Age of Child (Children) _____

APPENDIX H

Overview and Instructional Objectives
for "Local Government" Video Lesson

TV Focus Questions
for "Local Government" Video Lesson

TELECOURSE RESEARCH PROJECT

OVERVIEW AND INSTRUCTIONAL OBJECTIVES
TELEVISION COMPONENT OF "LOCAL GOVERNMENT" TELECOURSE LESSON

OVERVIEW

A Multitude of Local Governments

There are over 78,000 units of local government operating in the United States today. There are cities, counties, townships, school districts and other special purpose districts of all kinds. Most of us live under five or six of these governmental units and some of us live under more. We enjoy the services of these governments, abide by their laws and ordinances, and pay taxes to support them.

Services They Provide

In this lesson we take a close look at some of these local governments. We learn what they are, what they do for us, and who is in charge in each of them. We see that they provide such services as police and fire protection, garbage collection, sewage disposal, clean water, streets and highways, courts, traffic control, and many other services which affect us every day.

Importance of Local Governments

It is important for you to know about local governments, because they affect your life daily. Your awareness of the various units of local government can help you when you need to locate a governmental unit to get a street light on a dark block, a stop sign at a dangerous intersection, or a temporary postponement from jury service. You will have a better understanding of which layer of government provides which services.

We look into these governments and consider their relationships to our state and federal governments. In the telelesson we follow a citizen of Chicago as he discovers the city, county, and special districts which govern him in an area which has a tremendous number of local governments. By following our Chicagoan we are able to recognize similar local governments in our own areas.

INSTRUCTIONAL (KNOWLEDGE) OBJECTIVES

Upon successful completion of this lesson you should be able to:

1.) State some of the major functions of city government. Describe the relationship of cities to state governments and some of the major problems of cities today.

2.) Describe the major functions of county government. Explain its legal status, its relationship to its state government, and its principal organs and agencies.

3.) Define special districts. Describe factors which have facilitated the mushrooming of governments such as these all over the United States.

4.) Analyze the importance of behind-the-scenes power in almost all local governments.

This material is derived from the STUDENT'S GUIDE TO AMERICAN GOVERNMENT SURVEY. Eileen Lynch, editor. Kendall/Hunt Publishing Company, Dubuque, Iowa, 1978.

TELECOURSE RESEARCH PROJECT

T.V. FOCUS QUESTIONS FOR "LOCAL GOVERNMENT" TELELESSON

1.) How many layers of government does the Chicago citizen live under? List some of the governments which govern him.

2.) Are local governments evenly spread throughout the nation? Where are the largest number of units found?

3.) Which units of government carry out state responsibilities and functions?

4.) What is the major county policy-making board? What services does the county provide?

5.) Explain the mayor-council system of government.

6.) Explain how the Chicago political machine works.

7.) Describe a special district. Why are these districts formed?

8.) Why are there so many special districts in the Chicago metropolitan area?

This material is derived from the STUDENT'S GUIDE TO AMERICAN GOVERNMENT SURVEY. Eileen Lynch, editor. Kendall/Hunt Publishing Company, Dubuque, Iowa, 1978.

APPENDIX I

Instructions for Monitors

TELECOURSE RESEARCH PROJECT

INSTRUCTIONS FOR MONITORS

Bring groups to rooms.

Lee	room 118
Gary	room 120
Ronda	room 128

Distribute "Overview and Objectives" hand-out. Tell students to read it.

When students have finished reading the "O and O" hand-out, distribute the "TV Focus Questions" hand-out. Tell students to read it carefully because the information it covers represents the basic thrusts of the video program.

Before starting the tape, strongly encourage students to take notes while they watch the program. Remind them to be listening for the points that are made in the "TV Focus Questions" as they follow the tape.

Following the playing of the tape, allow for a twenty minute minimum to a thirty minute maximum for consideration of the "TV Focus Questions."

For Lee:

After a minimum of twenty minutes of student interaction and note taking, begin the posttest for the entire group at the same time.

For Gary:

After a minimum of twenty minutes of instructor-led discussion and note taking, begin the posttest for the entire group at the same time.

For Ronda:

After a minimum of twenty minutes of "roughing out" written responses to the "TV Focus Questions," allow individuals to begin the posttest who have indicated they are prepared to do so.

During the posttest, no one may use notes or hand-outs. In addition, there should be no collaboration among students during the exam.

When students finish the posttest, they should bring it to you. At that time you should give them the "Attitudinal Scale" to fill out.

When the "Attitudinal Scale" has been completed, students may return to room 170 if they wish to do so.

Be sure that student names and identification numbers are on:
1.) the computer score sheet;
2.) the posttest;
3.) the "Attitudinal Scale."

When the last student has completed the "Attitudinal Scale," please return to room 170 with all of the materials you have collected from the students.

Thank you.

APPENDIX J

Letter Asking for Participation in Second Experiment

Lansing Community College
P.O. Box 40010
Lansing, Michigan 48901-7211

February 20, 1987

Dear Telecourse Student:

Thank you very much for your willingness to participate in the Telecourse Research Project which will be held at Lansing Community College on February 28, 1987. I appreciate how valuable your time is to you, so I am grateful for your decision to help me and the College by involving yourself in our efforts to improve our instructional services.

The activities will begin at 9:30 AM on Saturday the 28th in room 111 of the AOF building (Academic and Office Facility). By glancing at the enclosed map you will see that the AOF building is located immediately next to the Central Fire Station which is situated on the corner of Grand Avenue and Shiawassee Street. Parking is available in back of the fire station as well as on Grand Avenue and Shiawassee Street. The two entrances to the AOF building are on the north side of the structure. Individuals will be at both the rear and front doors to direct you to room 111. Coffee, juice and rolls will be served and a gift of $15.00 will be given to you upon completion of the project. We will finish our work at approximately 12:00 noon.

If you have any questions regarding the project, please feel free to contact me at 483-1671 (office) or 627-3743 (home). Once again, I thank you for your commitment to take part in this important undertaking. I will look forward to seeing you on Saturday.

Sincerely,

James C. Greene

James C. Greene
Associate Professor
Media Department

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REFERENCES

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