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Michael L. Koffman
University of Massachusetts Amherst

A STUDY OF THE EFFECTS OF INSTRUCTIONAL ANALYSIS AND FEEDBACK ON THE CLASSROOM BEHAVIOR AND STUDENT ACHIEVEMENT OF UNIVERSITY TEACHING ASSISTANTS

A Dissertation Presented

by

MICHAEL L. KOFFMAN

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Approved as to style and content by:

Dr. Robert Miltz, Chairman

Dr. William Lauroesch, Member

Dr. John Louis, Member

Dr. Patrick Sullivan, Member

Dwight W. Allen

February, 1974

I would like to dedicate this completed work to my parents,
Elizabeth and David Koffman, as a small measure
of the love and esteem and gratitude that I hold for them.

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A Study of the Effects of Instructional Analysis and Feedback on the Classroom Behavior and Student Achievement of University Teaching Assistants (1974)

Michael L. Koffman, B.A. University of Massachusetts

Directed by: Dr. Robert Miltz

The purpose of this study was to evaluate an in-service teacher education model designed for higher education.

Basically, this model presumes that effective instruction is related to the level of performance by teachers of certain recurrent behaviors such as asking questions, pacing, elaborating, emphasizing, bringing closure, facilitating student participation, creating challenge, evaluating, etc. These behaviors are referred to as "technical skills of teaching."

They are incorporated into a questionnaire and are rated by the instructor, his students and an instructional specialist. Through analysis of these results as well as a videotape of the instructor's classroom teaching, certain skills are identified as "problematic" and in need of change. The desired changes are sought by various means including successive videotaping and analysis, successive student evaluations, micro-teaching, instructor discussions with students or other instructors, viewing instructional models, referring to specific readings, etc.

To test this model a group of 13 in-service graduate teaching assistants were divided into an experimental group, a quasi-experimental group and a control group. All subjects instructed their own section of a required freshman Rhetoric course designed to improve student writing and expression.

As a pretest the subjects completed self-evaluations, student evaluations, a 30-minute videotape of their classroom instruction and an essay-type student achievement test.

Members of the experimental and quasi-experimental groups individually reviewed their data with instructional specialists. The experimental group continued to meet with instructional specialists who provided additional experiences designed to facilitate changes in instruction.

After approximately eight weeks all subjects completed a posttest consisting of another 30-minute videotape of their classroom instruction, student evaluations (using the same form) and student achievement tests (using a parallel form).

Changes in classroom instructional behavior were analyzed by means of an adaptation of Flanders interaction analysis. The results showed observable change in all three groups. The experimental and quasi-experimental group instructors increased their "using student ideas," "focusing, summarizing, introducing or orienting statements" and "lecturing." The percentage of class time occupied by teacher talking increased and the per-

cent occupied by the students talking decreased. The control group instructors showed a marked increase in silence in their posttest lessons. Their "using student ideas" increased only slightly and their use of "focusing, summarizing, introducing or orienting statements" and "lecturing" decreased.

In the student evaluations, the experimental group showed positive patterns of change in the categories of "clarity," "evaluation and feedback" and "relating to student responses." The quasi-experimental group regressed in one category, "relating to student responses," and the control group improved in one category, "relating to student responses."

The achievement rating indicated that the mean score of the students in the experimental group improved by 3.33 points. The mean score of the quasi-experimental group remained unchanged, and the mean score of the control group students dropped 2 points.

The results tended to support the usefulness of this instructional improvement model. The classroom instructional behavior, student evaluations and student achievement of the instructors in the experimental group appeared to change in desirable ways. The classroom behavior of the instructors in the quasi-experimental and control groups changed less, and their student evaluations and student achievement for the most part did not change in desirable ways.

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INTRODUCTION

Statement of the Problem and Hypotheses

The present study is a contribution to the field of in-service teacher education at the higher education level. The purpose of the study was to measure the effects of particular instructional analysis and feedback procedures on the classroom behavior, student evaluations and student achievement of university teaching assistants.

This purpose may be stated in terms of the following hypotheses:

(1) There will be significant differences between the pretest and posttest classroom behavior of instructors who have undergone the instructional analysis and feedback procedures when measured by changes in Flanders interaction analysis categories.

(2) Differences in instructional behavior for this group will be accompanied by corresponding positive changes in student evaluations of the instructors when measured on student evaluation questionnaires.

(3) Differences in instructional behavior for this group will be accompanied by positive changes in student achievement as measured on student achievement tests.

In-Service Teacher Education

The field of in-service teacher education can be understood in terms of various components of instruction which in-service teacher educators attempt to affect as well as the various means by which they do so. These components would include the follow-

ing: instructional goals, teaching styles, specific methods, classroom instructional behavior, classroom environment, teacher personal characteristics. The "means" include group setting, data collection and analysis tools and teacher educator role. These components are represented in Figure 1 in greater detail.

This study dealt narrowly with the component of specific instructional behaviors, particularly in regard to their direct observation, analysis and evaluation. The setting was primarily an individual, one-to-one type, although group settings were explored. Data collection and analysis tools included student evaluations, direct classroom observation, videotape analysis, systematic behavior coding and instructor self-evaluation. The role of the teacher educator was that of analyst.

At the same time this study sought to contribute to the research on "teacher effectiveness," that is, to the body of literature which studies the specific characteristics of instructional situations as they relate to student outcomes. It would seem necessary in fact for the two fields of teaching research and in-service education to be closely connected if the in-service teacher educator is to serve in any way as a mediator tor between educational research and educational practice.

Such a role can be vitally important for a number of reasons. First, there is a growing body of knowledge on the relationship between various instructional components and student

IN-SERVICE TEACHER EDUCATION COMPONENTS

Instructional Components

Instructional Goals and Planning	Teaching Styles	Teaching Methods	Specific Instructional Behaviors	School and Classroom Environment	Teacher Personal Characteristics

Setting

Courses	Task and Support Groups	Workshops	Self-Programmed Instruction	Individual	Large-Group Presentation

Data Collection Means

Written Tests	Role-Playing and Laboratory Teaching	Classroom Observation	Video and Audio Recordings	Classroom Coding Systems
	Self-Evaluation and Self-Report	Student Achievement	Student Evaluations	

Teacher Educator Role

Advisor	Colleague	Instructor	Analyst	Supervisor

Figure 1. In-Service Teacher Education Components

indicating that in given situations, for specific instructonal goals, with certain populations of students, certain choices among the type and sequence of curriculum materials, methods, teaching approach and specific instructional behaviors will effect those objectives more completely than other choices.

Secondly, there is evidence that instructors are capable of manipulating their teaching in terms of these components so as to "improve" their teaching effectiveness.

Thirdly, most classroom instructors, especially at the higher education level either are not aware of instructional alternatives or they do not have the support and encouragement to investigate these in their classrooms.

Finally, the role of the in-service teacher educator gains importance in reference to the fact that the majority of instructors who will be teaching at the higher education level in the next ten years are teaching in higher education institutions at the present time.

The first two of the above propositions are the subject of Chapter II, "Review of the Literature." The third proposition, concerning instructors' knowledge of teaching components and instructional alternatives is the subject of the present chapter. The last proposition, given the present structure of tenure laws and the trend toward stabilization and even decline in the growth rate of higher education institutions, is mathematically correct.

The Training of Higher Education Faculty in Instruction

In a Report of the President's Commission on Higher Education (1947) the following statement was made,

> College teaching is the only major learned profession for which there does not exist a well-defined program of preparation directed toward developing the skills which it is essential for the practitioner to possess (p. 1).

After reviewing the graduate programs of fifty institutions of higher education, Heiss (1970) found that in 75% of the institutions the teaching assistantship was the primary means for preparing future college teachers and that "fewer than half of those who held such appointments were likely to receive adequate, systematic and continuous guidance from a senior member of the faculty (p. 39)." Few programs designed to prepare graduates for teaching were "interdisciplinary" and few graduate students took coursework in any aspect of teaching. Heiss concluded,

> Most graduate faculties have operated on the assumption that the process of becoming a researcher requires rigorous exposure to theory and practice, but the art and skill of teaching comes naturally or develops gratuitously when one is educated for research. Thus the emphasis in most Ph. D. programs has been heavily weighted in favor of preparing students to discover knowledge and only incidentally, if at all, on how to impart to others the nature and value of that knowledge (p. 37).

Arrowsmith (1967), Chairman of the Department of Classics at the University of Texas, makes the point in much stronger terms,

> I am suggesting what will doubtless seem paradox or treason: There is no necessary link between

> scholarship and education, or between research and culture, and in actual practice scholarship is no longer a significant educational force. Scholars, to be sure, are unprecedentedly powerful, but their power is professional and technocratic; as educators they have been eagerly disqualifying themselves for more than a century, and their disqualification is now nearly total. The scholar has disowned the student -- that is, the student who is not a potential scholar -- and the student has reasonably retaliated by abandoning the scholar. This, I believe, is the only natural reading of what I take to be a momentous event: the secession of the student from the institutions of higher learning on the grounds that they no longer educate and are therefore, in his word, irrelevant (p. 110).

Eble (1971) published the results of a two-year project (The Project to Improve College Teaching sponsored by the Association of American Colleges and the American Association of University Professors) which addressed the question of preparation for college teaching. His booklet was based largely on a career development questionnaire sent to faculty members of 142 different institutions.

To the first question, "My institution (does, does not) have an effective faculty development system," the response was overwhelmingly negative.

To question two, "Outside of the departmental program and budget, my institution provides specific support for (research, teaching, service)," about 60 percent of the respondents reported specific support for research, 10 percent reported support for teaching and even fewer for service. Eighteen respondents said their institutions offered no support outside of department bud-

gets for research, teaching or service.

Question three involved the most common form of institutional support for faculty development, sabbatical leave. Sixty percent of institutions in the survey conducted some form of sabbatical leave, but there was much discontent in terms of the nature of the leave and the selection procedures. Fewer than one-fourth of these schools awarded leaves for improving one's teaching, a research proposal, or a proposal for general professional development.

In two other questions concerning specific programs for the preparation of college teachers in graduate programs, over half of the respondents reported no specific preparation program aside from departmental course work, and none of institutions that provided some teacher preparation procedures had a comprehensive program (pp. 3-4).

Other Commission and private studies, particularly those conducted within the various disciplines (Miller and Wilson, 1963; Nowlis, Clark and Rock, 1968; Many, et al., 1969; NCTE, 1970; MacKenzie, 1970; Dean, n.d.) support the conclusion indicated above that not only are college faculty members not formally trained in instruction, but future college faculty are not being trained.

This situation is exacerbated at the junior college level where the role of the instructor centers even more on classroom instruction. A report submitted to the President and

Congress by the National Advisory Council on Education Professions Development (1972) stated that instructors at the junior and community colleges "are inadequate" and "do not know how to teach" and that teacher education programs are doing little to help them. The Council recommended in-service education programs to bring the instruction into line with the colleges' objectives.

Junior college administrators recently have called for teacher preparation programs that would aid new instructors in gaining a broader picture of curriculum and the needs of students than that usually afforded in a graduate school "subject-matter-centered" sequence (American Association of Junior Colleges, 1969). Others (Cohen, 1970) went so far as to request separate training institutions in which junior college instructors might be prepared outside the "contaminating influence" of the research-dominated universities.

Surveys of faculty members, graduate students and administrators also support the conclusion that college instructors are insufficiently trained in instruction.

A survey of 1700 University of Minnesota Ph. D.'s graduated in the periods 1935 to 1949 and 1954 to 1956 (Alciatore and Eckart, 1968) concerning the strengths and weaknesses of their career preparation are summarized in the following two tables.

TABLE I

RESEARCH ABILITIES JUDGED "ESSENTIAL" PRESENTLY AND "ACQUIRED" IN GRADUATE SCHOOL

Abilities Related to Research	Per Cent Essential	Per Cent Acquired
1. Familiarity with research materials and methods	76.3	88.0
2. Skill and practice in doing research	62.3	86.2
3. Ability to do research, produce artistic creations	59.2	81.3
4. Ability to supervise research programs	46.5	41.5
5. Ability to use a wide range of library resources	43.6	70.7

TABLE II

TEACHING SKILLS JUDGED "ESSENTIAL"PRESENTLY AND "ACQUIRED" IN GRADUATE SCHOOL

Abilities Related to Teaching	Per Cent Essential	Per Cent Acquired
1. Skill in lecturing	72.9	27.7
2. Ability to outline objectives and organize courses	71.7	40.0
3. Ability to teach or train others	60.7	35.4
4. Skill in handling discussion	60.5	30.4
5. Skill in planning for effective use of limited time	58.9	27.0
6. Ability to direct students in use of library	29.7	42.4
7. Skill in making and using illustrative devices	20.8	22.8

The discrepancy between training perceived as "essential" and training judged to have been "acquired" in the domain of teaching far outweigh that of the research domain in these results.

In the opinion of numerous college presidents, the knowledge of undergraduate education among students in their Ph. D. programs was much more problematic than the students' preoccupation with research or their specialization in a field (McGrath, 1961).

University teaching assistants in physics at the University of Maryland (Triezenberg, 1969) felt that learning to write course objectives, learning teaching techniques, lecturing to classes and being observed by a faculty member were most lacking in their present graduate program. The results of Triezenberg's survey are represented in Table III.

TABLE III

TEACHING ASSISTANT SURVEY - MARYLAND

General Area of Concern	Was Part of Experience	Should be Experience
Pre-semester orientation covering:		
Course objectives	17	73
Teaching techniques	6	74
Range of teaching experience including:		
Discussion of course evaluation	34	88
Participation in exam design	48	81
Lecture to lab./rec.	64	85
Lecture to whole class	16	55
Supervision and evaluation by means of:		
Regular meetings with faculty	67	87
Clearly specified responsibilities	65	82
Observation of T.A. by faculty	12	77

TABLE III (continued)

TEACHING ASSISTANT SURVEY - MARYLAND

General Area of Concern	Was Part of	Should be Experience
Formal course or seminar:		
In physics department	17	70
In general education	5	27

Organized Instructional Improvement Programs in Higher Education

The response to these criticisms of college instructor preparation has been an increase in both pre-service and in-service training programs. A variety of such programs are now emerging.

The results of Heiss's study for example were presented in a keynote address to a conference of the Commission of College Physics held at the University of Washington (West, et al., 1970), where the conference goal was the establishment of instructional training programs for future college physicists.

Fifty-three physicists from twenty-four institutions and a large number of graduate students in Physics agreed upon a model teacher preparation program including: "careful attention to selection, orientation, training, supervision and evaluation," "an apprenticeship program in which the variety and depth of the research apprenticeship is modeled for teaching and instruction," and "an internship program where theory becomes practice in an atmosphere where feedback is quick and useful (p. ii)." The conference members also advocated a Seminar on College Physics Teaching and constructed a model outline for such a seminar.

The Danforth Foundation since 1964 has promoted efforts to train college instructors via systematic teaching assistantship programs (Danforth, 1970). One such model began in 1967 at the University of Michigan's College Teacher Training Program, co-ordinated through the Center for Research on Learning and Teaching at that University (Koen and Ericksen, 1967). This approach moves "teaching fellows" through three sequential stages: first the "apprenticeship" where they participate in workshops, discussion sessions and limited apprentice teaching with feedback; second, teaching "assistant" in their own course or section, still with guidance; third, "instructor" assigned to work with two to four of the stage one trainees.

The program co-ordinator concluded that the stage three instructors "can provide adequate supervision." Furthermore, because the Instructors were committed to teaching they were willing to devote special time and effort to helping the trainees; they also posed "less of a threat" to the trainees than would a faculty member (Koen and Ericksen, 1967).

Other institutions have altered the type of degree that graduate students oriented toward college teaching might receive. At Washington University in St. Louis, a parallel degree program has been established (Centra, 1972b). Over 100 graduate institutions have established some form of the Doctor of Arts in College Teaching degree. This usually involves a master's degree in a subject area, three or four education

courses, supervised practice teaching and a special educatonal project (National Faculty Association, 1968).

In terms of in-service teacher education a variety of approaches are also in use. Golden West College has instituted a kind of "contract" system where individual instructors specify their teaching goals and agree upon means of measuring these in conjunction with their department chairman, academic dean and perhaps an instructional specialist (Cohen and Brawer, 1969; Cohen and Shawl, 1970).

Some institutions have emphasized self-initiated faculty projects in teaching and teaching improvement by funding faculty proposals (Mathis, 1972). Programs, materials and procedures have been organized for faculty self-evaluation and self-improvement (Mescon, et al., 1969; Boulding, 1970).

Self-improvement programs are often bolstered by student evaluations of the faculty member, sometimes conducted by individual departments or university-wide agencies. One such program differentiates three levels of student evaluation questionnaires, each one more specific about the faculty member's instruction. This allows the faculty member to pinpoint the unsuccessful aspects of his instruction and to initiate the appropriate changes (Smock and Crooks, 1973).

Several programs depend upon inter-faculty conferencing, especially classroom visits between beginning and experienced faculty (Diekhoff, 1960; Gustad, 1963; Hadgkinson, 1972). At

least one program, the Environment for Teaching program at Stanford's Center for Research and Development in Teaching, is investigating the link between the "political decision-making" activities in institutions and teaching, that is, whether there is any connection between instructors' ability to participate in the school's overall policy-making, job satisfaction and teaching performance (Baldridge, 1970).

The most marked trend in in-service education, however, has been the development of resource and improvement centers established within and co-ordinated by universities. Typically these are staffed with experts on multiple aspects of instruction and the various means of effecting instructional change. Thus they can instruct faculty or departments in curriculum design, teaching methods, use of media, etc., as well as directly observe and critique classroom teaching. In short, they serve a combined role of resource agent, supervisor and researcher.

It must be concluded nevertheless that most of these programs are "shooting in the dark," because so little is actually known about the effectiveness of instruction. As indicated in Chapter II, numerous in-service education techniques exist which appear to alter the way in which faculty members perform, but the vast majority of these do not measure student outcomes as a criterion of instructional improvement.(Burkhart, 1969).

The Role of Teaching in the University

The increasing number of improvement centers and the apparent interest of faculty members, students and administrators in college and university instruction is probably a productive trend. Certain qualifications regarding this trend must be noted however.

One is that although many faculty have felt they were not trained sufficiently in instruction, they presently feel that they have gained adequate mastery of instructional technique through experience. Thus a survey of 1,085 faculty members at six institutions (Gaff and Wilson, 1971) revealed that ninety percent considered teaching to be a "major source of satisfaction in their lives" and all but a few said that their students viewed them as effective teachers.

Although studies where faculty estimates of their teaching ability are compared to student estimates show that most faculty overestimate their teaching (Centra, 1972a), the lack of sophistication, use and credibility of measures of teacher effectiveness have not made this apparent. It is safe to say that most university faculty members at present have a complacent attitude toward instructional improvement programs.

This attitude is further supported by the traditional reward system at most institutions of higher education, where research productivity is promoted over teaching effectiveness. According to Eble (1971), "Within the profession at large,

the forces which work against undergraduate teaching are probably as great as those which work for it (p. 2)."

The nature of college and university education is also unique in this regard. The very structure of a residence, "campus" college with light class loads for faculty and myriad educational activities suggests that "a great deal, if not the greater part of the teaching-learning function is realized outside the classroom (Trent and Cohen, 1973, p. 1040)."

In fact, the real impact of university instructors may be related to such "incidental" or "hidden" factors as their personalities, life-styles and intellectual habits which students "model." Real learning at college may also be due to the open, "rich," supportive environment which is usually generated at the college level by faculty individual contact with students and the non-monitoring of student activities. Authors from Dewey (1939) to Rogers (1969) have advocated such an environment for fostering such positive outcomes as student independence, self-initiation and creativity. Only recently have researchers inquired into this overall environmental impact (Trent, 1970).

The question of instructional improvement for university faculty also involves certain philosophical issues. It is probably true that the United States has undergone a change in values during the last two decades. The question of whether the university should adapt itself to this change or attempt

to temper the change with traditional academic values is an important one. Nuthall and Snook (1973) make a strong argument for retention of traditional academic disciplines because they teach a unique way of thinking and knowing. The scholar-teacher role which is largely based on information transferral is certainly valid if transmitting new knowledge to students is an important activity. The rigor of both the academic disciplines and the knowledge generator role can be undermined by hasty adoption of such concepts as "student-centeredness," "relevance," "teaching-counseling," or "individualization."

The real facts are that little is known about the value of traditional instructional techniques or recently-developed instructional techniques. Sanford's observation in 1962 was reasserted a decade later by the authors of the most recent review of the literature on research in higher education (Trent and Cohen, 1973),

> The colleges will change only when more knowledge of what they do and of what they might do has been produced and made available to educators. The need for theory is apparent but what is more striking is the paucity of empirical studies (p. 1012).

C H A P T E R I I

REVIEW OF THE LITERATURE

Teacher Effectiveness Research

The field of research in education which might be described as "teacher effectiveness" research generally follows a paradigm expressed in the following question: "What specific characteristics of instruction result in what learning outcomes for what kinds of students in what kinds of educational contexts (Gage, 1963; Biddle, 1964; Meux, 1967; Centra, 1972)?" As an hypothesis this question becomes: "The quality of learning which transpires in a given instructional situation is a function of particular instructional procedures employed by a particular instructor for particular students with particular goals in mind (Popham, 1967, p. 2)."

Biddle (1964) represented the teacher effectiveness question in a seven-variable model depicted in Figure 2. The import of Biddle's model is that many variables operate in a given teaching/learning situation, and that reliable statements of teacher effectiveness (statements of cause-and-effect relationships between teaching factors and learning factors) must control for these variables.

Certain instructors are effective in certain situations more than in others. To use Biddle's example, "Some teachers may be inspirational leaders, others warm counselors, and still

BIDDLE'S SEVEN-VARIABLE-CLASS MODEL FOR TEACHER EFFECTIVENESS

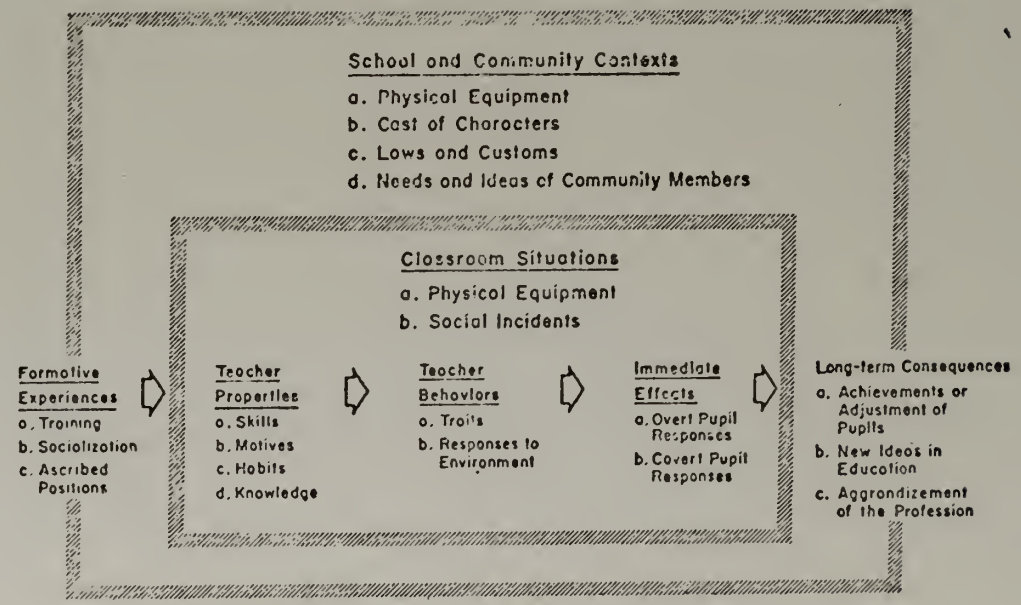

Figure 2. Biddle's Seven-Variable-Class Model for Teacher Effectiveness

others walking encyclopedias. In certain contexts, each of these competencies may be highly effective; in others each might have little or negative effect (p. 19)."

The failure of researchers to grasp the complexity of teaching/learning situations is largely at the root of reams of contradictory research findings. A good example is research in the effectiveness of various curriculum systems as cited by Rosenshine (1970):

> The lack of information on classroom interaction hinders evaluation of a single curriculum or different curricula because without this information one tends to assume that all classrooms using the same curriculum materials constitute a homogeneous 'treatment variable.' Such an assumption is questionable because teachers may vary widely in what activities they select and how they implement them. In studies where teacher behavior in special curricula was compared with the behavior of teachers in 'traditional instruction...there was often significant variation in the behavior of teachers within each group. Although the number of classrooms observed in these studies is small, the results are consistent enough to cause serious doubts about whether all classrooms using the same curriculum constitute a single treatment variable (p. 280).

Other studies that have suffered from a too simplified view of instruction were those seeking the universal qualities of "good teachers." For the most part these studies were concerned with the personal and social characteristics of teachers rather than their patterns of behavior in the classroom. The results of these investigations were negligible (Biddle, 1964). In other words, no personal characteristics of teachers

or general abilities were identified which could predict successful learning outcomes. Around 1960, according to Biddle, many educational researchers abandoned the field of competence research as "a simple-minded approach to a vastly more complex topic: the study of classroom interaction (p. vi)."

Ryans' study (1960) was probably a major influence on the directions that teacher effectiveness research has taken. Ryans focused on "teacher characteristics" meaning both "teacher properties" and "teacher behavior." His sample included approximately 6000 teachers in 1700 schools across 450 school systems, and his data was collected over a period of ten years (1950 - 1960).

Ryans rated three dimensions of teacher behavior via direct observation: "warm, understanding, friendly versus aloof, egocentric, restricted," "responsible, businesslike, systematic versus evading, unplanned, slipshod," and "stimulating, imaginative versus dull, routine (Ryans, 1964, p. 76)."

Seven teacher properties were considered: "favorable versus unfavorable opinions of pupils," "favorable versus unfavorable opinions of democratic classroom procedures," "favorable versus unfavorable opinions of administrative and other school personnel," "learning-centered" versus "child-centered" educational viewpoints, "verbal understanding," "emotional stability" and "validity of response."

Four student dimensions were also rated: "apathetic-alert," "obstructive-responsible," "uncertain-confident" and

"dependent-initiating." The seven teacher properties were measured by a self-report inventory consisting of 300 multiple-choice and check-list items relating to personal preferences, self-judgments, activities frequently engaged in, biographical data, etc.

The study moreover did not preconceive the teacher behaviors which were rated, rather a year and a half was spent directly observing classrooms, taking down observational data and organizing these into rater dimensions. The result was a document entitled the Classroom Observation Record.

Finally, great care was given to the training of the raters, including retraining at various intervals to insure consistency. Raters were advised to focus their attention sharply "on the specified behaviors or characteristics to be assessed (Ryans, 1964, p. 13)."

Ryans results were definitely not clear-cut and in some instances could be considered disappointing. For example, in the elementary school pupil behavior showed a positive correlation with such teacher behaviors and characteristics as "friendly," "systematic-businesslike," "favorable attitude toward pupils," "favorable attitude toward democratic classroom procedures." Student behavior appeared to be unrelated to teacher characteristics in secondary school.

The findings that participation in schoollike activities during childhood and adolescence were significantly re-

lated to positive scores on a majority of the ten teacher rating scales or that teachers in large schools scored higher than teachers from small schools or that teachers 55 years and above scored less well than younger instructors on all dimensions except "systematic and businesslike classroom behavior" and "learning-centered viewpoint" may be considered somewhat trivial. The results did not have much application to actual educational problems and their solutions.

Ryans study however pointed in many directions. He did employ direct classroom observation. He arrived at his observational categories inductively. He included a large number of variables with careful methodology; and he did produce certain correlations. He concluded,

> We are beginning to pull together factual information about teacher behavior that permits, for the first time, useful descriptions of the dimensions of teacher behavior and their interrelationships and interactions. This should be of significant usefulness to teacher education and to supervision in the schools--a taxonomy and analysis that make accurate description possible and that should lead to more definitive and operational methods for 'acquiring teacher behavior' both in the teacher education program and on-the-job supervision (Ryans, 1964, p. 96).

Programs and research in instructional improvement at the present time may be classified to some extent in two categories: (1) those who define, refine and apply a list of teacher competencies more or less generalizeable across different classroom contexts--a deductive approach, and (2) those who

attempt to gather factual information about teacher behavior and educational process in classrooms in a very descriptive-analytical manner--an inductive approach. Teacher educators who proceed deductively with a list of teacher competencies perhaps have more practical mobility. Those who proceed inductively are perhaps more likely to identify critical instructional variables. The two approaches nevertheless are symbiotic, as Biddle points out:

> The researcher ignores the practical problems of competence creation and evaluation at his peril. It is unlikely, however, that significant advances will be made in understanding teacher competence without a clearer picture of teacher behavior and its effects (p. 20).

The Technical Skills of Teaching

The "technical skills" approach may be considered a compromise between high inference "traits-rating" approaches and low inference "behaviors-effects" approaches. The difference is that in the case of technical skills, instead of a trait such as "warmth," there is a behavior such as "introduces a new idea." These behaviors are rated however in terms of an ideal model of their performance. The discrepancy between the instructor's actual performance of given behaviors and the ideal performance creates the basis for instructional change.

According to Gage (1967) technical skills are "specific instructional techniques and procedures that a teacher may use in the classroom (p. 607)." The choice of a particular set of technical skills to rate is somewhat arbitrary. What is im-

portant according to Gage is "the attempt to analyze teaching into limited, well-defined components that can be taught, practiced, evaluated, predicted, controlled and understood in a way that has proven to be altogether impossible for teaching viewed in the larger chunks that occur over a period of an hour, a day, a week or a year (p. 602).

A typical list of technical skills includes the following: "set induction," "probing questioning," "higher order questioning," "divergent questioning," "reinforcement," "stimulus variation," "use of examples," "planned repetition," "nonverbal cues," "completeness of communication" and "lecturing (Miltz, 1973)."

Micro-Teaching

The technical skills approach was particularly appropriate to laboratory settings and pre-service teacher training in that trainees could concentrate on mastering each skill separately, could view videotapes of teaching models, practice the skill before a small group of students and compare their performance (also videotaped) to that of the model (Allen and Fortune, 1967). This format was also extremely useful for research as Gage explains:

> Rather than seek criteria for the overall effectiveness of teachers in the many, varied facets of their roles, we may have better success with criteria of effectiveness in small, specifically defined aspects of the teacher's role. A sufficient number of laws applying to relatively pure aspects of the role, if such laws could be developed, might eventually be combined...to account for the actual behavior and

> effectiveness of teachers with pupils under genuine classroom conditions (p. 95).

Most of the subsequent studies using the technical skills and laboratory approach took place at Stanford University under the direction of N. L. Gage, Dwight Allen, Robert Bush and Frederick McDonald.

According to McDonald (1973) the first experiment using micro-teaching was performed by Aubertine (1964) on the subject of "set induction." Since that time several studies have been reported: "instructional set" and "cognitive closure" (Fortune, 1965), "cuing" (Unruh, 1967), "reinforcement" (McDonald and Allen, 1967), "explaining skills" (Rosenshine 1968, Miltz 1971), "verbal behavior" (Davis and Smoot, 1969), "modeling" (Orme, 1966; Berliner, 1967; Koran, 1970), "vocabulary, movement in the classroom, inclusion of content, use of questions, degree of control and encouragement of student participation"(Beard, 1969), "listening" and "response" (McKnight, 1970), "attending behavior" (Salzburg, et al., 1971; Ramp, et al., 1971), "planning" (Waimon, Bell and Ramseyer, 1971), "variability in explanatory mode" (Knight, 1971), "evaluating skills" (Legge and Asper, 1972).

Although many of these studies attempt to corroborate hypotheses about the relationship of these skills to teacher effectiveness (Allen and Fortune, 1967), the vast majority do not use student gains as the effectiveness criterion (Rosen-

shine, 1973). Furthermore, most of these studies occur singly rather than in the systematic research designs envisioned by Gage. Thus, although the general effects of a skill may be reported with significant results, the experimental manipulation of various sub-aspects of the skill or other situation variables in general has not taken place. It must be concluded in such a case that a true cause-effect relationship between the teaching skill and student learning was not determined.

Two instances of such systematic research have occurred. The first attempted to determine correlations between dimensions of "explaining skills" and student comprehension (Belgard, Rosenshine and Gage, 1971; Unruh, 1971; Rosenshine, 1971; Dell and Hiller, 1971). Although correlations were found, the need for numerous other studies manipulating the variables in systematic ways became apparent:

> The conclusions based on correlational evidence... are interesting to examine. Student ratings of dimensions of the teacher's performance correlated with how much the students learned; in addition, students' self-reported attention to the lesson also correlated with what they learned. What immediately comes to mind as a result of these data is the possibility of artifactual or superstitious behavior on the part of the student. What may be happening is that the student observes certain activities in the teacher that alert the student to paying careful attention to what is being said. It may be that such alerting or attention-producing stimuli are significant variables in causing the student to learn--perhaps even more significant than the form and content factors of the presentation

> which are supposedly related to good explanatory exposition (Glaser, 1971, p. 221).

Rosenshine (1973) noted that a second series conducted at Canterbury University, New Zealand (Wright and Nuthall, 1970; Highes, 1971; and Church, 1971) although not conclusive have at least achieved a promising research methodology:

> In each study the experimenters taught almost identical lessons to existing classes, modifying the lessons only to introduce the experimental variations, and monitoring the tape recording of the lessons to insure high implementation of the treatment and fidelity to the content (p. 124).

Often "technical skills" and micro-teaching studies investigate the laboratory as a teacher training medium, as opposed to researching the effects of particular skills. The results of such studies are that in general teachers trained in the laboratory have exhibited "significant gains" in teaching skills acquisition during successive teaching sessions. Moreover they have retained these behaviors in their regular classroom teaching or internship (Allen and Fortune, 1967; Fortune, Cooper and Allen, 1967; Davis and Smoot, 1969; Limbucher, 1969; Borg, Kelley, Langer and Gall, 1970).

One researcher feels that much of what has been written about micro-teaching is misleading and that "claims for its effectiveness have very little substance in fact (McDonald, 1973)." McDonald's point is that although such issues as the length of the micro-teaching session, the effects of practice and the transfer of training to subsequent performance are

important, the most important research should concern the application of behavior modification principles to shaping student learning: "At the present time only a relatively small number of student behaviors can be brought under behavioral control by applying these principles (p. 2)." "Behavior modification systems have not been developed for teaching complex behaviors such as problem solving (p. 3)."

At least two exploratory studies have been reported where "technical skills" and "microteaching" were used effectively with higher education faculty and graduate teaching assistants in an in-service education program. In the department of General Engineering at the University of Illinois (Perlberg and O'Bryant, 1970) twelve faculty members were videotaped in their classrooms and discussed their instruction with an instructional specialist. At the same time four graduate teaching assistants participated as a group in a micro-teaching laboratory. According to the authors, "Live observation in the classroom and discussion between researcher and students showed a visible change in style of teaching (p. 741)."

Sixteen faculty members in the Dental Division at Tel Aviv University (Perlberg, et al., 1972) participated in a series of microteaching sessions with the result that several participants volunteered to continue the videotaping and instructional analysis process in their regular classrooms.

Learning Principles

Lawrence Alexander and Robert Davis have investigated an in-service education approach at the higher education level which is similar to the technical skills approach but which has its roots in educational psychology and systems design.

One of their initial studies (Alexander and Davis, 1970) involved a ten-week in-service education project with thirty graduate teaching assistants. The instructional concepts and skills forming the core of the program fell into five categories: organizing subject matter, classroom management, establishing a facilitative class atmosphere, evaluating student learning or one's own instruction, and providing a model of professional behavior. Specific behaviors within these categories included writing and sequencing learning objectives, presenting advanced organizers in class, assessing student entry skills, asking questions, avoiding threatening practices, reinforcing participative behavior, giving recognition to original and thoughtful contributions and using personal illustrations of problem solving.

The teaching assistants were given a list of these behaviors and asked to check those which they thought might be problematic in their classes. They then videotaped a class and selected short segments of the tape which were illustrative of these problems. These were shown to their fellow teaching assistants. The subsequent discussion and problem-

solving session was controlled and moderated by the person whose tape was being shown. During the next week the teaching assistants would attempt to modify their classroom behavior according to the recommendations that had been made. These were videotaped and the process repeated itself. Student evaluations and student debriefing about the class were also used as data collection devices in this model.

A questionnaire asking the participants to evaluate the various aspects of the program is replicated in Table IV.

TABLE IV

GRADUATE TEACHING ASSISTANTS RATING OF TRAINING PROGRAM

	Percent Responding		
	SA & A	N	D & SD
1. I learned some new teaching skills.	94	6	0
2. I am more favorably disposed to teaching as a result of the program.	71	18	11
3. I could have put the same amount of time to better use in preparing for my profession.	18	6	76
4. Debriefings with peers should be eliminated.	0	0	100
5. Videotape is a valuable and useful feature.	100	0	0

According to the authors,

> When they entered the program, most GTA's were deficient in three general areas related to teaching competence: command of the subject matter, knowledge of psychological principles and instructional technology, and inter-personal sensitivity and communication skills.
>
> As they began to acquire background concepts and principles...their confidence increased and they were willing to experiment further (p.25).

Student Evaluations

Student evaluations of instructors are commonplace. After much research, the general indication is that such evaluations do rate instructors accurately on dimensions important to student learning (Costin and Greenough, 1971; Frey, 1973).

Systematic use of student questionnaires to improve instruction in the manner described by Smock and Crooks (1973) in Chapter I is rare. Centra (1972b) has demonstrated the value of such an approach in a two-semester study at five different types of colleges. In his study a detailed questionnaire containing items that had been ascertained to contain information which faculty members desired about their classes, was administered to three groups. The first group administered the questionnaire and received the results at mid-semester. The second group administered the questionnaire at mid-semester but did not receive the results until the end of the semester. A third group as well as the first two groups administered the questionnaire at the end of the semester. Findings were that no differences occurred between the "experimental" and "control" groups. Across both groups however teachers who rated themselves more favorably than their students showed the greatest change. This process repeated during the second semester resulted in the feedback group scoring better than a second control group of teachers on several items.

The author concluded, "Given enough time...student ratings did result in some modest instructional changes for a wide range of teachers (p. 22)."

The results of student evaluations of teacher effectiveness however are very similar to the "general abilities" and "personal qualities" paradigm of early teacher effectiveness research. A review of this literature (Centra 1972a) indicates that students learn more from instructors who, according to the students, "are organized in their lessons, give clear explanations, stimulate their intellectual curiosity, give interesting presentations of course material, are attentive to students' reactions, are friendly and are flexible (p. 22)." It is doubtful how much real value this information has for teacher improvement.

It is conceivable that extensive use of student questonnaires in the same instructional situation over a period of time will identify critical and useful characteristics of effective teaching in that situation. In a study by Frey (1973) using a sample of eight instructors of Introductory Calculus and five instructors of Multidimensional Calculus at the university level, the profile of the most effective instructor (validated by student achievement criteria) was the one who (a) made the students "work hard" and "spend a lot of time" in the course, (b) presented the material well in terms of communicating ideas in an "unambiguous manner," using examples and illustrations, and

(c) was seen as slightly "inaccessible" or impersonal (businesslike) by students. Instructors who in the judgment of students made them feel they were learning a great deal, who organized the course in a very logical and orderly way, or who graded in a fair and accurate manner were not as effective.

It is questionable in another situation for example a humanities course with ten students, that the above profile would predict effectiveness. Gump's research in the effects of classroom environments and "role expectations" supports this conclusion. The population of students in calculus might expect mathematics courses to entail hard work, presentational mode and businesslike manner, without which factors an instructor's credibility might be damaged, student attention lag and learning diminish.

If principles of effective teaching which can be used as a guideline by instructors are to be generated through student evaluations, then it would appear that this must also be done in specifically defined educational contexts.

The Inductive-Analytical Approach

The inductive approach to the analysis of instruction also has a broad literature. Rosenshine's (1973) review of direct observational instruments estimates the number of systems to be in excess of 120.

The inductive approach assumes that the correlates of teacher effectiveness are not known . The role of the in-service teacher educator or researcher then is to gather as much information (data) as possible on what is actually occurring in an instructional situation. Only after careful description does analysis of the data take place, and any judgment of the effectiveness or ineffectiveness of behavior patterns are made in reference to the specific context, especially to the instructors goals (Cogan, 1973). The approach is very similar to field observation and recording in anthropology.

The observational instruments or category systems mentioned above are used as checklists both to facilitate recording and to aid the observor in focusing on specific aspects of the teaching/learning situation. Many early researchers (Anderson 1939; Lewin, et al., 1939; Withall, 1949) were interested in the social-emotional climate in the classroom. Bales and Strodtbeck (1951) studied "phases in group problem-solving." Meux and Smith (1964) focused on the logic of teacher-student and student-student interchanges. Systems have been developed to record and analyze data on such subjects as group size, speaker and location of speaker in the room; cognitive and/or affective levels of instruction; teacher and student "roles"; content topics and sub-topics; content or process orientation; nonverbal behavior (Rosenshine 1973).

Such coding of classroom phenomena may take place in the form of absolute counts of instructional behaviors, sequencies of behavior or sequences noted in regular time intervals. The advantage of the last process is that it provides the researcher and the teacher with a fairly accurate estimate of the amount of class time occupied by various activities.

The use of the inductive approach in terms of coding systems has had promising results. Eighteen studies reported by Flanders (1971) indicated that in all cases attention to their teaching behavior using category systems as well as practice and feedback allowed teachers to incorporate desired behaviors into their instruction.

Eleven of the studies supported the proposition that by learning how to code instruction by means of interaction analysis categories and by interpreting their own teaching as well as the teaching of another person, instructors tend to become more "responsive" to student ideas. Although the results were less clear, there was a concomitant tendency for teachers to become more "flexible," that is, to consciously alter their teaching mode from "direct" to "indirect" depending on the context.

Three of the studies wherein the Minnesota Teacher Attitude Inventory was administered, indicated that the attitudes of college students toward teaching and programs for the preparation of teachers became more positive among those who studied interaction analysis.

In six other studies conducted by Flanders, all with pre-high school populations, it was apparent that more student-centered modes ("when students have opportunities to express their ideas, and when these ideas are incorporated into the learning activities") predicted increased student learning and more positive student attitudes toward the teacher and the learning activities (Flanders, 1970, p. 401).

The importance of "flexibility" is indicated by Soar (1968) who studied 54 elementary classrooms in an effort to identify the optimum relationships between pupil initiation and teacher initiation with regard to various cognitive tasks. The results of Soar's study for tasks requiring creative thinking (Curve A), very little abstract reasoning (Curve B) and pronounced abstract reasoning (Curve C) are depicted in Figure 3.

These data indicate that the optimum point of indirectness for the creative task was not even reached in these classrooms, and that it was reached sooner for the less abstract task than for the more abstract task. In other words the data suggest that instructional tasks of a lower cognitive order are optimally taught in an instructional mode characterized by more direct teacher behaviors and initiation, and that instructonal tasks of a "higher" cognitive order are best taught via less teacher initiation and more teacher indirect behaviors.

Figure 4 represents these results in relationship to "teacher criticism." Here the indication is that direct teacher

RELATIONSHIP OF TEACHER INDIRECTNESS TO PUPIL GROWTH

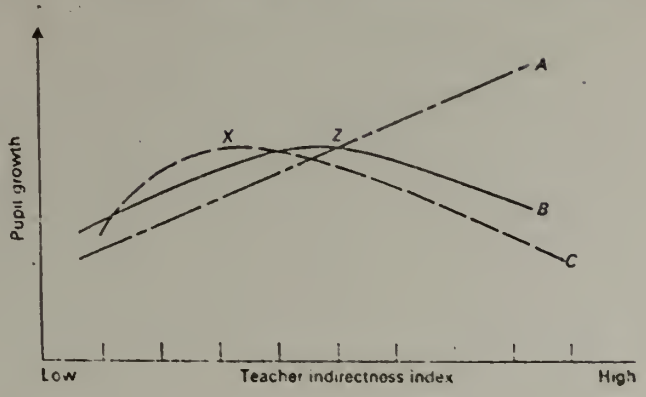

Figure 3. Relationship of Teacher Indirectness to Pupil Growth

RELATIONSHIP OF TEACHER CRITICISM TO PUPIL GROWTH

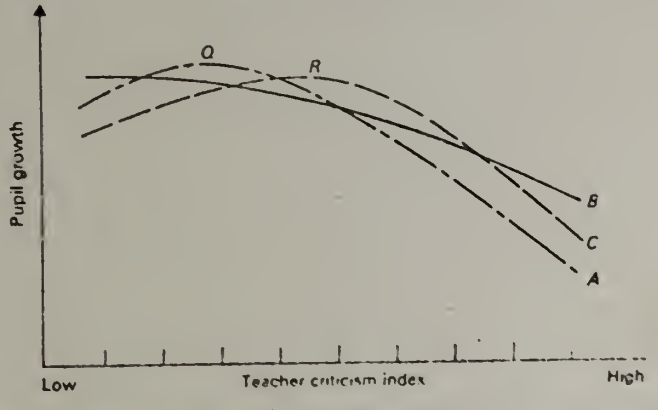

Figure 4. Relationship of Teacher Criticism to Pupil Growth

behavior in terms of teacher criticism contributes to pupil growth in both the creative and less abstract tasks--not however to the more abstract tasks. In regard to the former, continued critical teacher behavior tends to be productive for the less abstract tasks past the point where such behavior ceased being productive for the creative tasks. The teacher who does not adjust the extent of his criticizing to the particular task at hand reduces his effectiveness.

The present study incorporates the methodology of many of the studies mentioned above, specifically the "technical skills" approach, videotape feedback, instructional specialists and student evaluations. These were incorporated into an in-service teacher education model at the higher education level by Allen and Melnick (1972). This study is the third in a potential series of studies testing the effectiveness of that model.

Melnick (1972) completed the pilot study for the model at the University of Massachusetts with a sample of seven faculty members from the department of Computer Science. His complete model involved eight sequential steps. First was an initial interview to bring out the faculty member's needs and expectations in reference to instructional improvement. Second was a video recording of thirty minutes of the faculty member's classroom teaching. Third was a fifty-four item student evaluation based on a list of twenty-four technical skills of teaching.

The faculty member also rated himself on each item in the evaluation and predicted for each item what he believed the student response would be. The faculty member and students also indicated what they believed were the instructor's five strongest and five weakest skills, and the three skills that he should most improve on. The fourth step was the computer processing of this data. Next was the identification of a teaching problem determined by the faculty member and an instructional specialist using all the data collected. This involved (step five) a preliminary review of the data by instructional specialist and faculty member together, a more intense review of the data by each one separately (step six), and a final session isolating a particular teaching skill which was judged most crucial for improvement (step seven). The last stage of the model was the faculty member's participation is certain "treatment and training" activities relating to this skill. These might include micro-teaching, further videotapes of the classroom, viewing films of model instructors, reviewing certain literature, and/or continued consultation with the instructional specialist (Melnick, p. 32).

For the most part Melnick's study was devoted to the identification of teaching problems and not the systematic eliminating of these problems. Much time was spent in the development of instrumentation. No formal evaluation of the teacher improvement was made. There was interest on the part of these faculty

to continue in this improvement process at a future time.

A second study (Noam, 1973) following this eight-step model was conducted at the University of Massachusetts with thirteen faculty members from the Chemistry Department.

In this study greater emphasis was placed on having faculty members show change in the teaching skills which were identified as problematic. The procedures followed for enacting this change were for the most part those sketched by Melnick. In addition, Noam taught a demonstration lesson in one of the Chemistry classes, conducted data review sessions with faculty and students together, and convened two meetings of the faculty members to discuss chemistry instruction in general. Toward the end of the semester a final videotape was taken and analyzed together with the initial videotape of these faculty. A questionnaire was also distributed which asked the instructors to evaluate this improvement process.

An interaction analysis of the pairs of videotapes revealed that the faculty members had in fact changed in the desired manner. In general the percentage of instructor question-asking, student responding and teacher clarifying or expanding on student ideas (all goals of this group) increased significantly.

However, since there was no control group in this study, it is not possible to know if the changes which took place were due to the treatment. A second administration of the fifty-four item questionnaire was not made, so that changes in the

students' evaluations of the instructors' teaching skills could be observed. No achievement data was collected.

The faculty response to the improvement process was positive. Seventy-six percent of the participants indicated they would have liked to continue improvement procedures. An equal percentage believed they had gained new insights. All stated that they had become aware of teaching problems. Only thirty-nine percent felt that the process had given them an opportunity to practice new skills (Noam, p. 63).

C H A P T E R I I I

PROCEDURES

A slightly altered version of the Allen and Melnick model (1972) discussed in Chapter II was investigated in this study.

A group of graduate teaching assistants were divided into two experimental groups and a control group. All subjects completed a pretest which consisted of a half-hour videotape of their classroom instruction, student evaluations and a student achievement test.

Members of the two experimental groups individually reviewed their videotapes and student evaluations with the help of an instructional specialist. One experimental group continued to meet with instructional specialists who provided them with additional procedures for enacting changes in classroom instruction.

After approximately eight weeks all subjects completed a posttest consisting of the same components: a half-hour videotape, student evaluations and a student achievement test. All participants including the control group reviewed their student evaluations and videotapes at the conclusion of the study.

The pretest and posttest videotapes were analyzed along seventeen dimensions using an adaptation of Flanders Interaction Analysis (Amidon and Flanders, 1971). The student evaluations were reduced to numerical scores along thirty-one individual

items and ten factors. The student achievement data was rated by three subject matter specialists. These ratings and scores were used to test differences among the three groups. The remainder of this chapter describes procedures for (a) treatment, (b) additional data collection and (c) data analysis.

Treatment

Subjects. The subjects were thirteen graduate student teaching assistants (seven female and six male) who were teaching a required Freshman Rhetoric 100 course at the University of Massachusetts during the Winter-Spring semester of 1973. All of the subjects had taught the course the previous semester, and some had additional teaching experience at the university or secondary level. Nine were teaching one section of the course during that semester and four were teaching two sections. The majority of the subjects were graduate students in the English department; two were in the Linguistics department and one in the Botany and German departments.

The total group was divided into an experimental group of five, a quasi-experimental group of four and a control group of four by means of a table of random numbers. Three members from the experimental and quasi-experimental group were then randomly assigned to each of three instructional specialists. Two control group members were similarly assigned to each of two additional instructional specialists.

Participation in this study was considered part of the

general staff development program for instructors of this course. This program was conducted by the Rhetoric 100 course director and consisted of several weekly staff meetings where the theoretical bases for such a course as well as certain recommended instructional methods were discussed. This staff development program was attended by all subjects and did not include in-class observation and instructional analysis by the course director.

Setting. Rhetoric 100 was basically a writing course with more emphasis on the students' ability to see life situations with increased awareness and to express their ideas with intellectual accuracy, than on traditional writing mechanics. This was considered a new and experimental orientation for this course at the University. Students customarily wrote one or more short papers a week and class activities most often revolved around the analysis, discussion and evaluation of these papers. Published literature as well as the more technical aspects of writing were discussed later in the semester.

Initial Interview. Each participant in the two experimental groups underwent an initial interview wherein the theory, purposes and procedures of the treatment model were described. At the same time the instructional specialist filled out a course information form which included a statement by the teaching assiatant about his perceived instructional problems, if any. The instructional specialist also gave the teaching assistant two of the student evaluation forms, one to be filled out as a self-

evaluation and the other as a prediction of the students' evaluation.

At the conclusion of the interview a class was chosen to be videotaped and a pre-videotaping form was given to the instructor. This solicited information on the objectives and procedures for that particular lesson. Both the self-evaluaton, prediction of student evaluation and pre-videotaping information were returned to the instructional specialist before the videotaping. The control group members underwent a much shorter interviewing process with the primary focus on establishing times for the videotaping and administration of student evaluations. No attempt was made to explain to the control group the theory and procedures of this improvement model nor were they informed of the specific treatment of the other participants. They were told that at the conclusion of the second series of data collection procedures their data would be reviewed with them by an instructional specialist if they so desired.

Observation. To familiarize themselves with the general setting of the class and the particular style of the teaching assistant, the instructional specialists observed at least one class meeting. At that time if not before, the students were informed of the teacher's participation in an instructional improvement program which included videotaping and student evaluations.

Videotape I. A thirty-minute videotape was taken in the

instructors' classrooms according to the following general format: the first fifteen minutes of class, the middle ten minutes, and the final ten minutes.

Student Evaluations. The students filled out a thirty-one item evaluation of the instructor at the end of the class that was videotaped (Figure 5). The evaluation was designed to elicit student ratings of the instructors' performance of twenty-one technical skills of teaching (Figure 6). (Appendix C contains descriptions of each of these skills.)

Interpretation and Feedback. The student evaluations were tabulated by computer and this data as well as the videotape were made available to the teachers in both experimental groups. (Appendix C contains a sample of the "Crosstabulations," "Best Skills" and "Weakest Skills" sections of the computer printout for student evaluations.) The instructors's self-evaluation, prediction of student evaluations and the actual mean scores of the student evaluations on each item were listed on a single three-column page.

The instructors and instructional specialists then met for an interpretation conference. The focus of the conference was the identifying of teaching skills which were believed to be both important to the instructors' courses and "problematic." Extreme differences between the students' rating of particular skills and the instructors' ratings were one index of problem skills. Another was instances of skills that were rated well

STUDENT-CENTERED ANALYSIS OF TEACHING (SCAT)

DIRECTIONS:

We would like your opinion of your instructor's performance of each of the following teaching behaviors or skills. Please read each item carefully and circle one of the responses as follows:

E excellent to very good performance in this area

S satisfactory performance in this area

I I would like to see some improvement in this area

I! I strongly recommend improvement in this area

O does not apply - (please use sparingly)

1. When beginning a class, lesson, or new instructional activity, the instructor usually makes clear what he/she hopes to accomplish.	E	S	I	I!	O
2. The instructor usually gets me interested at the beginning of each class session and learning activity.	E	S	I	I!	O
3. The instructor presents new ideas and information at an appropriate pace, i.e. neither too fast nor too slow.	E	S	I	I!	O
4. The instructor arranges and presents material in a clear, well-organized fashion.	E	S	I	I!	O
5. In this instructor's class it is usually possible to know which points are most important, and to see the relationships between topics.	E	S	I	I!	O
6. The instructor knows when to elaborate on a topic and he/she elaborates effectively by using examples pointing out relationships, and/or giving more detailed explanations.	E	S	I	I!	O
7. The instructor provides useful summaries at appropriate times, (e.g. at end of class session or end of unit.)	E	S	I	I!	O
8. When the instructor reaches the end of any segment of a presentation, he/she effectively "wraps it up" by summarizing, checking for comprehension, relating the covered material to what is to come, and noting whether or not the material will be taken up again.	E	S	I	I!	O

Figure 5. Student Evaluation Form of the Clinic to Improve University Teaching - Spring 1973

STUDENT-CENTERED ANALYSIS OF TEACHING (SCAT)

Again, your response choices are:

E excellent to very good performance in this area

S satisfactory performance in this area

I I would like to see some improvement in this area

II I strongly recommend improvement in this area

O does not apply - (please use this sparingly)

9.	The instructor has an effective presentation style (e.g. voice quality, choice of words, body movements, etc.)	E	S	I	II	O
10.	The instructor inspires excitement and interest in the subject matter.	E	S	I	II	O
11.	The instructor is creative and imaginative in his/her teaching methods.	E	S	I	II	O
12.	The instructor makes students feel free to disagree with him/her, with fellow students, or with the readings.	E	S	I	II	O
13.	The instructor gives open-minded presentations, of a variety of points of view.	E	S	I	II	O
14.	The instructor relates the topics to a wide range of fields, situations, applications, and interests.	E	S	I	II	O
15.	The instructor encourages independent thought and, when necessary, helps students find the necessary resources to pursue independent study.	E	S	I	II	O
16.	The general design of this instructor's course (number and choice of lectures, discussions, reading, papers, examinations) is appropriate.	E	S	I	II	O
17.	The level of difficulty and the amount of work in this course are about right for me.	E	S	I	II	O
18.	The instructor allows students to work out alternative ways of achieving course objectives and helps students who want to do this.	E	S	I	II	O
19.	The instructor is an effective discussion leader (encourages contributions, keeps the discussions focused, doesn't dominate, etc.)	E	S	I	II	O

Figure 5. Student Evaluation Form of the Clinic to Improve University Teaching - Spring 1973 (continued)

STUDENT-CENTERED ANALYSIS OF TEACHING (SCAT)

Remember, your response choices are:

E excellent to very good performance in this area

S satisfactory performance in this area

I I would like to see some improvement in this area

I! I strongly recommend improvement in this area

0 does not apply- (please use this sparingly)

20.	The instructor invites students to share their knowledge, experiences, and opinions at appropriate times.	E	S	I	I!	0
21.	The instructor encourages students to listen and to respond to each other.	E	S	I	I!	0
22.	The instructor uses questions effectively (e.g. to focus attention on important points, to check on student understanding, to get students to think, etc.).	E	S	I	I!	0
23.	The instructor restates students' questions for clarification and answers them in a way that the whole class understands.	E	S	I	I!	0
24.	The instructor provides encouragement and opportunity for student questions, suggestions, comments or criticisms regarding any aspect of this course.	E	S	I	I!	0
25.	The instructor seems to know when students are confused, bored or frustrated.	E	S	I	I!	0
26.	The instructor answers questions, or encourages and helps others to answer them, with understanding and clarity.	E	S	I	I!	0
27.	The instructor demonstrates his/her active interest in students as individuals by being easy to approach, patient, and willing to help.	E	S	I	I!	0
28.	The instructor makes clear to students what is expected of them and how their performances are to be evaluated.	E	S	I	I!	0

Figure 5. Student Evaluation Form of the Clinic to Improve University Teaching - Spring 1973 (continued)

STUDENT-CENTERED ANALYSIS OF TEACHING (SCAT)

Remember, your response choices are:

E excellent to very good performance in this area

S satisfactory performance in this area

I I would like to see some improvement in this area

I! I strongly recommend improvement in this area

O does not apply- (please use this sparingly)

29.	The instructor evaluates student work in a clear and consistent way.	E	S	I	I!	O
30.	The instructor keeps the students posted on their progress through questions in class, individual conferences, and appropriate quizzes and tests.	E	S	I	I!	O
31.	The instructor openly talks about questions of "right and wrong" as they relate to his/her subject matter (e.g. does not avoid discussing controversial issues).	E	S	I	I!	O

Figure 5. Student Evaluation Form of the Clinic to Improve University Teaching - Spring 1973 (continued)

TWENTY-ONE TECHNICAL SKILLS OF TEACHING

AND RELATED STUDENT EVALUATION ITEMS

1. Set Induction (items 1 and 2)
2. Logical Organization (items 4 and 5)
3. Pacing (item 3)
4. Elaboration (item 6)
5. Closure (items 7 and 8)
6. Expression (item 9)
7. Inspiration/Charisma (item 10)
8. Level of Challenge (item 17)
9. Treatment of Divergent Views (items 12 and 13)
10. Defining and Expanding Relevance (item 14)
11. Facilitating Student Participation (items 19 and 20)
12. Facilitating Student-Student Interaction (item 21)
13. Asking Questions (item 22)
14. Answering Questions (items 23 and 26)
15. Choosing Appropriate Modes and Materials (items 11 and 16)
16. Instructional Flexibility and Individualization (items 18 and 27)
17. Facilitating Independent/Creative Inquiry (item 15)
18. Monitoring Student Response (items 24 and 25)
19. Making Expectations Clear (item 28)
20. Evaluation (items 29 and 30)
21. Defining and Expanding Ethical Contexts (item 31)

Figure 6. Twenty-One Technical Skills of Teaching and Related Student Evaluation Items

below the overall rating. Where the skills that were rated low could be viewed in terms of a more general problem domain, such as "discussion leading" or "clarity," then a clearer vision of what behaviors might undergo productive change in the classroom was obtained.

During this conference, or a second follow-up conference, the instructional specialists attempted to clarify low skill ratings by pointing out specific classroom episodes with the use of the videotapes. On occasion the instructional specialists used interaction analyses for pointing out classroom behavior patterns that might aid the interpretation of the ratings and indicate productive change directions.

In the conference the videotape viewing process was focused by the instructional specialist. The tape would be stopped at various places where data appeared that might relate to the student evaluations. Also, when the instructors had acknowledged the desire to alter their instruction in specific ways, the instructional specialists in reviewing the videotape often would stop the tape at points where the desired behavior changes might have been appropriate.

Follow-up. The experimental group also engaged in follow-up activities designed by the instructors and the instructional specialists. Such activities were specific to the particular change goals and included the following: successive videotaping and feedback sessions focusing on the appearance and reinforce-

ment of specific behaviors; micro-teaching with feedback from students as well as instructional specialists; videotape viewing and group discussion of instruction in the classroom; videotape viewing and group discussion among several of the instructors; administering and interpreting additional student evaluations; obtaining additional student feedback in the form of in-class audiotape recordings made be selected students; obtaining lesson specific achievement data; planning lessons; reading specific materials. Each member of the experimental group spent approximately ten additional hours in follow-up activities.

Additional Data Collection

Videotape II, Student Evaluations. Approximately eight weeks after the inception of the treatment process a final thirty-minute videotape and set of student evaluations were completed for both experimental groups and the control group. The same student evaluation questionnaire was used for the posttest as was used in the pretest.

Student Achievement Tests. During the second week and during the eighth week of the treatment process an essay-type exam was administered to the classes of all subjects. Two forms of this exam were constructed by the course director. Half of both experimental groups and the control group received one form of the exam as a pretest. This sequence was reversed for the posttest.

Data Analysis

The sequence of data collection and treatment for this study is summarized in Figure 7.

Interaction Analysis. The first fifteen minutes of all pretest and posttest videotapes were selected for the analysis. This segment of each tape was the most standardized across all subjects--reflecting the first fifteen minutes of each class. Two of these segments were transferred to one thirty-minute tape and coded for rating.

Four raters were then trained in a seventeen-category system of interaction analysis (Figure 8) developed for this study by subscripting categories from Flanders' ten-category system (Figure 9) (Amidon and Flanders, 1971). This training consisted of approximately six hours of supervised practice in using this system to analyze videotapes. Three of the four raters had had several hours of previous experiences using interaction analysis systems. Raters did not know which tapes were pretest and which posttest. An audio-tape counting off three-second intervals was played together with the videotape during the rating. One tape segment was rated by all four raters and the inter-rater reliability computed according to the following Scott coefficient (Flanders, 1967, pp. 161-166):

$$\text{coefficient "pi"} = \frac{P_o - P_e}{1 - P_e}$$

SEQUENCE OF DATA COLLECTION AND TREATMENT

EXPERIMENTAL GROUP	QUASI-EXPERIMENTAL GROUP	CONTROL GROUP
Initial Interview	Initial Interview	Initial Interview
Student Achievement Tests	Student Achievement Tests	Student Achievement Tests
Classroom Observation	Classroom Observation	
Videotape I	Videotape I	Videotape I
Student Evaluations	Student Evaluations	Student Evaluations
Interpretation Conference(s)	Interpretation Conference(s)	
Follow-up Procedures		
Videotape II	Videotape II	Videotape II
Student Evaluations	Student Evaluations	Student Evaluations
Student Achievement Tests	Student Achievement Tests	Student Achievement Tests

Figure 7. Sequence of Data Collection and Treatment

SEVENTEEN-CATEGORY INTERACTION ANALYSIS SYSTEM

1. Instructor accepts or discusses student feelings
2. Instructor praises or compliments
3. Instructor relates to student responses
    a. by simple acknowledgement or encouragement
    b. by restating, clarifying, incorporating or expanding the response
    c. by probing or encountering
    d. by redirecting the response to other students
    e. by correcting or disapproving
4. Question-asking
    a. lower order recall or convergent questioning
    b. higher order divergent or evaluative questioning
5. Lecturing
    a. focusing, summarizing, introducing, orienting statements
    b. all other lecturing
6. Giving directions
7. Criticizing or justifying authority
8. Student talk - responding
9. Student talk - initiating
10. Silence or confusion
    a. silence
    b. confusion

Figure 8. Seventeen-Category Interaction Analysis System

FLANDERS TEN-CATEGORY INTERACTION ANALYSIS SYSTEM

INDIRECT INFLUENCE	1. Accepts Feeling: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting or recalling feelings is included. 2. Praises or Encourages: praises or encourages student action or behavior. Jokes that release tension, but not at the expense of another individual; nodding head, or saying "um hm?" or "go on" are included. 3. Accepts or Uses Ideas of Students: clarifying, building, or developing ideas suggested by a student. As teacher brings more of his own ideas into play, shift to Category 5. 4. Asks Questions: asking a question about content or procedure with the intent that a student answer.
DIRECT INFLUENCE	5. Lecturing: giving facts or opinions about content or procedures; expressing his own ideas, asking rhetorical questions. 6. Giving Directions: directions, commands, or orders with which a student is expected to comply. 7. Criticizing or Justifying Authority: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
STUDENT TALK	8. Student Talk - Response: talk by students in response to teacher. Teacher initiates the contact or solicits student statement. 9. Student Talk - Initiation: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
	10. Silence or Confusion: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observor.

Figure 9. Flanders Ten-Category Interaction Analysis System

where P_o is the proportion of agreement, and P_e is the proportion of agreement expected by chance which is found by squaring the proportion of tallies in each category and summing these over all categories. Scott's coefficient can be expressed in words as the amount that two observors exceeded chance agreement divided by the amount that perfect agreement exceeds chance.

A computer program was developed for this study (deFreisse, 1973) which converted the interaction analysis scores to a 17 x 17 matrix and (by collapsing the subscripted categories) also converted them to a Flanders 10 x 10 matrix. The program also produced the following special measures: Ratio of Indirect Teacher Behaviors to Direct Behaviors (I/D Ratio), a Revised I/D Ratio, Total Indirect Behaviors (Extended Indirect), Total Direct Behaviors (Extended Direct), Total Teacher Talk, Total Student Talk, and the Student/Teacher Talk Ratio (Amidon and Flanders, 1971). When the first and second videotape scores of each instructor were submitted, the program computed a Difference Matrix. This matrix for examining differences between the first and second videotaped instructional episodes was completed for all three groups in the study.

Because many of the categories in the 17-category system appeared not to have been sufficiently differentiated by the raters, the Flanders 10-category system was used for most of the interaction analysis and interpretation. This was done in three ways: (1) through comparisons of the Difference Matrices,

(2) through comparisons of selected interaction analysis categories, and (3) through flow charts generated from each group matrix.

Student Evaluations. A numerical score was assigned to each of the values in the student evaluation instrument (E S I I! O). The mean score for each item in the pretest and posttest evaluations of each group was computed and compared. Comparisons were also made by means of t-tests. This procedure was repeated for groups of items within ten factors derived by means of factor analysis (Figure 10). (The factor matrix is contained in Appendix C).

Student Achievement. Three raters were trained by the Rhetoric 100 course director to rate the student writing tests along three dimensions: (1) "literacy," indicating the technical correctness of the writing, (2) "focus," indicating the ability of the writers to organize their ideas around a central purpose, and (3) "felicity," indicating the awareness displayed by the writer of his reader as evidenced in the use of rhetorical devices.

Ten matched pairs of student papers from each subject's class were rated by all three raters on each dimension. In the case of subjects with two class sections, only the section that was videotaped was used in the achievement rating.

The scores on the three dimensions were summed for each student and a mean score determined for each subject's class.

STUDENT EVALUATION FACTORS

FACTOR 1: All items

FACTOR 2: "Clarity and Presentation (items 1, 5, 6, 7, 8, 3, 4)"

FACTOR 3: "Interest (items 2, 10, 25, 9, 11)"

FACTOR 4: "Clarity (items 1, 5, 6, 7, 8)"

FACTOR 5: "Evaluation and Feedback (items 28, 29, 30)"

FACTOR 6: "Relating to Student Responses (items 23 and 26)"

FACTOR 7: "Relating to Student Needs (items 25 and 27)"

FACTOR 8: "Discussion Leading (items 19, 20, 21, 22)"

FACTOR 9: "Openness (items 11, 12, 13, 14, 15, 18, 24, 27, 31)"

FACTOR 10: "Course Design (items 16 and 17)"

Figure 10. Student Evaluation Factors

A total achievement mean score for the five classes in the experimental group and the four classes in the quasi-experimental and control groups was computed for pretest and posttest. Comparisons between these scores were aided by t-tests.

The results, interpretations and conclusions of these procedures are given detailed treatment in the following chapters.

C H A P T E R IV

RESULTS

Changes In Instructional Behavior: Interaction Analyses

In order to represent the characteristic patterns of instructional behavior for the experimental, quasi-experimental and control groups, a seventeen-category system of classroom behavior coding was employed in analyzing both pretest and posttest videotapes. The scores derived from this system were later reduced to a ten-category system (Amidon and Flanders, 1971). The results of both coding systems were displayed on matrices for interpretation. (Matrices not directly discussed in sections of this chapter are included in Appendix B.)

Difference Matrices. In order to identify changes in instructional behavior within each group from pretest to posttest videotaping, three Difference Matrices were computed. As indicated by the 10 x 10 Difference Matrix for the experimental group (Table V), substantial changes appear to have occurred in at least five column totals (3, 4, 5, 8, 9) and three cells (3-3, 5-5 and 9-9). The amount of student talk in the classes of the experimental group decreased by 10.71%, that is, 10.71% more of the first lesson was occupied by student talk than the second lesson (columns 8 and 9). The amount of lecturing increased by 12.21% (column 5). The time occupied by teacher questioning decreased by 4.90% (column 4). The amount of ac-

TABLE V

EXPERIMENTAL GROUP DIFFERENCE MATRIX

Categories

	* 1	2	3	4	5	6	7	8	9	10	
1	* 0	0	0	0	0	0	0	0	0	0	Tallies
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	* 0	-10	-1	-14	-1	1	1	-11	-7	-8	
	* 0.00	0.59	0.00	0.84	0.02	0.07	0.07	0.66	0.38	0.47	
3	* 0	-2	57	2	0	-2	0	-3	-7	5	
	* 0.00	0.12	4.26	0.22	0.06	0.12	0.00	0.17	0.38	0.35	
4	* 0	2	-4	-39	3	1	0	-35	-14	-3	
	* 0.00	0.13	0.25	2.23	0.23	0.07	0.00	2.03	0.84	0.01	
5	* 0	3	1	-6	154	-3	3	-2	4	1	
	* 0.00	0.21	0.07	0.27	11.86	0.19	0.20	0.11	0.30	0.13	
6	* 0	2	0	0	0	-3	0	-1	0	-1	
	* 0.00	0.13	0.00	0.00	0.01	0.18	0.00	0.06	0.00	0.05	
7	* 0	0	1	1	3	0	5	0	-1	1	
	* 0.00	0.00	0.07	0.07	0.20	0.00	0.34	0.01	0.06	0.07	
8	* 0	-24	4	-10	-1	1	0	-40	0	-14	
	* 0.00	1.37	0.36	0.56	0.04	0.07	0.00	1.77	0.02	0.85	
9	* 0	-17	-2	-9	-3	0	-2	2	-85	-7	
	* 0.00	0.97	0.05	0.49	0.17	0.00	0.12	0.13	4.49	0.40	
10	* 0	-4	-6	-14	0	2	3	6	-13	14	
	* 0.00	0.24	0.36	0.80	0.09	0.14	0.20	0.51	0.74	1.26	
TOTALS	* 0	-50	50	-89	155	-3	10	-84	-123	-12	
	* 0.00	2.82	4.10	4.90	12.21	0.15	0.68	4.14	6.37	0.05	

I/D RATIO ----------	-0.130
REVISED I/D RATIO --	-0.023
EXTENDED INDIRECT --	3.187
EXTENDED DIRECT ----	0.155
TEACHER TALK -------	10.660
STUDENT TALK -------	-10.714
STU/TEAC TALK RATIO	-0.304

cepting and using student ideas (column 3) increased 4.10%. Finally, though the percentage is small, the amount of teacher praise decreased 2.82% (column 2).

The remaining four columns changed insignificantly (columns 1, 6, 7 and 10). The 3-3 cell, indicating continuous using or expanding on student ideas increased by 4.26%. Continuous lecturing (cell 5-5) decreased by 4.49%. Reinforcement and praise (column 2) was particularly decreased following student talk (cells 8-2 and 9-2).

The Difference Matrix for the control group (Table VI) indicates notable changes in question-asking (column 4), lecturing (column 5), both student talk categories (columns 8 and 9) and silence (column 10). Columns 1, 2, 3, 6 and 7 did not change noticeably.

Question-asking by the instructors in the control group (column 4) became 5.17% less of the total lesson. Lecturing was 7.97% less. Teacher initiated student talk (student talk - response, column 8) decreased by 6.31% while student initiated talk increased 10.57% and silence increased 5.96%. Heavy change cells for the control group were cell 4-4 (continuous teacher question-asking, -3.78%); cell 5-5 (continuous lecturing, -8.30%); cell 8-8 (continuous student responding, -4.72%); cell 9-9 (continuous student initiated talk, +7.46%) and cell 10-10 (continuous silence, +3.43%).

The quasi-experimental group (Table VII) showed strong

TABLE VI

CONTROL GROUP DIFFERENCE MATRIX

Categories	1	2	3	4	5	6	7	8	9	10	
1	1	0	0	1	0	0	0	0	0	0	Tallies
	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	4	3	1	2	1	0	1	1	2	
	0.00	0.34	0.24	0.07	0.17	0.09	0.00	0.08	0.08	0.17	
3	1	0	11	-2	-5	0	0	-1	0	9	
	0.09	0.00	0.89	0.19	0.44	0.00	0.00	0.09	0.01	0.77	
4	0	0	2	-42	-7	1	0	-19	8	1	
	0.00	0.00	0.17	3.78	0.63	0.09	0.00	1.71	0.68	0.02	
5	0	3	0	-12	-87	0	0	7	6	1	
	0.00	0.25	0.00	1.10	8.30	0.00	0.00	0.59	0.51	0.06	
6	0	0	0	1	-1	1	0	0	1	2	
	0.00	0.00	0.00	0.09	0.09	0.08	0.00	0.00	0.09	0.17	
7	0	0	0	0	2	0	0	0	0	0	
	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	
8	0	1	-6	-12	1	0	1	-52	-3	1	
	0.00	0.06	0.54	1.07	0.07	0.00	0.09	4.72	0.27	0.07	
9	0	5	4	2	9	0	1	1	9	15	
	0.00	0.41	0.34	0.16	0.77	0.00	0.09	0.09	7.46	1.26	
10	0	2	-1	7	4	1	0	-6	24	42	
	0.00	0.17	0.09	0.57	0.30	0.09	0.00	0.54	2.04	3.43	
TOTALS	2	15	13	-56	-89	4	2	-59	156	73	
	0.17	1.23	1.01	5.17	7.97	0.34	0.17	6.31	10.57	5.96	

I/D RATIO	0.017
REVISED I/D RATIO	-0.035
EXTENDED INDIRECT	1.213
EXTENDED DIRECT	0.084
TEACHER TALK	-10.217
STUDENT TALK	4.261
STU/TEAC TALK RATIO	0.157

TABLE VII

QUASI-EXPERIMENTAL GROUP DIFFERENCE MATRIX

Categories	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	Tallies
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	-2	9	0	0	-1	2	-3	4	-4	
	0.00	0.16	0.74	0.01	0.00	0.08	0.16	0.24	0.33	0.32	
3	0	1	30	7	1	0	0	2	-2	3	
	0.00	0.08	2.49	0.58	0.08	0.00	0.00	0.16	0.16	0.25	
4	0	0	2	-37	-4	-2	0	4	-2	6	
	0.00	0.00	0.16	2.95	0.32	0.16	0.00	0.35	0.16	0.51	
5	0	-3	1	-1	114	-5	-1	-6	0	0	
	0.00	0.24	0.08	0.06	9.75	0.41	0.08	0.49	0.00	0.02	
6	0	-2	0	0	-3	-59	0	-2	-1	-2	
	0.00	0.16	0.00	0.00	0.24	4.80	0.00	0.16	0.08	0.16	
7	0	0	-1	0	0	0	-4	0	1	0	
	0.00	0.00	0.08	0.00	0.00	0.00	0.33	0.00	0.08	0.00	
8	0	3	2	8	-8	-1	-1	89	-5	1	
	0.00	0.25	0.17	0.66	0.65	0.08	0.08	7.40	0.41	0.09	
9	0	-3	-2	-3	-3	-1	-1	0	-116	-3	
	0.00	0.24	0.16	0.24	0.24	0.08	0.08	0.00	9.31	0.23	
10	0	3	1	-7	2	0	1	4	-3	-4	
	0.00	0.25	0.08	0.56	0.16	0.00	0.08	0.34	0.23	0.28	
TOTALS	0	-3	42	-33	99	-69	-4	86	-132	-3	
	0.00	0.21	3.49	2.56	8.58	5.61	0.32	7.36	10.59	0.13	

I/D RATIO ---------- -0.035

REVISED I/D RATIO -- 0.444

EXTENDED INDIRECT -- 4.486

EXTENDED DIRECT ---- -5.041

TEACHER TALK ------- 3.359

STUDENT TALK ------- -3.232

STU/TEAC TALK RATIO -0.031

changes in accepting and using student ideas (column 3), in question-asking (column 4), in lecturing (column 5), in giving directions (column 6) and in both student response and student initiation (columns 8 and 9).

The amount of class time devoted to using student ideas in the quasi-experimental group (column 3) increased 3.49%. Lecturing (column 5) increased by 8.58%. Giving directions (column 6) decreased by 5.61%. Student response (column 8) increased by 7.36%, and student initiation (column 9) decreased by 10.59%. In terms of notable cell changes, continuous use of student ideas (cell 3-3) increased by 2.49%; continuous question-asking (cell 4-4) decreased by 2.95%; continuous lecturing (cell 5-5) increased by 9.75%; continuous direction-giving (cell 6-6) decreased by 4.80%; continuous student response (cell 8-8) increased by 7.40% and continuous student initiation (cell 9-9) decreased by 9.31%.

Comparison of Difference Matrices along Selected Dimensions. The numerical scores (number of three-second tallies), the percentage of the total second videotape lesson that these represent, the change in the number of tallies and the change in the lesson percentage from the pretest videotape along a number of significant dimensions are listed in Table VIII for all three groups in the study.

From this table it is possible to see more clearly how each group changed from pretest to posttest lesson. Several important

TABLE VIII

COMPARISON OF INTERACTION ANALYSIS DIMENSIONS

	EXPERIMENTAL	CONTROL	QUASI-EXPERIMENTAL	
1. Accepts Feeling	23	2	0	Tallies for second lesson
	1.54	.17	0	Percent of second lesson
	+23	+2	0	1st/2nd lessons difference (tallies)
	+1.54	+.17	0	1st/2nd lessons difference (percent)
2. Praise	54	40	29	
	3.62	3.43	2.39	
	-50	+15	-3	
	-2.82	+1.23	-.21	
3. Uses Student Ideas	195	63	71	
	13.09	5.40	5.84	
	-50	+13	+42	
	+4.10	+1.01	+3.49	
4. Asks Questions	120	118	120	
	8.05	10.11	9.88	
	-89	-56	-33	
	-4.90	-5.17	-2.56	
5. Lecturing	508	368	529	
	34.09	31.53	43.54	
	+155	-82	+99	
	+12.21	-7.97	+8.58	
6. Giving Directions	8	2	2	
	0.54	.16	.16	
	-3	+4	-69	
	-0.15	+.34	-5.61	

TABLE VIII

COMPARISON OF INTERACTION ANALYSIS DIMENSIONS (continued)

	EXPERIMENTAL	CONTROL	QUASI-EXPERIMENTAL	
7. Criti-cizing	12	2	4	Tallies for second lesson
	.81	.17	.33	Percent of second lesson
	+2	+2	-4	1st/2nd lessons difference (tallies)
	+.17	+.17	-.32	1st/2nd lessons difference (percent)
8. Student Talk-Response	208	119	203	
	13.96	10.20	16.71	
	-84	-69	+88	
	-4.14	-6.31	+7.63	
9. Student Talk-Initiation	206	234	141	
	13.83	20.05	11.60	
	-123	126	-132	
	-6.57	10.57	-10.59	
10. Silence-Confusion	156	215	116	
	10.47	18.42	9.55	
	-12	+73	-3	
	-.05	+5.96	-.13	
Cell 3-3	142	36	46	
	9.53	3.08	3.79	
	+57	+11	+30	
	+4.26	+.89	+2.49	
Cell 4-4	36	43	60	
	2.42	3.68	4.94	
	-39	-42	-37	
	-2.23	-3.78	-2.95	

TABLE VIII

COMPARISON OF INTERACTION ANALYSIS DIMENSIONS (continued)

	EXPERIMENTAL	CONTROL	QUASI-EXPERIMENTAL	
Cell 5-5	452	313	483	Tallies for second lesson
	30.34	26.82	39.75	Percent of second lesson
	+154	-87	+114	1st/2nd lessons difference (tallies)
	+11.86	-8.30	+9.75	1st/2nd lessons difference (percent)
Cell 8-8	139	74	166	
	9.33	6.34	13.66	
	-40	-52	+89	
	-1.77	-4.72	+7.40	
Cell 9-9	122	169	117	
	10.20	14.48	9.63	
	-85	+89	-116	
	-4.49	+7.46	-9.31	
Cell 10-10	77	121	48	
	5.17	10.37	3.95	
	+14	+42	-4	
	+1.26	+3.43	-.23	
3a. Acknowledgement	42	34	28	
	2.82	2.91	2.30	
	-47	+15	+12	
	-2.70	+1.25	+1.00	
3c. Probing	54	42	40	
	3.62	3.60	3.29	
	-54	-23	+19	
	-3.07	-2.11	+1.58	

TABLE VIII

COMPARISON OF INTERACTION ANALYSIS DIMENSIONS (continued)

	EXPERIMENTAL	CONTROL	QUASI-EXPERIMENTAL	
3d. Redirecting	9	8	2	Tallies for second lesson
	.60	.69	.16	Percent of second lesson
	-11	+6	0	1st/2nd lessons difference (tallies)
	-.64	+.51	0	1st/2nd lessons difference (percent)
5A. Orienting	89	10	65	
	5.97	.86	5.35	
	+19	-12	+15	
	+1.63	-1.07	+1.28	
I/D Ratio	.426	.372	.291	Second Lesson
	-.130	+.017	-.005	1st/2nd lessons difference
Revised I/D Ratio	.944	.951	.959	
	-.023	-.035	+.444	
Extended Indirect	14.966	7.798	7.819	
	+3.187	+1.213	+4.486	
Extended Direct	.403	.171	.000	
	+.155	+.084	-5.041	
Teacher Talk	61.745	51.328	62.140	
	+10.660	-10.217	+3.359	
Student Talk	27.785	30.249	28.313	
	-10.714	+4.261	-3.232	
Stud./Teacher Talk Ratio	.450	.589	.456	
	-.304	+.167	-.081	

patterns emerge.

First, there appears to be much more parity between the changes that took place in the experimental and quasi-experimental groups compared to the control group. For example, in column 3, using student ideas, the experimental and quasi-experimental groups gained 4.10% and 3.49% respectively, while the control group gained only 1.01%.

In column 5, lecturing, although the final percentages for all three groups on the posttest are similar (34.09%, 31.53% and 43.54%) the tendency for both experimental and quasi-experimental groups was to increase the amount of direct teacher influence, that is, to increase lecturing, while for the control group the tendency was to decrease direct influence. Since the absolute number of tallies is very high, these percentage differences indicate substantial change.

Remarkable here is the fact that as indicated in the above analysis, using student ideas (column 3) in the experimental and quasi-experimental groups also had a tendency to increase. In other words, both the experimental and quasi-experimental instructors tended to be both more "direct" and more "indirect" in their teaching as witnessed by the second videotape. This change pattern is described by Flanders (1970) as "flexible." The control group showed only a slight incease in "indirect" teaching and a decrease in "direct" teaching.

Cells 3-3 and 5-5 reflect these similarities and differ-

ences. The 3-3 cell for the experimental and quasi-experimental groups increased 4.26% and 2.49% respectively, and .89% for the control group. The percentages for the 5-5 cell were +11.86% and +9.75% for the experimental and quasi-experimental groups, and -8.30% for the control group.

The special measure of "extended indirect" from Table VIII (which totals the number of tallies and percents in the intersections of columns 1, 2, 3 and rows 1, 2, 3 of the matrix) and the "total teacher talk" measure further support the "flexible" pattern of the experimental and quasi-experimental groups. The total number of indirect behaviors increased 3.18% for the experimental group, 4.486% for the quasi-experimental, and 1.21% for the control.

In terms of total teacher talk, which totals columns 1 through 7 of the matrix, the experimental group showed an increase of 10.77% from 51.08% to 61.74%. The control group decreased from 61.545% to 51.82%. The quasi-experimental group reflected the experimental group with an increase of 3.35% from 58.78% to 62.14%.

The total student talk (columns 8 and 9), ratio of student talk to teacher talk, and cells 8-8 and 9-9 also tended to differentiate between the experimental and quasi-experimental groups on the one hand and the control group on the other.

Both the experimental and quasi-experimental groups showed decreases in the amount of time occupied by students in class

(the sum of columns 8 and 9). For the experimental and quasi-experimental groups the decrease was 10.71% and 3.23% respectively. For the control group there was an increase of 4.26%. The resulting student/teacher talk ratio was -.304 experimental, -.081 quasi-experimental and +.167 control. Cells 8-8 and 9-9 taken together indicate a total decrease for the experimental and quasi-experimental groups in continuous student talk (-6.26% and -1.91%). The control group increased 10.89% in these combined cells.

There is also an interesting difference among the groups in terms of "silence or confusion" (column 10). This is an important classification in that the amount of silence and the placement of silence indicates a great deal about the pace or rhythm of the instruction. The amount of silence for both experimental and quasi-experimental groups remained approximately the same for both lessons. Silence or confusion in the classes of the control group increased by 5.96%.

For the most part this increased silence in the control group occurred in the 10-10 cell. In this cell the total second observation number of tallies was 121, an increase of 42 tallies and 3.43%. In other words, there was a marked increase in extended (six seconds or more) silence in the control group. There was also an increase of 15 tallies in the control group's 9-10 cell indicating more silence after a student contribution or a change in student speakers.

The patterns for category 4, question-asking, were largely the same for all three groups. As indicated in Table VIII the total number of tallies during the second observation of the experimental, control and quasi-experimental groups was 120, 118 and 120. The number of tallies and percentage of instructor questioning decreased in all three cases: -89 tallies experimental, -56 tallies control, -33 tallies quasi-experimental.

Column 2, praise (indicating both extended general praise as well as short encouragement and prompting) decreased in the experimental group by 2.82%, remained approximately the same in the quasi-experimental group and increased by 1.23% in the control group.

Flanders' special I/D Ratio, the relationship of indirect teaching modes (columns 1 - 4) to total teacher talk (columns 1 - 7) is intended to trace instructor tendencies toward greater or lesser "control" over the classroom. As described in the previous discussion the experimental and quasi-experimental goups tended to become both more indirect and more direct: the overall result was a decrease in their I/D Ratio (-.130 experimental, -.005 quasi-experimental). The I/D Ratio for the control group increased by .017.

The remaining categories of Table VIII which have not been discussed (Column 1, Column 6, Column 7) and special measures (Revised I/D Ratio, Extended Direct) do not offer very much

information. Column 1 (accepts feeling) clearly showed differences among the groups (+1.54% experimental, +.7% control) but the number of tallies in this category was minimal, including none at all for the quasi-experimental group.

Columns 6 and 7 also accounted for a minor percent of the total behavior observed: 25 tallies or .32% of the total 7,854 tallies of both observations for all groups fell into category 7. One hundred tallies or 1.23% fell into category 6, which was also a special case because one continuous segment (59 tallies) of one lesson concerned giving directions.

Since the Revised I/D Ratio has only categories 6 and 7 as the denominator and since Extended Direct is the total of the 6-6, 6-7, 7-6 and 7-7 cells of the matrix, these measures yielded little useful information.

The 17 x 17 interaction analysis matrix was designed to identify teaching patterns in a classroom more specifically. This was accomplished by adding to the 10 x 10 matrix seven categories. However, category 4b (higher order questioning) was not discriminated well enough for raters during their training. Categories 3e and 10b contained almost no tallies. The remaining four categories are also listed in Table VIII.

Category 5a (focusing, summarizing, introducing, orienting) was differentiated from the general category of lecturing. According to the data, the experimental and quasi-experimental groups increased markedly in this category: 19 tallies

1.63% for experimental, 15 tallies 1.28% for quasi-experimental. The control group decreased by 12 tallies -1.07% in this category. It is also noteworthy that the vast majority of these orienting statements occurred in continuous sequence. Of the 89 tallies in 5a for the experimental group, 78 occurred in the 5a-5a continuous cell; for the quasi-experimental group, 50 of 65 tallies occurred in the 5a-5a cell. Only 4 of the control group's 10 tallies in 5a occurred in the 5a-5a cell.

Category 3a, indicating the very brief almost perfunctory "yes," "very good," "right" kinds of teacher encouragement and prompting of student contributions was separated from category 2, praise. At the second videotape observation the experimental group exhibited much less of this kind of behavior (-47 tallies, -2.70%). Both the control group and the quasi-experimental groups however increased these behaviors: +15 tallies 1.25% for control, +12 tallies 1.00% for quasi-experimental.

In terms of category 3c, both the experimental and control groups decreased: -54 tallies -3.07% experimental, -23 tallies -2.11% control. The quasi-experimental group increased by 19 tallies +1.58%. In this data then there does not appear to be a strong relationship between student-centeredness in terms of using student ideas (category 3) where the experimental and quasi-experimental groups increased markedly and student-centeredness in terms of probing or encountering student ideas (category 3c), where only the quasi-experimental

group increased.

Category 3d, also separated from the general category of questioning, showed a definite decline in the experimental group (-11 tallies, -.64%) and a definite increase in the control group (+6 tallies, +.51%). The quasi-experimental group for the most part did not exhibit redirecting behaviors.

As illustrated in Table IX, of sixteen categories and special measures in the interaction analysis, half involved the experimental and quasi-experimental groups changing in one direction while the control group changed in the opposite direction. Two showed all three groups moving in the same direction but with the experimental and quasi-experimental groups moving much more decidedly in that direction. Five involved some other combination.

The eight measures wherein the experimental and quasi-experimental groups move in the same direction and the control group in the opposite direction are based on observational categories which account for 79.84% of the total classroom behavior in both pretest and posttest videotapes of the combined groups (columns 2, 5, 8, 9, 10). If the instance where both experimental and quasi-experimental groups increase decidedly more than the control group (column 3) is added, this figure rises to 86.91%. In other words, if this 86.91% of the two videotaped classroom lessons of the Rhetoric sample were viewed through these particular interaction analysis categories,

TABLE IX

DIRECTION OF CHANGE ON STUDENT EVALUATIONS FOR EACH SUB-GROUP

Dimensions Where Experimental and Quasi-Experimental Groups Change Opposite Control Group	Dimensions Where Experimental and Quasi-Experimental Groups Change Similarly But More Markedly Than Control Group	Other
2. Exper. -2.82% Quasi- -.21 Control +1.23	3. Exper. +4.10% Quasi- +3.49 Control +1.01	1. Exper. +1.54% Quasi- .00 Control +.17
5. Exper. +12.21% Quasi- +8.58 Control -7.97	Extended Indirect Exper. +3.187 Quasi- +4.486 Control 1.213	4. Exper. -4.90% Quasi- -2.56 Control -5.17
8. and 9. Exper. -10.71% Quasi- -3.23 Control +10.57		3a. Exper. -2.70% Quasi- +1.00 Control +1.25
10. Exper. -.05% Quasi- -.13 Control +5.96		3c. Exper. -3.07% Quasi- +1.58 Control -2.11
5a. Exper. +1.63% Quasi- +1.28 Control -1.07		3d. Exper. -.64% Quasi- .00 Control +.51
I/D Exper. -.130 Quasi- -.005 Control +.017		
Teacher Talk Exper. +10.660 Quasi- +3.359 Control -10.217		

TABLE IX

DIRECTION OF CHANGE ON STUDENT EVALUATIONS FOR EACH SUB-GROUP (continued)

Dimensions Where Experimental and Quasi-Experimental Groups Change Opposite Control Group	Dimensions Where Experimental and Quasi-Experimental Groups Change Similarly But More Markedly Than Control Group	Other
Stud./Teacher Talk Ratio Exper. -.304 Quasi- -.081 Control +.167		

in every category it would be observed that the experimental and quasi-experimental groups changed, changed in the same direction, and changed in contrast to the control group.

Flow Charts. A useful way of displaying interaction analysis data is through flow charts. These are constructed from interaction analysis matrices in the following way: (1) a certain minimum number of tallies in each cell to be represented on the flow chart is chosen, (2) all "steady state" cells (5-5, 4-4, 3-3, etc.) with this number of tallies or more are represented on a chart in proportionately sized boxes and all transition cells (4-8, 5-4, 3-4, etc.) with this number of tallies or more are represented by connecting arrows, and (3) all other "steady state" or transition cells are added as necessary such that there is an arrow leading to and exiting from each box. (For purposes of interpretation certain transition cells or steady state cells are entered which have a total number of tallies below the established minimum number.)

The minimum number of tallies chosen for this interpretation was 20. The number of tallies in each flow chart entered through these procedures is approximately 80% of the total tallies recorded for the same lesson on the 10 x 10 matrix. Thus what these flow charts represent are the most typical patterns of instructional behavior that one would observe in these classrooms eighty percent of the time.

The pretest flow chart for the experimental group (Figure 11) depicts large amounts of lecturing (5-5), student initiated talk (9-9) and student responding (8-8). The amount of teacher question-asking (4-4) and the amount of using student ideas (3-3) are approximately equal.

The general "flow" of the instruction is to and from the teacher's question-asking (4-4). Thus the transitions from lecturing to question-asking (5-4), silence to question-asking (10-4), student initiated talk to question-asking (9-4), student responding to question-asking (8-4) and teacher praise (2-2) to question-asking (2-4) are all solid lines on the flow chart (twenty or more tallies). This indicates a more or less teacher-centered mode, perhaps recitational. There is also a strong student-centered tendency, as evidenced in the relatively large number of using student ideas (box 3-3).

The most typical instructional sequence is from question-asking to student responding to short praise to question-asking.

After treatment the experimental group (Figure 12) showed a tendency to become more teacher-centered and more student-centered, a result which Flanders terms "flexibility" or the tendency of teachers to alternate their basic instructional modes in response to different instructional situations (Flanders, 1970).

Lecturing for the experimental group increased by 154 tallies or approximately 50%. The use of student ideas increased

EXPERIMENTAL GROUP PRETEST FLOW CHART

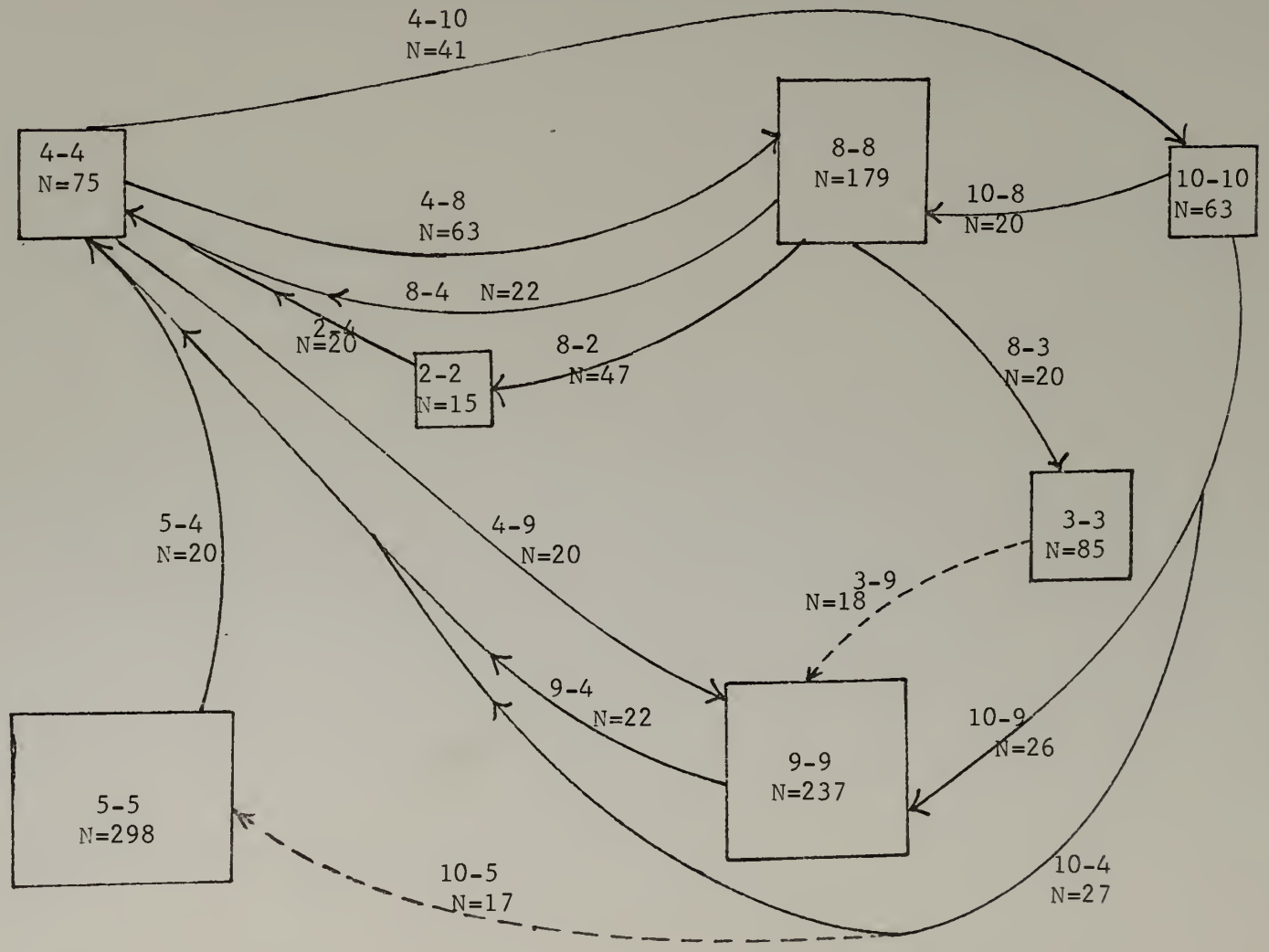

Figure 11. Experimental Group Pretest Flow Chart

EXPERIMENTAL GROUP POSTTEST FLOW CHART

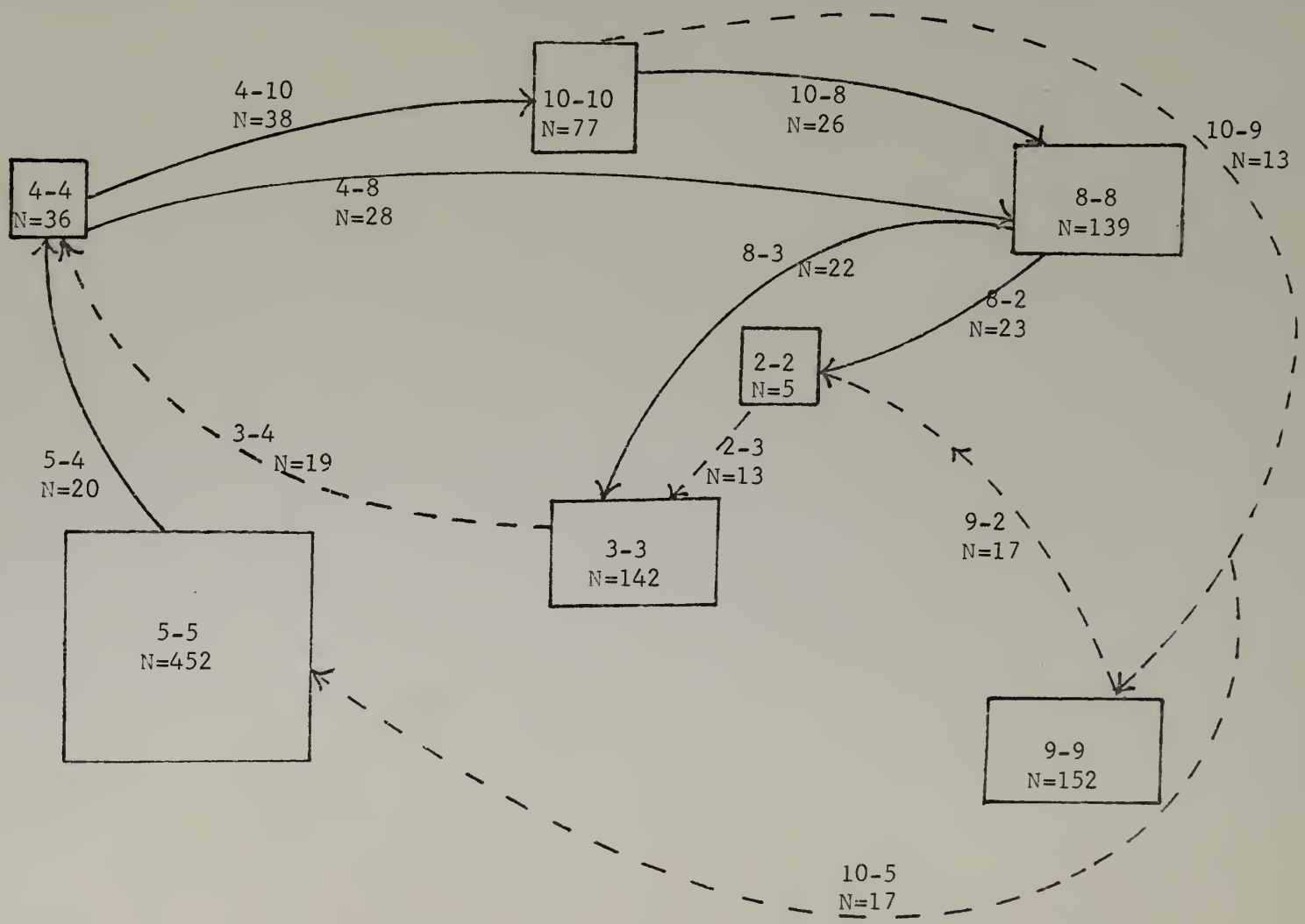

Figure 12. Experimental Group Posttest Flow Chart

57 tallies or 70%. Whereas the instructional patterns in the experimental group's pretest flowed toward teacher question-asking from five different directions, in the posttest this flow was from only two directions (lecturing to question-asking, and using student ideas to question-asking). The instructional patterns in the experimental group's posttest flowed mainly toward the 3-3 box, clarifying and using student ideas.

The most typical instructional sequence in the posttest was from question-asking (4-4) to silence (10-10) to student responding (8-8) then equally to short praise (2-2) and to using student ideas (3-3). The tallies in the 2-2 box moreover tended to flow to 3-3. Student talk decreased by approximately 30%.

The quasi-experimental group's pretest flow chart (Figure 13) is characterized by large amounts of lecturing (5-5) and student initiated talk (9-9), very similar to the experimental group. The amount of student response in this group was much less than that of the experimental group (77 tallies) and the amount of continuous teacher question-asking (4-4) was slightly greater.

The student-centeredness (3-3) of the quasi-experimental pretest group was very little (16 tallies) compared to the pretest 85 tallies of the experimental group. The quasi-experimental group also contained a pretest lesson involving prolonged direction giving .

QUASI-EXPERIMENTAL GROUP PRETEST FLOW CHART

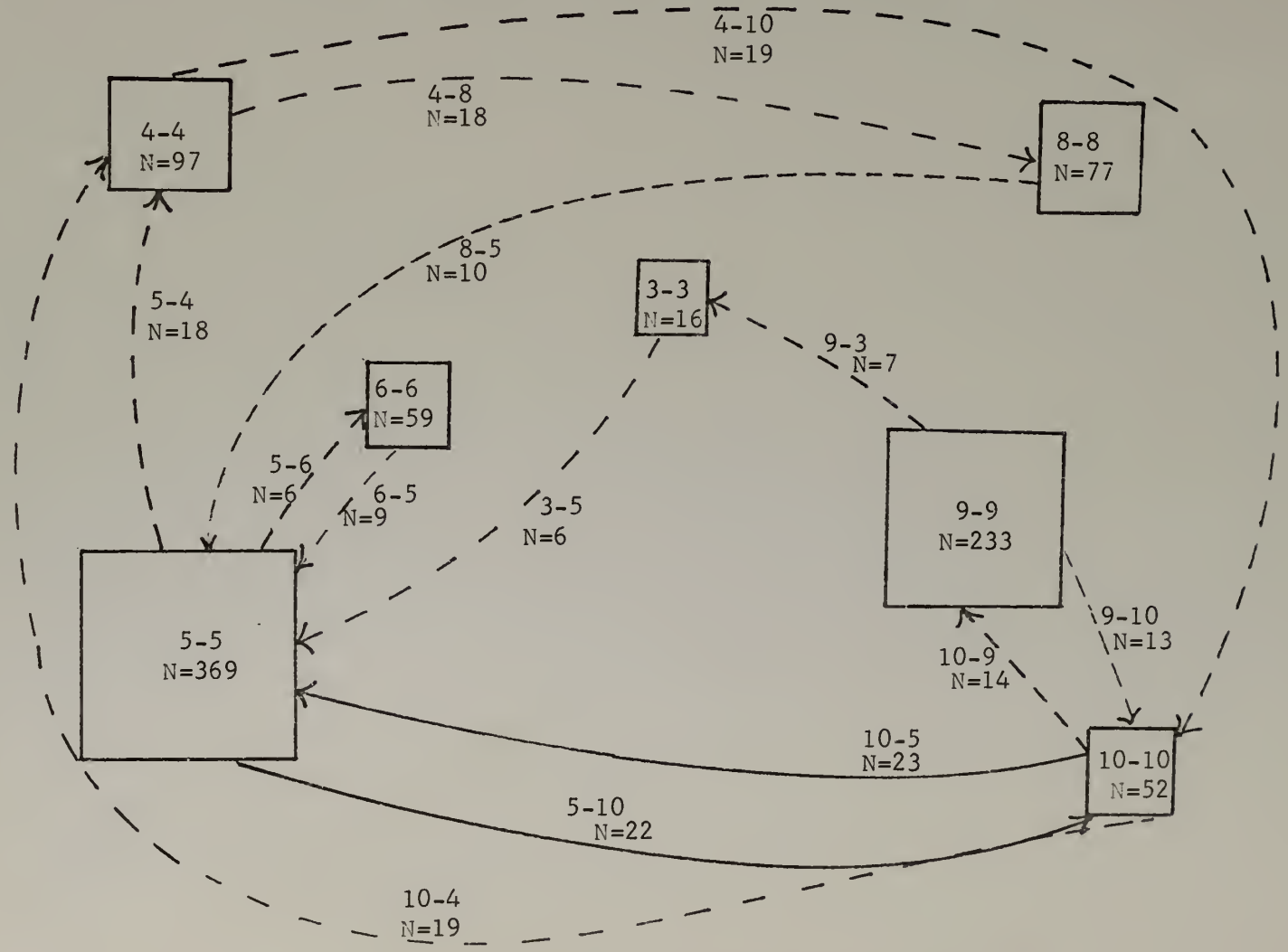

Figure 13. Quasi-experimental Group Pretest Flow Chart

The primary flow of the quasi-experimental group's instruction in the pretest was in two directions: toward teacher lecturing (48 tallies from four directions) and toward silence (54 tallies from four directions). The most typical instructional sequence was from question-asking (4-4) to silence (10-10) to lecturing (5-5) to silence (10-10) to question-asking (4-4).

In the quasi-experimental group's posttest (Figure 14) the primary instructional pattern was from question-asking to silence to lecturing to silence--almost exactly the same as in the pretest. The shift that occurred for the experimental group toward student-centeredness (3-3) as well as teacher-centeredness (5-5) was approximated but to a much lesser degree by the quasi-experimental group.

The control group pretest (Figure 15) was similar to the other two groups in that lecturing (5-5) and student responding (8-8) were relatively large categories. The control group however was characterized in the pretest by more lecturing (400 tallies) than the other two groups and a lesser amount of total student talk (206 tallies). There was more silence in the control group, roughly twice as much as the experimental group. The control group was also similar to the quasi-experimental group in terms of the small amount of using student ideas (3-3) displayed.

QUASI-EXPERIMENTAL GROUP POSTTEST FLOW CHART

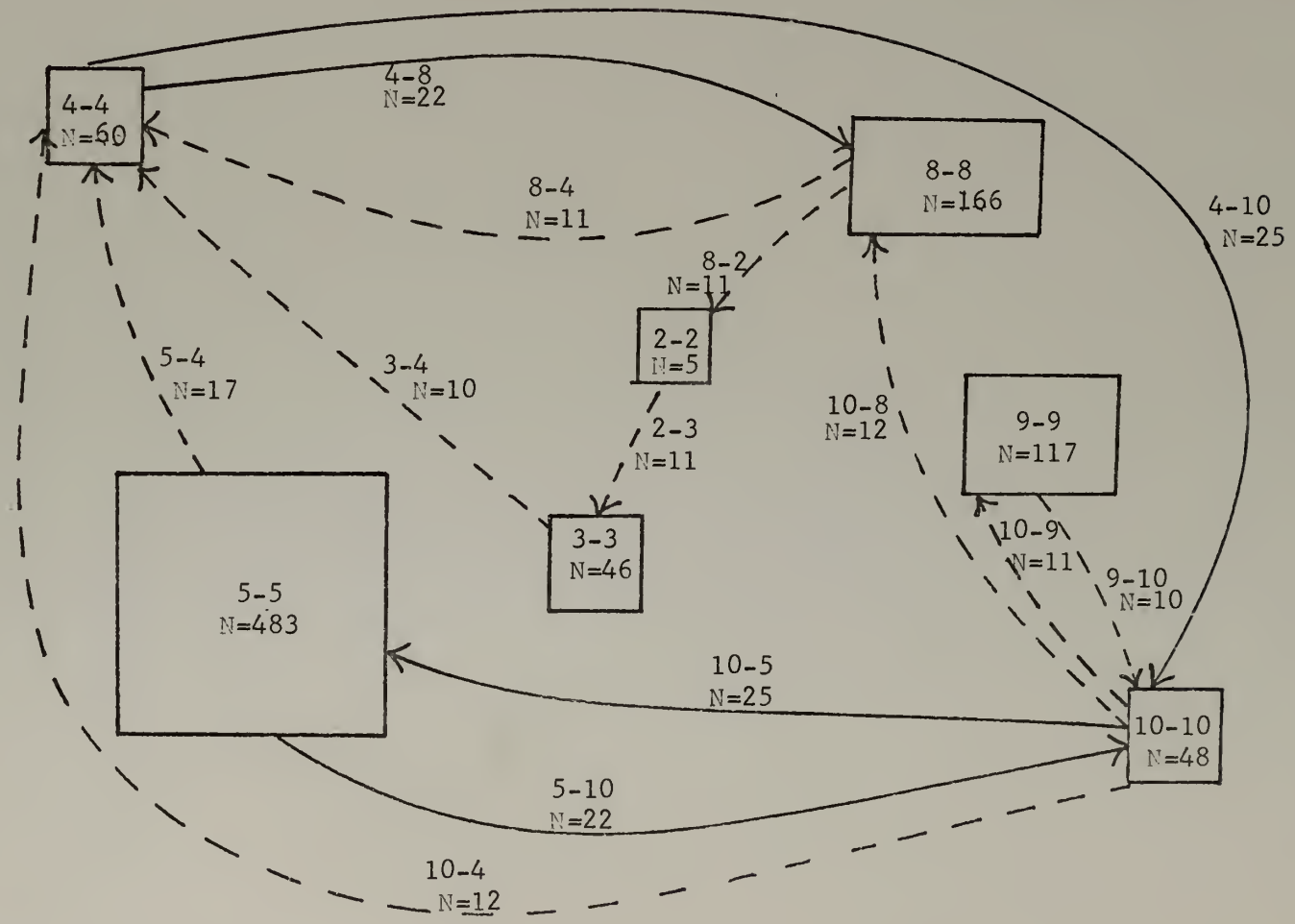

Figure 14. Quasi-Experimental Group Posttest Flow Chart

CONTROL GROUP PRETEST FLOW CHART

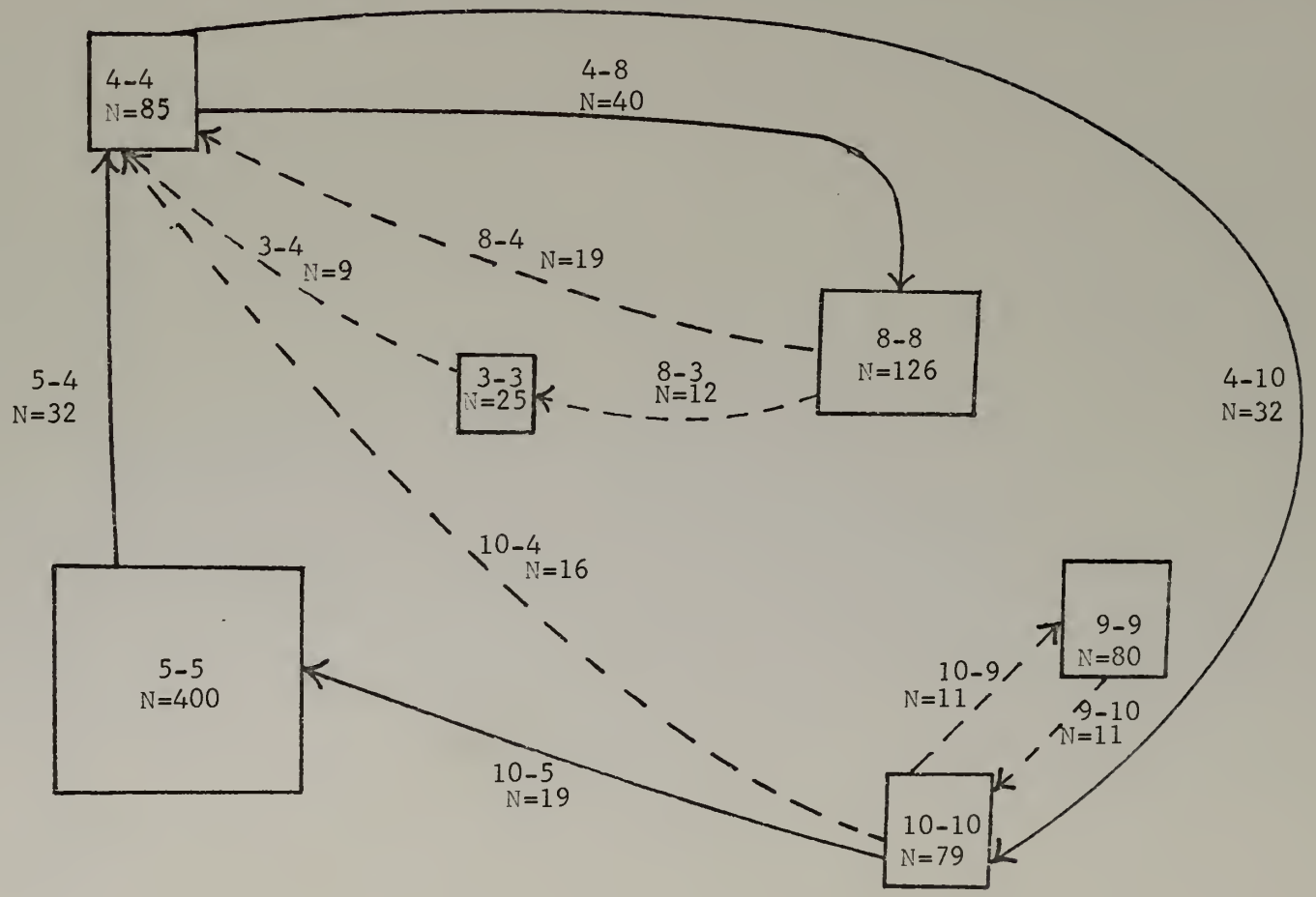

Figure 15. Control Group Pretest Flow Chart

The general flow of the instructional patterns in the control group's pretest videotape as in the experimental group's, was toward question-asking (76 tallies from four directions). There were two sequences that were dominant: question-asking to student response to question-asking and question-asking to silence to lecturing to question-asking.

The control group posttest showed a marked drop in question-asking, which was also true for the experimental and quasi-experimental groups. There was also a marked decrease in lecturing, which ran counter to these other two groups. Also in contrast was the control group's increase in total student talk and silence.

The dominant flow of the control group's posttest instruction was toward silence (10-10), 69 tallies from four directions.

The most typical instructional sequence was from question-asking to silence to student initiation to silence--and then either back to question-asking or to lecturing. The instructional pattern shift then in the control group was toward the strengthening of the silence-student initiation, student initiation-silence sequences, with the intervals of student initiated talk and silence being much longer.

Significance of Changes. The use of statistics to estimate the significance of the changes in instructional behavior discussed above was judged to be inappropriate to

CONTROL GROUP POSTTEST FLOW CHART

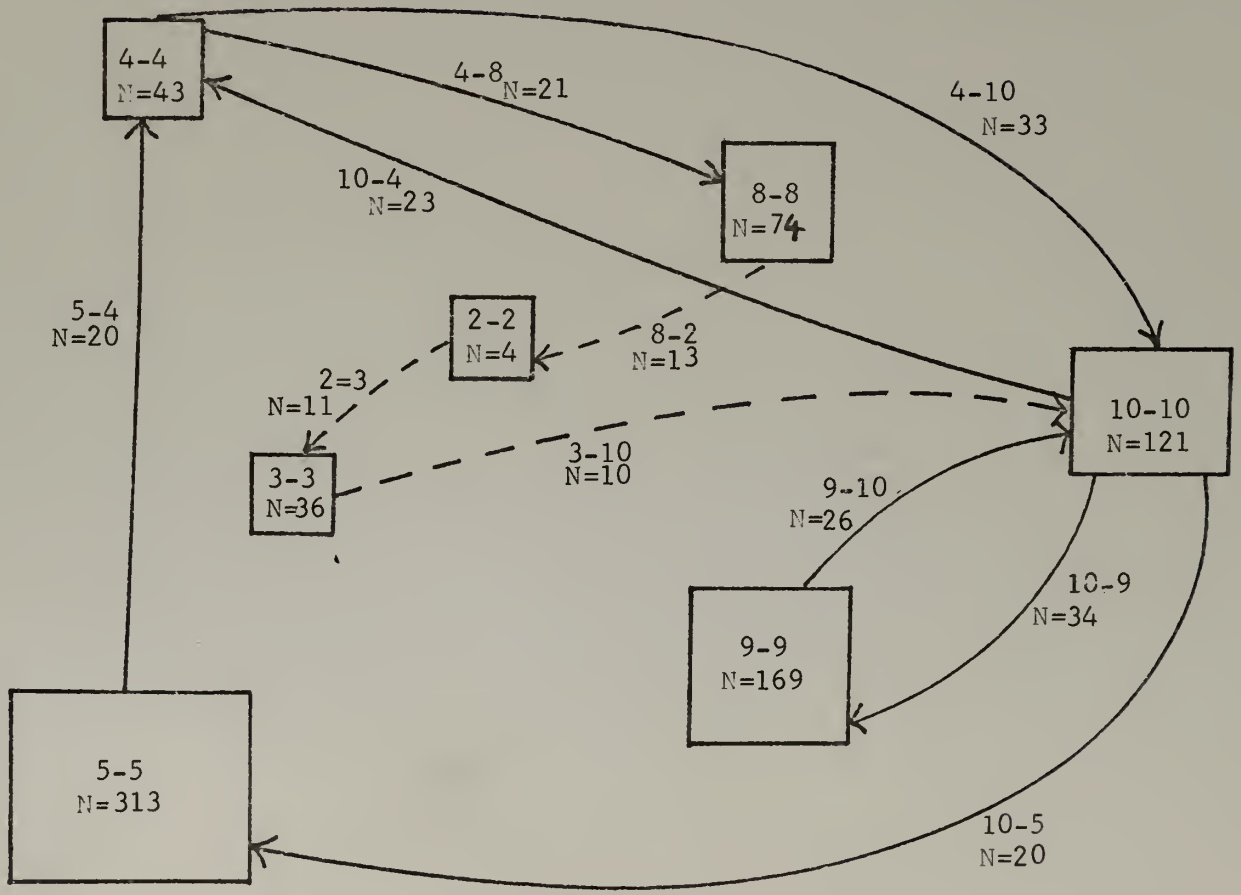

Figure 16. Control Group Posttest Flow Chart

the present study primarily because the sample size, thirteen, broken up into three groups was exceedingly small.

According to Flanders (1970), who has conducted studies of a similar nature with larger numbers of teachers, the increased or decreased behavior in any one category does not need to be large in order to be significant:

> It is important to place these changes in teaching behavior into a reasonable perspective. The increased use of Category 3, for example, is only a matter of 4 or 5 percent. A control group might average around 8 percent Category 3, while those who study interaction analysis are more likely to average from 3 to 5 points higher (p. 358).

In which case several of the instructional behavior changes revealed in the present study might be considered significant changes, including for example Category 3 in the experimental and quasi-experimental groups.

Inter-Rater Reliability. Rating reliability among the four interaction analysis raters was estimated by the Scott coefficient reported by Flanders (1967). One fifteen minute videotaped teaching segment was scored by all raters and the scores compared.

The resulting reliability estimates were extremely varied, ranging from a low of .4657 (Rater 1 and Rater 4) to a high of .7808 (Rater 2 and Rater 4). The test case reported by Flanders (1967, p. 163) indicated a reliability of .8899.

Table X represents the four raters' scores on the rater reliability tape in each of the categories of the 10-category system. It is apparent from this table that the greatest part of the discrepancy among the raters occurred in differentiating "student talk - response" from "student talk - initiation."

The difference between a student "initiation" where the student's ideas, views or information go beyond what was requested by the instructor--and a student "response," can be a very difficult distinction to make on a videotape recording, especially where the microphone is not aimed at student speakers.

If categories 8 and 9 were considered as one category, the rater reliability would be much greater.

Student Evaluations

A thirty-one item questionnaire asking students to evaluate their instructors on a number of technical teaching skills was administered twice to all groups.

Pretest and posttest comparisons between items were aided by t-tests. Comparisons were also made between clusters of items suggested by factor analysis. (Detailed representation of this data appears in Appendix C).

Table XI contains a summary of these comparisons. As indicated, only a few of the thirty-one questionnaire items or ten special factors showed any real change. The disparity between the three groups in terms of the items that did appear

TABLE X

RATER SCORES FOR ONE FIFTEEN-MINUTE LESSON USING THE FLANDERS TEN-CATEGORY SYSTEM

Category	Rater 1	Rater 2	Rater 3	Rater 4
1. Accepts Feeling	0	0	0	0
2. Praises or Encourages	7	20	12	19
3. Uses Student Ideas	20	18	15	15
4. Asks Questions	37	28	32	35
5. Lecturing	44	54	47	44
6. Giving Directions	0	6	0	3
7. Criticizing	0	0	0	0
8. Student Talk-Response	153	105	49	72
9. Student Talk-Initiation	31	83	128	92
10. Silence or Confusion	18	11	17	18
TOTALS	310	325	300	298

TABLE XI

COMPARISON OF STUDENT EVALUATION PRETEST AND POSTTEST SCORES FOR INDIVIDUAL ITEMS AND FACTORS

	EXPERIMENTAL		QUASI-EXPERIMENTAL		CONTROL	
Var.	Diff. in Mean	T-Value	Diff. in Mean	T-Value	Diff. in Mean	T-Value
1.	+.2076	1.32	.00	.00	+.1118	.80
2.	-.0433	-.35	-.0945	-.69	+.1212	.80
3.	+.1407	1.05	+.1258	.70	-.1852	-1.19
4.	-.0744	-.54	+.0322	.27	+.2058	1.29
5.	+.2393	1.61	+.0570	.42	-.0564	-.36
6.	-.0038	-.03	-.2778	-1.77	+.1673	1.26
7.	+.2771	1.61	+.0983	.54	-.0104	-.06
8.	+.1516	.90	-.1293	-.70	+.0357	.19
9.	-.1268	-1.31	-.2916	-1.97*	+.1964	1.47
10.	+.0388	.34	-.0763	-.47	+.0687	.60
11.	-.1245	-1.05	-.0782	-.53	+.0160	.10
12.	-.1189	-1.44	-.2684	-2.11*	+.0771	.68
13.	+.1697	1.23	-.1242	-.71	+.0291	.22
14.	+.3328	1.97*	+.0638	.28	-.0714	-.52
15.	+.1542	.73	-.2703	-1.10	-.0808	-.35
16.	+.2607	1.87	+.0960	.56	-.2707	-1.60
17.	-.0648	-.50	-.2128	-1.27	+.1964	1.47
18.	+.1021	.40	-.2231	-.93	+.2030	.88
19.	-.0761	-.71	+.0539	.39	+.1429	.79

*significant at the .05 level

TABLE XI (continued)

COMPARISON OF STUDENT EVALUATION PRETEST AND POSTTEST SCORES FOR INDIVIDUAL ITEMS AND FACTORS

Var.	EXPERIMENTAL		QUASI-EXPERIMENTAL		CONTROL	
	Diff. in Mean	T-Value	Diff. in Mean	T-Value	Diff. in Mean	T-Value
20.	+.0040	.05	-.2785	-2.51*	+.0075	.05
21.	-.0011	-.01	+.0598	.43	+.1268	.93
22.	-.0763	-.78	-.0501	-.42	+.1626	1.18
23.	+.4083	2.74*	-.3352	-1.83	+.1701	1.07
24.	+.0180	.16	-.0336	-.19	-.1240	-.93
25.	+.0561	.42	-.0952	-.58	-.2589	-.93
26.	-.0522	-.52	-.1389	-.86	+.2133	1.51
27.	+.0353	.34	-.1326	-.94	-.0056	-.04
28.	+.4055	2.70*	-.0941	-.54	+.3891	2.19*
29.	+.2341	1.59	+.1405	.96	+.0216	.13
30.	+.1830	1.06	-.5084	-2.04*	-.2396	-1.25
31.	-.0098	-.05	-.1715	-.75	+.2265	1.16
F1	+.0860	1.53	-.1021	-1.16	+.0558	.63
F2	+.1335	1.55	-.0137	-.13	+.0381	.37
F3	-.0399	-.51	-.1270	-1.17	+.0547	.47
F4	+.1743	1.91	+.0497	.48	-.0504	-.45
F5	+.2744	2.38*	-.1534	-1.14	+.0571	.41
F6	+.1780	1.82	-.2370	-1.74	+.1918	1.53
F7	+.0457	.50	-.1139	-.91	-.0822	-.64

TABLE XI (continued)

COMPARISON OF STUDENT EVALUATION PRETEST AND POSTTEST SCORES FOR INDIVIDUAL ITEMS AND FACTORS

Var.	Diff. in Mean	T-Value	Diff. in Mean	T-Value	Diff. in Mean	T-Value
F8	-.0373	-.55	-.0538	-.58	+.1100	.92
F9	+.0999	1.28	-.1294	-1.05	+.0401	.43
F10	+.0980	.90	-.0584	-.41	-.0372	-.31

to change is difficult to interpret. All of the notable differences that occurred for the quasi-experimental group were negative. No two of these negative items appear in any one factor however, so there is no evident "pattern" of change. Items 12 and 20 might be viewed in terms of the instructors' relating to students and their openness, keying from the words "feel free," "invites," and "share" (see Table XII, for a list of apparent change items in the quasi-experimental group). These data point perhaps to increased restrictiveness in this group's classrooms. Items 6 and 23 point to poor performance in terms of "clarity." Item 9 concerns presentation style and item seventeen refers to the curriculum design.

The remaining student evaluation items for this group show no change. Twenty-one of the thirty-one student evaluation items and all seven factors showed very slight declines in the ratings.

TABLE XII

QUASI-EXPERIMENTAL GROUP STUDENT EVALUATION ITEMS AND FACTORS INDICATING CHANGE

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6. "The instructor knows when to elaborate on a topic and he/she elaborates effectively by using examples, pointing out relationships, and/or giving more detailed explanations."
   Mean: -.2778 T-Value: -1.77

9. "The instructor has an effective presentation style (e.g. voice quality, choice of words, body movements, etc.)."
   Mean: -.2916 T-Value: -1.97*

12. "The instructor makes students feel free to disagree with him/her, with fellow students or with the readings."
    Mean: -.2684 T-Value: -2.11*

17. "The level of difficulty and the amount of work in this course are about right for me."
    Mean: -.2128 T-Value: -1.27

20. "The instructor invites students to share their knowledge, experiences, and opinions at appropriate times."
    Mean: -.2785 T-Value: -2.51*

23. "The instructor restates students' questions for clarification and answers them in a way that the whole class understands."
    Mean: -.3352 T-Value: -1.83

30. "The instructor keeps the students posted on their progress through questions in class, individual conferences, and appropriate quizzes and tests."
    Mean: -.5084 T-Value: -2.04*

F6 "Relating to Student Responses (items 23 and 26)"
   Mean: -.2370 T-Value: -1.74

The control group showed noticeable change in five items and one factor (Table XIII).

Patterns in this data however are also difficult to delineate. Item 4 might be interpreted with item 9 to suggest a general improvement in the instructors' classroom presentations. The positive direction of item 17 is offset by the negative direction of item 16, both items referring to course design. Item 26 points to a more positive relating to student responses and item 28 suggests improved instructor procedures for evaluating students. None of these items form a clear trend with their related items as indicated by the low factor scores throughout the control group. To some extent Factor 6, "relating to student responses (items 23 and 26)" is an exception, but not a definitive one.

The experimental group showed marked change in ten individual items and three factors (Table XIV). Two of these items showed change in a negative direction (items 9 and 12).

The three factors ("evaluation and feedback," "clarity," and "relating to student responses") were especially positive, indicating that the experimental group instructors had improved in such specific ways as making expectations clear for the course and for individual lessons, evaluating clearly and consistently, explaining and summarizing ideas, and restating,

TABLE XIII

CONTROL GROUP STUDENT EVALUATION ITEMS AND FACTORS

INDICATING CHANGE

---

4. "The instructor arranges and presents material in a clear, well-organized fashion."
   Mean: +.2058 T-Value: 1.29

9. "The instructor has an effective presentation style (e.g. voice quality, choice of words, body movements, etc.)."
   Mean: +.1964 T-Value: 1.47

16. "The general design of this instructor's course (number and choice of lectures, discussions, reading, papers, examinations) is appropriate."
   Mean: -.2707 T-Value: -1.60

17. "The level of difficulty and the amount of work in this course are about right for me."
   Mean: +.1964 T-Value: 1.51

26. "The instructor answers questions, or encourages and helps others to answer them, with understanding and clarity."
   Mean: +.2133 T-Value: 1.51

28. "The instructor makes clear to students what is expected of them and how their performances are to be evaluated."
   Mean: +.3891 T-Value: 2.19

F6 "Relating to Student Responses" (items 23 and 26)
   Mean: +.1918 T-Value: 1.53

TABLE XIV

EXPERIMENTAL GROUP STUDENT EVALUATION ITEMS AND FACTORS INDICATING CHANGE

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1. "When beginning a class, lesson, or new instructional activity, the instructor usually makes clear what he/she hopes to accomplish."
   Mean: +.2076 T-Value: 1.32

5. "In this instructor's class it is usually possible to know which points are most important, and to see the relationships between topics."
   Mean: +.2393 T-Value: 1.61

7. "The instructor provides useful summaries at appropriate times, (e.g. at end of class session or end of unit).
   Mean: +.2771 T-Value: 1.61

9. "The instructor has an effective presentation style (e.g. voice quality, choice of words, body movements, etc.)
   Mean: -.1268 T-Value: -1.31

12. "The instructor makes students feel free to disagree with him/her, with fellow students, or with the readings."
    Mean: -.1189 T-Value: -1.44

14. "The instructor relates the topics to a wide range of fields, situations, applications, and interests."
    Mean: +.3328 T-Value: 1.97*

16. "The general design of this instructor's course (number and choice of lectures, discussions, readings, papers, examinations) is appropriate."
    Mean: +.2607 T-Value: 1.87

23. "The instructor restates students' questions for clarification and answers them in a way that the whole class understands."
    Mean: +.4083 T-Value: 2.74*

28. "The instructor makes clear to students what is expected of them and how their performances are to be evaluated."
    Mean: +.4055 T-Value: 2.70

TABLE XIV

EXPERIMENTAL GROUP STUDENT EVALUATION ITEMS AND FACTORS INDICATING CHANGE (continued)

29. "The instructor evaluates student work in a clear and consistent way."
Mean: +.2341 T-Value: 1.59

F4 "Clarity (items 1, 5, 6, 7, 8)"
Mean: +.1743 T-Value: 1.91

F5 "Evaluation and Feedback (items 28, 29,30)"
Mean: +.2744 T-Value: 2.38*

F6 "Relating to Student Responses (items 23 and 26)"
Mean: +.1780 T-Value: 1.82

clarifying and answering student questions. The overall change factor for the experimental group (F1) was decidedly higher than that of the control group and quasi-experimental group.

Student Achievement

All groups in the study completed student achievement tests. Two forms of the test were used, each one given to half the students as a pretest and reversed as a posttest. The intervening period between pretest and posttest was approximately eight weeks. The tests were rated by three subject matter specialists according to three dimensions: "literacy," "focus," and "rhetorical felicity."

The results of these ratings (Table XV) indicate that none of the groups underwent dramatic changes in achievement. It is notable however that the average student achievement scores of the experimental group gained 3.33 points. The scores for the quasi-experimental group remained roughly the same. The scores or the control group decreased by 2 points.

The achievement scores of three of the five classes in the experimental group advanced. Three of four classes in the quasi-experimental group advanced. Two of four classes in the control group advanced.

Six classes received test "x" first and seven received test "o" first. Four of the six test x - test o sequence classes improved their achievement ratings by the second test. Four of the seven test o - test x sequence group improved their achieve-

TABLE XV

STUDENT ACHIEVEMENT SCORES

EXPERIMENTAL GROUP:	Mean	Standard Deviation	T-Value
pretest:	79.933	10.363	1.34
posttest:	83.266	5.861	

QUASI-EXPERIMENTAL GROUP	Mean	Standard Deviation	T-Value
pretest:	73.750	9.725	.06
posttest:	73.583	14.061	

CONTROL GROUP	Mean	Standard Deviation	T-Value
pretest:	82.417	7.948	.46
posttest:	80.417	15.442	

ment ratings. The mean score for the two tests across the entire sample differed by 3 points.

Correspondance Among Measures

The instructional problems (defined in terms of technical teaching skills) identified by the experimental and quasi-experimental groups after the initial data analysis and feedback process centered on issues of "clarity," "student participation" and "evaluation/feedback." The specific goals of these instructors concerned improving questioning skills, eliminating vagueness, focusing, clarifying goals and standards, summarizing and reinforcing (Table XVI).

The factors from the student evaluations in which the experimental group showed marked improvement were "clarity," "relating to student responses" and "evaluation and feedback." These factors included specific questions concerning clarifying lesson objectives to students, organizing ideas, summarizing, restating and clarifying student questions, making expectations clear and evaluating student work.

The instructional behaviors which showed marked changes in the experimental group were an increase in lecturing, an increase in orienting statements and an increase in accepting and using student ideas.

There would appear to be a logical relationship between the improvement goals of the experimental group, the results of the student evaluations and the observed instructional be-

TABLE XVI

INSTRUCTIONAL PROBLEMS AND IMPROVEMENT GOALS

OF EXPERIMENTAL AND QUASI-EXPERIMENTAL GROUPS

	Problems	Improvement Goals
EXPERIMENTAL GROUP	Lack of student participation	Reduce the amount of vagueness in questioning
	Discussion had little direction	Increase teacher directiveness and structuring
		Reduce extended student talk by focusing
	Lack of clarity on the part of students concerning the purpose and results of classroom lessons	Spend more time clarifying goals and objectives
	Lack of effective feedback and evaluation procedures	Increase the occurrence of reinforcement, probing and redirecting
		Increase the number of summaries
		Spend more time clarifying course and lesson requirements and evaluation criteria
QUASI-EXPERIMENTAL GROUP	Lack of student participation	Reduce the amount of vagueness in questioning
		Reduce repetitious questioning
	Lack of clarity on the part of students concerning the purpose and results of classroom lessons	Spend more time clarifying goals and objectives
		Focus and summarize more often
		Use more feedback during class discussion
	Lack of effective feedback and evaluation procedures	Organize presentations more deliberately
		Emphasize important points and relationships

TABLE XVII

CORRESPONDANCE BETWEEN IMPROVEMENT GOALS, BEHAVIOR CHANGES, AND STUDENT EVALUATION SCORES (EXPERIMENTAL GROUP)

Improvement Goals	Behavior Changes	Student Evaluation Scores
Increase instructor focusing and structuring	An increase in instructor lecturing (category 5)	Positive change in Factor 4, "clarity (items 1, 5, 6, 7, 8)"
Increase the number of summaries	An increase in orienting statements (category 5a)	
Spend more time clarifying goals and objectives		
Reduce the amount of vagueness in questioning	Reduction in continuous question-asking (cell 4-4)	
Spend more time clarifying course and lesson requirements and evaluation criteria	An increase in instructor lecturing (category 5)	Positive change in Factor 5, "evaluation and feedback (items 28, 29, 30"
	An increase in orienting statements (category 5a)	
Increase the occurrence of reinforcement, probing and redirecting	An increase in accepting and using student ideas (category 3)	Positive change in Factor 6, "Relating to Student Responses (items 23 and 26)

havior changes of these instructors. This relationship is illustrated in Table XVII.

In other words, the instructors in the experimental group appeared to change the instructional behavior which they intended to change as judged by an analysis of pretest and posttest videotaped lessons, and these changes appear to have been recognized and reported by the students through the student evaluation items.

C H A P T E R V

DISCUSSION AND CONCLUSIONS

Purpose and Procedures

The purpose of this study was to test a particular model for the improvement of instruction at the higher education level. This model was characterized both by its focus on evaluating and changing a discrete number of technical skills of teaching (question-asking, elaboration, pacing, etc.), and its data collection, analysis and treatment procedures. These included an initial interview with the instructor, classroom videotaping, student evaluations, an instructional specialist working individually with the instructor, and various follow-up procedures.

A group of thirteen graduate student teaching assistants, all of whom were teaching a required freshman Rhetoric course were randomly divided into three groups: experimental, quasi-experimental and control. The first group completed each phase of the instructional improvement model including follow-up procedures occupying approximately ten hours time. The second group completed only the first phase of this model, ending with the identification of teaching skills which could be improved. The third or "control" group completed only the data collection steps in the model.

All three groups also administered a specially devised student achievement test to their students during the fourth week of

the semester, while the initial data collection was taking place. A final student achievement test, videotape and student evaluation were completed approximately eight weeks later, at the conclusion of the semester. The class size, course goals and student assignments were similar across all sections of the course.

The pretest and posttest videotapes were analyzed and compared by independent raters through a seventeen-category interaction analysis instrument adapted from Flanders (1971). The achievement tests were analyzed and compared by three subject matter specialists using a rating system constructed by the course director. Student evaluations were computed in terms of frequency counts and mean scores for each item and for ten general factors. Changes in achievement test scores and student evaluation items and factors were computed statistically by means of t-tests. Changes in classroom instructional behavior as identified through interaction analysis were interpreted from the interaction analysis matrices and flow charts representing these matrices.

The major assumptions of the study were that the analysis of instruction by higher education instructors using the focus and procedures of this improvement model would result in: (1) the identification and alteration of "problematic" teaching skills, (2) positive change in related student evaluation scores and (3) greater achievement as measured on pre- and post- achievement tests.

It was also assumed that instructors not exposed to the analysis and feedback aspects of this model would not manifest these results (or would not manifest them to the same extent). Finally, it was assumed that instructors who were exposed only to initial analysis and feedback without follow-up procedures either would not manifest these results or would manifest them to a lesser extent.

Summary of Results

Change in Instructional Behavior. The results of analyzing the pretest and posttest videotapes of all three groups revealed that the experimental group's general instructional pattern changed from a heavy emphasis on instructor question-asking with extended student responding and initiating to one with a heavy emphasis on the instructor's expanding and clarifying student ideas with extended instructor lecturing. This might be described as an increase in "flexibility" (Flanders, 1970).

The control group's general instructional pattern shifted from a heavy emphasis on question-asking with extended instructor lecturing to heavy emphasis on silence with extended student talk evolving out of that silence. This might be described not as a trend toward student-centeredness on the part of these instructors but rather a general lessening of their overt involvement in the class.

The quasi-experimental group shifted slightly from a general pattern emphasizing lecturing and question-asking and si-

lence to one emphasizing lecturing, question-asking, student responding and silence.

Flow charts of the overall instructional patterns in the three groups illustrated that the quasi-experimental group shifted much less than either the control or experimental group, and that the control group appeared to shift less than the experimental group.

In general the two experimental groups changed in the same direction and changed in contrast to the control group. For example they did more clarifying and expanding of student ideas. They lectured more and made more "orienting statements." They also showed less silence in their classrooms, in which the ratio of student talk to teacher talk decreased.

The extended treatment group changed more than the limited treatment group in each of these change dimensions.

Changes in Student Evaluations. Of thirty-one items on the student evaluations, three showed positive significant change in the experimental group; three showed significant negative change in the quasi-experimental group and one showed significant positive change in the control group.

The experimental group improved in "defining and expanding relevance," in "relating to student ideas" and in "making expectations clear."

The quasi-experimental group regressed in "expression," "facilitating student participation" and in "evaluation."

The control group improved in "making expectations clear."

Only one general factor for any of the groups changed significantly. This was the "evaluation and feedback" factor in the experimental group. Two other factors in that group ("clarity" and "relating to student responses") were very close to significant change.

Changes in Achievement. Although none of the differences between pretest and posttest achievement scores were significant, it is noteworthy that the mean achievement score of the experimental group students gained 3.33 points while that of the quasi-experimental group students did not change and that of the control group students decreased by 2 points. The scores were a sum of three independent scores representing a rating of the mechanics of writing, clarity of purpose and rhetorical ability.

Conclusions

Despite numerous methodological problems and limitations discussed below, it may be said that the results of this study tentatively support the assumptions. The classroom instructional behavior, student evaluations and student achievement of the instructors in the experimental group did appear to change in desirable ways, whereas the classroom behavior of the instructors in the quasi-experimental and control groups changed less, and their student evaluations and student achievement for the most part did not change in desirable ways.

The fact that the observed instructional behavior changes

and the student evaluation changes of the instructors in the experimental group tend to correspond with their stated problems and improvement goals suggests that the behavior changes in this group were intentional and were related to the treatment process.

The follow-up treatment moreover appears to have been important in that the quasi-experimental group altered its behavior in the same directions as the experimental group (having expressed similar change goals) but did not change to the same extent.

Finally, the achievement data tentatively support the conclusion that clarifying and expanding student ideas, making orienting statements and lecturing are critical variables in the instruction of this particular kind of course. Instructors who manifested more of these behaviors from their first to their second videotape tended to be rated higher by students and to generate higher student achievement.

One interpretation of the control group's videotape posttest results is that the instructors in the control group shifted their teaching style to one that relied much more on student initiation. Given the extremely long periods of silence that characterized these posttest videotapes however it seems probable that the students found this role difficult. A content analysis of these lessons might have indicated a lack of purposefulness and direction in the student talk.

The increased active participation of the instructors in the experimental group both through lecturing and through clarifying

and/or expanding on student contributions suggests that this group identified instructional goals and learned certain instructional behaviors through their involvement in the treatment process which related to improving their presentations and increasing their "student-centeredness." The sharper dichotomy between teacher-centered and student-centered instructional modes for the experimental group indicates both greater perceptiveness and greater flexibility on the part of these instructors in choosing the appropriate instructional mode to fit different contexts.

Limitations

Although the results suggest that this instructional improvement model is effective in promoting valuable instructional change, this conclusion must be qualified in numerous ways.

In the first place, since this mode of treatment was the only mode tested in this design, then it is possible to conclude that not this particular treatment but any systematic in-service educational treatment of higher education instructors will result in productive behavior change.

More specifically, Flanders (1970) and others (Amidon and Hough, 1967) have achieved similar results with primary through secondary school instructors without the use of videotape feedback and student evaluations. Their instructors, trained in interaction analysis, tended to become both more distinctly teacher-centered and student-centered ("flexible") in the classroom, and their students showed corresponding gains in achievement.

This suggests two hypotheses. First, since interaction analysis was used in this study as a feedback procedure by at least two of the three instructional specialists, then exposure to interaction analysis may have been the critical variable in the change process -- videotaping, student evaluations, etc., being superfluous. Second, since two different instructional analysis procedures tended to produce similar results, then the critical variable for change may lie in the very act of instructors observing, analyzing and attempting to improve their teaching -- a question of "mind set" -- and not in a particular improvement model.

In addition, because few situational variables were measured and the range of the measuring instruments was limited, it is not possible to know in this study whether other instructional variables (such as the instructor's overt level of enthusiasm or his belief in the value of the subject matter) or instructor personality variables or student personality variables or slight variations in curriculum or method were related to the results.

The use of random selection did not insure a normal distribution of such variables among the three groups. Thus it is obvious from the pretest flow charts of the groups that the experimental group is much more predisposed to student-centered instructional behaviors than the other two groups. One plausible conclusion of this study then is that the treatment will generate

"flexibility" in instructors whose initial instructional patterns are predisposed to "flexibility."

Other variables that were not measured in this study were the actual treatment of the instructors by the instructional specialists. In this study the instructional specialists worked with instructors from both the experimental and quasi-experimental groups. It is possible that the treatment given to the experimental group was qualitatively different rather than quantitatively different.

Furthermore, without having some measure of this treatment, it is impossible to know what role the instructional specialist plays in the overall model. All instructional specialists in this study might have been characterized by client-centeredness which fostered student-centered instructional change in the experimental groups through modeling, not through the treatment procedures of the model.

Also, although the course goals and procedures were to a large extent standardized, there were numerous deviations among instructors. The writing sample and the achievement rating system were composed by the course director to fit an overall model; some instructors with different specific goals might have generated strong student gains in respects not measured on the achievement test.

Finally, the results of the data in the present study were not conclusive. With five instructors or less in each group it

was not possible to ascertain the level of significance for changes in classroom instructional behaviors as recorded in the interaction analysis categories. Furthermore, of thirty-one items and ten factors in the student evaluations of each group, only three items and one factor in the experimental group actually showed significant positive change (at the .05 level), while the only three items that showed significant change for the quasi-experimental group changed in a negative direction. Moreover one of the significant change items in the experimental group also changed significantly in the control group, indicating a variable operating in the experimental situation other than the treatment. Although trends existed for achievement gains by the experimental group and losses in the control group, much of the variance can be attributed to chance.

Implications for Future Research

Certainly replication of this study with a larger sample is highly recommended. It would also be important in future studies of this kind to measure more of the situational variables. This includes the use of additional instruments such as those measuring non-verbal behavior as well as expansion of the measuring instruments used in this study. The achievement testing particularly should attempt to measure outcomes that are ascertained as congruent with the specific goals of individual instructors.

Closely measuring a wide range of instructional variables

is especially necessary if the research on cause-effect relationships or "laws" in instruction is to be advanced. Such research depends on making correlations between specific instructional variables and specific learning outcomes across a number of well defined instructional contexts.

In order to generalize the present model, it would also be important to apply it in different instructional contexts. This includes different academic departments and student grade levels as well as different instructional styles. In terms of the latter, it might be recommended that videotaping and interaction analysis be used first to identify groups of instructors with distinctive styles. Members from each group could then be randomly assigned to treatment and non-treatment groups.

For the purpose of improving the treatment model itself, it would be necessary to (1) test it in similar conditions against other models, and (2) measure more closely each variable in the model and vary these under experimental conditions.

The apparent regression in the quasi-experimental group in this study in terms of student evaluations suggests another line of future inquiry: whether improvement programs such as the one presented here, when enacted on a short-term basis without follow-up, can actually do more harm than good.

Finally, it would seem important for future studies to address the question of the videotape medium itself in terms of its propensity to foster certain kinds of instructional change

vis-a-vis other data collection and feedback media. It is possible for example that instructors viewing themselves on videotape will be more inclined to alter their apparent relationship with students rather than relationships of a less overt and more intellectual nature. The latter might be better promoted through written transcripts of the classroom or even audiotape.

Summary

Compared to many previous studies in the field of in-service teacher education, the present study was exemplary in its attempt to deal with the complexities of instructional situations. Both direct observational data and student evaluational data and achievement data were collected, analyzed and compared.

The results of these analyses and comparisons suggest numerous directions for valuable future research.

The apparent correspondance between the stated improvement goals of the instructors, the observed changes in instructional behavior and the changes in certain student evaluation categories among the experimental group instructors in this study tend to support the conclusion that instructors can decide to alter their instruction in productive ways and that students do detect and respond to such changes.

In light of the paucity of in-service teacher education programs and models at all levels of education--but especially at the higher education level, the results and implications of this study are important and deserve additional investigation.

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APPENDIX A

COURSE INFORMATION AND PRE-VIDEOTAPING INFORMATION FORMS

Course Information Form

1. Department _____

2. Name of teacher _____

3. Course title _____

4. Catalogue description of course (type in from catalogue).

5. Prerequisites _____

6. Other courses in sequence _____

7. For which, if any, programs is this course a requirement?

_____

8. How many students are enrolled? _____

9. How many of the enrolled students are:

   a. Freshman? _____ c. Juniors? _____

   b. Sophomores? _____ d. Seniors? _____

10. What is the structural format of the course (i.e., three lectures a week, one lecture group and two discussion groups, etc.)?

_____

11. How are student grades determined? _____

_____

12. Are grades (check appropriate responses): pass/fail? _____
satisfactory/unsatisfactory? _____ A through F _____

13. Try to get and attach: a. syllabus c. assignments
b. reading list d. examinations

14. Generally, what are the informational, skill, and affective course objectives? (Please list on back of this sheet.)

15. What is the presumed relationship between what happens in class and the work which students are asked to do outside class?

Course Information Form (continued)

16. If this course is in any sense experimental (either in objectives or teaching patterns), describe. _____

_____

17. Has the teacher had any particular highs or difficulties with this course? If so, describe. _____

_____

18. If there are others now teaching this course, who and/or how many? _____

_____

Name_____

Date of class_____

Pre-videotaping Information

To enhance our understanding of the videotape of your class, would you please take a few moments to answer the questions which follow? Please note that neither specific behavioral objectives nor an elaborate lesson plan are being requested. The intention is merely to provide a frame of reference for the videotaped class.

Would you please complete this and give it to me before class?

1. Generally, what are your objectives for this class (i.e. to elaborate on specified concepts or processes, to introduce a new topic, to review previously considered material, to go over assigned readings, etc.)? _____

_____

_____

2. How do you hope to accomplish those objectives (i.e. by lecturing, class discussion, asking questions, etc)?_____

_____

_____

3. What do you expect students to have done to prepare for this class? _____

_____

4. What do you exp-ct students to do during class? _____

_____

_____

5. If you think it would be useful, would you describe what was done in the immediately preceding class? _____

_____

_____

THANK YOU

APPENDIX B

INTERACTION ANALYSIS MATRICES

10 x 10 Pretest and Posttest Matrices for Each Sub-group

17 x 17 Pretest and Posttest Matrices for Each Sub-group

17 x 17 Difference Matrices for Each Sub-group

EXPERIMENTAL GROUP 10 x 10 PRETEST MATRIX

Categories

	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	Tallies
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	15	14	20	9	0	0	15	17	14	
	0.00	0.93	0.87	1.24	0.56	0.00	0.00	0.93	1.05	0.87	
3	0	2	85	17	11	2	0	7	18	3	
	0.00	0.12	5.27	1.05	0.69	0.12	0.00	0.43	1.12	0.19	
4	0	0	4	75	6	0	0	63	20	41	
	0.00	0.00	0.25	4.65	0.37	0.00	0.00	3.91	1.24	2.54	
5	0	1	0	26	298	3	0	5	7	13	
	0.00	0.06	0.00	1.61	18.47	0.19	0.00	0.31	0.43	0.81	
6	0	0	0	0	1	4	0	2	0	4	
	0.00	0.00	0.00	0.00	0.06	0.25	0.00	0.12	0.00	0.25	
7	0	0	0	0	0	0	0	1	1	0	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	
8	0	47	18	22	5	1	0	179	3	17	
	0.00	2.91	1.12	1.36	0.31	0.06	0.00	11.10	0.19	1.05	
9	0	34	15	22	6	0	2	0	237	13	
	0.00	2.11	0.93	1.36	0.37	0.00	0.12	0.00	14.69	0.81	
10	0	5	9	27	17	1	0	20	26	63	
	0.00	0.31	0.56	1.67	1.05	0.06	0.00	1.24	1.61	3.91	
TOTALS	0	104	145	209	353	11	2	292	329	168	
	0.00	6.45	8.99	12.96	21.89	0.68	0.12	18.10	20.40	10.42	

I/D RATIO ----------	0.556
REVISED I/D RATIO --	0.957
EXTENDED INDIRECT --	11.779
EXTENDED DIRECT ----	0.248
TEACHER TALK -------	51.085
STUDENT TALK -------	38.500
STU/TEAC TALK RATIO	0.754

EXPERIMENTAL GROUP 10 x 10 POSTTEST MATRIX

Categories

	* 1	2	3	4	5	6	7	8	9	10	
1	* 0	0	0	0	0	0	0	0	0	0	Tallies
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	* 0	5	13	6	8	1	1	4	10	6	
	* 0.00	0.34	0.87	0.40	0.54	0.07	0.07	0.27	0.67	0.40	
3	* 0	0	142	19	11	0	0	4	11	8	
	* 0.00	0.00	9.53	1.28	0.74	0.00	0.00	0.27	0.74	0.54	
4	* 0	2	0	36	9	1	0	28	6	38	
	* 0.00	0.13	0.00	2.42	0.60	0.07	0.00	1.88	0.40	2.55	
5	* 0	4	1	20	452	0	3	3	11	14	
	* 0.00	0.27	0.07	1.34	30.34	0.00	0.20	0.20	0.74	0.94	
6	* 0	2	0	0	1	1	0	1	0	3	
	* 0.00	0.13	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.20	
7	* 0	0	1	1	3	0	5	1	0	1	
	* 0.00	0.00	0.07	0.07	0.20	0.00	0.34	0.07	0.00	0.07	
8	* 0	23	22	12	4	2	0	139	3	3	
	* 0.00	1.54	1.48	0.81	0.27	0.13	0.00	9.33	0.20	0.20	
9	* 0	17	13	13	3	0	0	2	132	6	
	* 0.00	1.14	0.87	0.87	0.20	0.00	0.00	0.13	10.20	0.40	
10	* 0	1	3	13	17	3	3	26	13	77	
	* 0.00	0.07	0.20	0.87	1.14	0.20	0.20	1.74	0.87	5.17	
TOTALS	* 0	54	195	120	508	8	12	208	206	156	
	* 0.00	3.62	13.09	8.05	34.09	0.54	0.81	13.96	13.83	10.47	

I/D RATIO ----------	0.426
REVISED I/D RATIO --	0.944
EXTENDED INDIRECT --	14.956
EXTENDED DIRECT ----	0.403
TEACHER TALK -------	61.745
STUDENT TALK -------	27.795
STU/TEAC TALK RATIO	0.450

QUASI-EXPERIMENTAL GROUP 10 x 10 PRETEST MATRIX

Categories

	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	Tallies
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	7	2	5	3	1	0	3	4	7	
	0.00	0.57	0.16	0.41	0.24	0.08	0.00	0.24	0.33	0.57	
3	0	0	16	3	6	0	0	0	4	0	
	0.00	0.00	1.30	0.24	0.49	0.00	0.00	0.00	0.33	0.00	
4	0	1	0	97	10	2	0	18	6	19	
	0.00	0.08	0.00	7.89	0.81	0.16	0.00	1.46	0.49	1.54	
5	0	4	0	18	369	6	1	6	4	22	
	0.00	0.33	0.00	1.46	30.00	0.49	0.08	0.49	0.33	1.79	
6	0	2	0	0	4	59	0	3	1	2	
	0.00	0.16	0.00	0.00	0.33	4.80	0.00	0.24	0.08	0.16	
7	0	0	1	1	2	0	4	0	0	0	
	0.00	0.00	0.08	0.08	0.16	0.00	0.33	0.00	0.00	0.00	
8	0	8	3	3	10	2	1	77	7	4	
	0.00	0.65	0.24	0.24	0.81	0.16	0.08	6.26	0.57	0.33	
9	0	8	7	7	3	1	1	0	233	13	
	0.00	0.65	0.57	0.57	0.24	0.08	0.08	0.00	18.94	1.06	
10	0	2	0	19	23	0	1	8	14	52	
	0.00	0.16	0.00	1.54	1.87	0.00	0.08	0.65	1.14	4.23	
TOTALS	0	32	29	153	430	71	8	115	273	119	
	0.00	2.60	2.36	12.44	34.96	5.77	0.65	9.35	22.20	9.67	

I/D RATIO ----------	0.296
REVISED I/D RATIO --	0.515
EXTENDED INDIRECT --	3.333
EXTENDED DIRECT ----	5.041
TEACHER TALK -------	58.780
STUDENT TALK -------	31.545
STU/TEAC TALK RATIO	0.537

QUASI-EXPERIMENTAL GROUP 10 x 10 POSTTEST MATRIX

Categories

	* 1	2	3	4	5	6	7	8	9	10	
1	* 0	0	0	0	0	0	0	0	0	0	Tallies
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	* 0	5	11	5	3	0	2	0	0	3	
	* 0.00	0.41	0.91	0.41	0.25	0.00	0.16	0.00	0.00	0.25	
3	* 0	1	46	10	7	0	0	2	2	3	
	* 0.00	0.08	3.79	0.82	0.58	0.00	0.00	0.16	0.16	0.25	
4	* 0	1	2	60	6	0	0	22	4	25	
	* 0.00	0.08	0.16	4.94	0.49	0.00	0.00	1.81	0.33	2.06	
5	* 0	1	1	17	483	1	0	0	4	22	
	* 0.00	0.08	0.08	1.40	39.75	0.08	0.00	0.00	0.33	1.81	
6	* 0	0	0	0	1	0	0	1	0	0	
	* 0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.00	0.00	
7	* 0	0	0	1	2	0	0	0	1	0	
	* 0.00	0.00	0.00	0.08	0.16	0.00	0.00	0.00	0.08	0.00	
8	* 0	11	5	11	2	1	0	166	2	5	
	* 0.00	0.91	0.41	0.91	0.16	0.08	0.00	13.66	0.16	0.41	
9	* 0	5	5	4	0	0	0	0	117	10	
	* 0.00	0.41	0.41	0.33	0.00	0.00	0.00	0.00	9.63	0.82	
10	* 0	5	1	12	25	0	2	12	11	48	
	* 0.00	0.41	0.08	0.99	2.06	0.00	0.16	0.99	0.91	3.95	
TOTALS	* 0	29	71	120	529	2	4	203	141	116	
	* 0.00	2.39	5.84	9.88	43.54	0.16	0.33	16.71	11.60	9.55	

I/D RATIO ----------	0.291
REVISED I/D RATIO --	0.959
EXTENDED INDIRECT --	7.819
EXTENDED DIRECT ----	0.000
TEACHER TALK -------	62.140
STUDENT TALK -------	28.313
STU/TEAC TALK RATIO	0.456

CONTROL GROUP 10 x 10 PRETEST MATRIX

Categories

	1	2	3	4	5	6	7	8	9	10	
1	0	0	0	0	0	0	0	0	0	0	Tallies
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	0	8	7	3	0	0	2	3	2	
	0.00	0.00	0.70	0.61	0.26	0.00	0.00	0.18	0.26	0.18	
3	0	2	25	9	7	0	0	3	3	1	
	0.00	0.18	2.19	0.79	0.61	0.00	0.00	0.26	0.26	0.09	
4	0	1	0	85	13	0	0	40	3	32	
	0.00	0.09	0.00	7.46	1.14	0.00	0.00	3.51	0.26	2.81	
5	0	1	0	32	400	1	0	3	2	11	
	0.00	0.09	0.00	2.81	35.12	0.09	0.00	0.26	0.18	0.97	
6	0	0	0	0	1	1	0	0	0	0	
	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	
7	0	0	0	0	0	0	0	0	0	0	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8	0	12	12	19	6	0	0	126	7	6	
	0.00	1.05	1.05	1.67	0.53	0.00	0.00	11.06	0.61	0.53	
9	0	7	3	6	1	0	0	0	80	11	
	0.00	0.61	0.26	0.53	0.09	0.00	0.00	0.00	7.02	0.97	
10	0	2	2	16	19	0	0	14	10	79	
	0.00	0.18	0.18	1.40	1.67	0.00	0.00	1.23	0.88	6.94	
TOTALS	0	25	50	174	450	2	0	198	148	142	
	0.00	2.19	4.39	15.28	39.51	0.18	0.00	16.51	9.48	12.47	

I/D RATIO ----------	0.355
REVISED I/D RATIO --	0.996
EXTENDED INDIRECT --	6.595
EXTENDED DIRECT ----	0.098
TEACHER TALK -------	61.545
STUDENT TALK -------	25.998
STU/TEAC TALK RATIO	0.422

CONTROL GROUP 10 x 10 POSTTEST MATRIX

Categories

	1	2	3	4	5	6	7	8	9	10	
1	1	0	0	1	0	0	0	0	0	0	Tallies
	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	Percents
2	0	4	11	8	5	1	0	3	4	4	
	0.00	0.34	0.94	0.69	0.43	0.09	0.00	0.26	0.34	0.34	
3	1	2	36	7	2	0	0	2	3	10	
	0.09	0.17	3.09	0.60	0.17	0.00	0.00	0.17	0.26	0.86	
4	0	1	2	43	6	1	0	21	11	33	
	0.00	0.09	0.17	3.68	0.51	0.09	0.00	1.80	0.94	2.83	
5	0	4	0	20	313	1	0	10	8	12	
	0.00	0.34	0.00	1.71	26.82	0.09	0.00	0.86	0.69	1.03	
6	0	0	0	1	0	2	0	0	1	2	
	0.00	0.00	0.00	0.09	0.00	0.17	0.00	0.00	0.09	0.17	
7	0	0	0	0	2	0	0	0	0	0	
	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	
8	0	13	6	7	7	0	1	74	4	7	
	0.00	1.11	0.51	0.60	0.60	0.00	0.09	6.34	0.34	0.60	
9	0	12	7	8	10	0	1	1	169	26	
	0.00	1.03	0.60	0.69	0.86	0.00	0.09	0.09	14.48	2.23	
10	0	4	1	23	23	1	0	8	34	121	
	0.00	0.34	0.09	1.97	1.97	0.09	0.00	0.69	2.91	10.37	
TOTALS	2	40	63	118	368	6	2	119	234	215	
	0.17	3.43	5.40	10.11	31.53	0.51	0.17	10.20	20.05	18.42	

I/D RATIO ----------	0.372
REVISED I/D RATIO --	0.951
EXTENDED INDIRECT --	7.798
EXTENDED DIRECT ----	0.171
TEACHER TALK -------	51.328
STUDENT TALK -------	30.249
STU/TEAC TALK RATIO	0.589

EXPERIMENTAL GROUP 17 x 17 PRETEST MATRIX

Categories

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	10	0	0	0	0	0	0	0	1	3	0	0	0	1	0	0
	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.19	0.00	0.00	0.00	0.06	0.00	0.00
3A	0	0	5	14	13	4	0	3	0	1	4	0	0	15	16	14	0
	0.00	0.00	0.31	0.87	0.81	0.25	0.00	0.19	0.00	0.06	0.25	0.00	0.00	0.93	0.99	0.87	0.00
3B	0	1	1	85	8	5	0	4	0	6	5	2	0	7	18	2	1
	0.00	0.06	0.06	5.27	0.50	0.31	0.00	0.25	0.00	0.37	0.31	0.12	0.00	0.43	1.12	0.12	0.06
3C	0	0	0	4	39	0	0	0	1	0	0	0	0	38	12	14	0
	0.00	0.00	0.00	0.25	2.42	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	2.36	0.74	0.87	0.00
3D	0	0	0	0	0	1	0	0	0	0	0	0	0	12	2	4	1
	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.12	0.25	0.06
3E	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00
4A	0	0	0	0	0	0	0	24	0	0	4	0	0	12	1	15	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	0.00	0.00	0.25	0.00	0.00	0.74	0.06	0.93	0.00
4B	0	0	0	0	0	0	0	0	10	0	2	0	0	1	5	7	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.12	0.00	0.00	0.06	0.31	0.43	0.00
5A	0	0	0	0	0	0	0	2	0	56	6	0	0	3	2	1	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	3.47	0.37	0.00	0.00	0.19	0.12	0.06	0.00

EXPERIMENTAL GROUP 17 x 17 PRETEST MATRIX (continued)

	*	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B	
	*	0	1	0	0	1	0	0	14	9	1	235	3	0	2	5	11	1	
5B	*																		
	*	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.87	0.56	0.06	14.57	0.19	0.00	0.12	0.31	0.68	0.06	
	*	0	0	0	0	0	0	0	0	0	0	1	4	0	2	0	4	0	
6	*																		
	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.00	0.12	0.00	0.25	0.00	
	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7	*																		
	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	*	0	0	47	18	19	3	0	0	0	2	3	1	0	179	3	14	3	
8	*																		
	*	0.00	0.00	2.91	1.12	1.18	0.19	0.00	0.00	0.00	0.12	0.19	0.06	0.00	11.10	0.19	0.87	0.19	
	*	0	1	33	15	18	3	2	0	1	1	5	0	0	0	237	12	1	
9	*																		
	*	0.00	0.06	2.05	0.93	1.12	0.19	0.12	0.00	0.06	0.06	0.37	0.00	0.00	0.00	14.69	0.74	0.06	
	*	0	1	3	7	9	4	0	9	4	2	15	1	0	19	25	60	0	
0A	*																		
	*	0.00	0.06	0.19	0.43	0.56	0.25	0.00	0.56	0.25	0.12	0.93	0.06	0.00	1.18	1.55	3.72	0.00	
	*	0	1	0	2	1	0	0	0	0	0	0	0	0	1	1	1	2	
0B	*																		
	*	0.00	0.06	0.00	0.12	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.06	0.12	
	*	0	15	89	145	108	20	2	56	25	70	283	11	0	292	329	159	9	
TOTALS	*	0.00	0.93	5.52	8.99	6.70	1.24	0.12	3.47	1.55	4.34	17.54	0.68	0.00	18.10	20.40	9.86	0.56	

EXPERIMENTAL GROUP 17 x 17 POSTTEST MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	10A	10B
1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	18	4	0	0	1	0	0	0	0	0	4	1	0	1	0	1	0
	1.21	0.27	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.27	0.07	0.00	0.07	0.00	0.07	0.00
3A	0	0	1	13	4	0	0	1	0	1	3	0	1	3	10	5	0
	0.00	0.00	0.07	0.87	0.27	0.00	0.00	0.07	0.00	0.07	0.20	0.00	0.07	0.20	0.67	0.34	0.00
3B	0	0	0	142	13	1	0	4	1	2	9	0	0	4	11	7	1
	0.00	0.00	0.00	9.53	0.87	0.07	0.00	0.27	0.07	0.13	0.60	0.00	0.00	0.27	0.74	0.47	0.07
3C	0	0	1	0	17	0	0	1	0	0	3	0	0	18	4	10	0
	0.00	0.00	0.07	0.00	1.14	0.00	0.00	0.07	0.00	0.00	0.20	0.00	0.00	1.21	0.27	0.67	0.00
3D	0	0	0	0	0	3	0	0	0	0	1	1	0	1	2	1	0
	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.07	0.13	0.07	0.00
3E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4A	0	1	0	0	0	0	0	13	0	0	5	0	0	8	0	21	1
	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.00	0.34	0.00	0.00	0.54	0.00	1.41	0.07
4B	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	5	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.07	0.00	0.34	0.00
5A	0	1	0	0	0	0	0	1	0	78	7	0	0	0	0	2	0
	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	5.23	0.47	0.00	0.00	0.00	0.00	0.13	0.00

EXPERIMENTAL GROUP 17 x 17 POSTTEST MATRIX

	*	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	*	0	3	0	1	0	0	0	13	6	4	363	0	3	3	11	11	1
5B	*																	
	*	0.00	0.20	0.00	0.07	0.00	0.00	0.00	0.87	0.40	0.27	24.36	0.00	0.20	0.20	0.74	0.74	0.07
	*	0	2	0	0	0	0	0	0	0	0	1	1	0	1	0	3	0
6	*																	
	*	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.20	0.00
	*	0	0	0	1	1	0	0	0	0	0	3	0	5	1	0	1	0
7	*																	
	*	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.34	0.07	0.00	0.07	0.00
	*	0	1	22	22	7	3	0	2	0	0	4	2	0	139	3	3	0
8	*																	
	*	0.00	0.07	1.48	1.48	0.47	0.20	0.00	0.13	0.00	0.00	0.27	0.13	0.00	9.33	0.20	0.20	0.00
	*	0	0	17	13	10	1	0	2	0	1	2	0	0	2	152	5	1
9	*																	
	*	0.00	0.00	1.14	0.87	0.67	0.07	0.00	0.13	0.00	0.07	0.13	0.00	0.00	0.13	10.20	0.34	0.07
	*	0	0	1	3	1	1	0	11	0	2	10	3	3	26	13	74	1
0A	*																	
	*	0.00	0.00	0.07	0.20	0.07	0.07	0.00	0.74	0.00	0.13	0.67	0.20	0.20	1.74	0.87	4.97	0.07
	*	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	2
0B	*																	
	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.27	0.00	0.00	0.00	0.00	0.00	0.13
	*	23	12	42	195	54	9	0	49	8	89	419	8	12	208	206	149	7
TOTALS	*	1.54	0.80	2.82	13.09	3.62	0.60	0.00	3.29	0.54	5.97	28.12	0.54	0.80	13.96	13.83	10.00	0.47

QUASI-EXPERIMENTAL GROUP 17 x 17 PRETEST MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	10A	10B
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	6	0	0	0	0	0	1	0	0	2	1	0	3	1	2	0
	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.16	0.08	0.00	0.24	0.08	0.16	0.00
3A	0	0	1	2	3	0	0	0	1	0	1	0	0	0	3	4	1
	0.00	0.00	0.08	0.16	0.24	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.24	0.33	0.08
3B	0	0	0	16	1	1	0	1	0	0	6	0	0	0	4	0	0
	0.00	0.00	0.00	1.30	0.08	0.08	0.00	0.08	0.00	0.00	0.49	0.00	0.00	0.00	0.33	0.00	0.00
3C	0	0	0	0	11	0	0	1	0	0	1	1	0	4	2	1	0
	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.00	0.33	0.16	0.08	0.00
3D	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.00	0.00	0.00
3E	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4A	0	1	0	0	0	0	0	67	0	0	5	1	0	9	1	15	1
	0.00	0.08	0.00	0.00	0.00	0.00	0.00	5.45	0.00	0.00	0.41	0.08	0.00	0.73	0.08	1.22	0.08
4B	0	0	0	0	0	0	0	0	18	0	3	0	0	4	3	2	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.00	0.24	0.00	0.00	0.33	0.24	0.16	0.00
5A	0	0	0	0	0	0	0	2	0	34	9	1	0	0	1	3	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	2.76	0.73	0.08	0.00	0.00	0.08	0.24	0.00

QUASI-EXPERIMENTAL GROUP 17 x 17 PRETEST MATRIX (continued)

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	0	3	1	0	0	0	0	9	7	12	314	5	1	6	3	19	0
5B	0.00	0.24	0.08	0.00	0.00	0.00	0.00	0.73	0.57	0.98	25.53	0.41	0.08	0.49	0.24	1.54	0.00
	0	2	0	0	0	0	0	0	0	1	3	59	0	3	1	2	0
6	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.24	4.80	0.00	0.24	0.08	0.16	0.00
	0	0	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.24	0.00	0.00	0.00	0.00
	0	1	7	3	1	1	1	1	0	1	9	2	0	77	7	4	0
8	0.00	0.08	0.57	0.24	0.08	0.08	0.08	0.08	0.00	0.08	0.73	0.16	0.00	6.26	0.57	0.33	0.00
	0	1	7	7	4	0	1	3	0	0	3	1	0	0	233	12	1
9	0.00	0.08	0.57	0.57	0.33	0.00	0.08	0.24	0.00	0.00	0.24	0.08	0.00	0.00	18.94	0.98	0.08
	0	1	0	0	1	0	0	14	4	2	18	0	1	8	14	41	1
0A	0.00	0.08	0.00	0.00	0.08	0.00	0.00	1.14	0.33	0.16	1.46	0.00	0.08	0.65	1.14	3.33	0.08
	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	10
0B	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.81
	0	16	16	29	21	2	3	100	30	50	380	71	5	115	273	105	14
TOTALS	0.00	1.30	1.30	2.36	1.71	0.16	0.24	8.13	2.44	4.07	30.80	5.77	0.41	9.35	22.20	8.54	1.14

QUASI-EXPERIMENTAL 17 x 17 POSTTEST MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
1	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
2	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 0.08	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
3A	0 0.00	0 0.00	5 0.41	11 0.91	4 0.33	0 0.00	2 0.16	1 0.08	0 0.00	0 0.00	2 0.16	0 0.00	0 0.00	0 0.00	0 0.00	2 0.16	1 0.08
3B	0 0.00	0 0.00	1 0.08	46 3.79	7 0.58	1 0.08	0 0.00	2 0.16	0 0.00	2 0.16	5 0.41	0 0.00	0 0.00	2 0.16	2 0.16	3 0.25	0 0.00
3C	0 0.00	0 0.00	1 0.08	2 0.16	17 1.40	0 0.00	0 0.00	0 0.00	0 0.00	1 0.08	0 0.00	0 0.00	0 0.00	10 0.82	3 0.25	6 0.49	0 0.00
3D	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 0.08	0 0.00	1 0.08	0 0.00
3E	0 0.00	0 0.00	0 0.00	0 0.00	1 0.08	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 0.16	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
4A	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	27 2.22	1 0.08	0 0.00	3 0.25	0 0.00	0 0.00	7 0.58	0 0.00	9 0.74	0 0.00
4B	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 1.23	0 0.00	2 0.16	0 0.00	0 0.00	4 0.33	1 0.08	9 0.74	0 0.00
5A	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 0.16	50 4.12	7 0.58	1 0.08	0 0.00	0 0.00	1 0.08	4 0.33	0 0.00

QUASI-EXPERIMENTAL 17 x 17 POSTTEST MATRIX (continued)

	* 1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	* 0	1	0	1	0	0	0	8	7	4	422	0	0	0	3	17	1
5B	*																
	* 0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.66	0.58	0.33	34.73	0.00	0.00	0.00	0.25	1.40	0.08
	* 0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
6	*																
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7	*																
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
	* 0	0	11	5	7	1	0	2	1	0	2	1	0	166	2	4	1
8	*																
	* 0.00	0.00	0.91	0.41	0.58	0.08	0.00	0.16	0.08	0.00	0.16	0.08	0.00	13.66	0.16	0.33	0.08
	* 0	0	5	5	3	0	0	1	0	0	0	0	0	0	117	10	0
9	*																
	* 0.00	0.00	0.41	0.41	0.25	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	9.63	0.82	0.00
	* 0	0	5	1	1	0	1	6	4	5	18	0	1	11	11	44	1
0A	*																
	* 0.00	0.00	0.41	0.08	0.08	0.00	0.08	0.49	0.33	0.41	1.48	0.00	0.08	0.91	0.91	3.62	0.08
	* 0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	3
0B	*																
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16	0.00	0.00	0.00	0.08	0.00	0.00	0.25
	* 0	1	28	71	40	2	3	47	31	65	464	2	1	203	141	109	7
TOTALS	*																
	* 0.00	0.08	2.30	5.84	3.29	0.16	0.25	3.87	2.55	5.35	38.19	0.16	0.08	16.71	11.60	8.97	0.58

CONTROL GROUP 17 x 17 PRETEST MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	10A	10B
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	2	0
	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.09	0.09	0.18	0.00
3A	0	0	0	8	3	0	0	3	0	0	2	0	0	1	2	0	0
	0.00	0.00	0.00	0.70	0.26	0.00	0.00	0.26	0.00	0.00	0.18	0.00	0.00	0.09	0.18	0.00	0.00
3B	0	0	2	25	6	0	0	3	0	0	7	0	0	3	3	1	0
	0.00	0.00	0.18	2.19	0.53	0.00	0.00	0.26	0.00	0.00	0.61	0.00	0.00	0.26	0.26	0.09	0.00
3C	0	0	0	0	29	0	0	1	0	0	1	0	0	21	3	10	0
	0.00	0.00	0.00	0.00	2.55	0.00	0.00	0.09	0.00	0.00	0.09	0.00	0.00	1.84	0.26	0.88	0.00
3D	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
3E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4A	0	1	0	0	0	0	0	32	0	0	12	0	0	17	0	21	0
	0.00	0.09	0.00	0.00	0.00	0.00	0.00	4.57	0.00	0.00	1.05	0.00	0.00	1.49	0.00	1.84	0.00
4B	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	1	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.00
5A	0	0	0	0	0	0	0	2	0	17	0	0	0	1	0	2	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	1.49	0.00	0.00	0.00	0.09	0.00	0.18	0.00

CONTROL GROUP 1,7 x 17 PRETEST MATRIX (continued)

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	0	1	0	0	1	0	0	28	1	1	382	1	0	2	2	9	0
5B	0.00	0.09	0.00	0.00	0.09	0.00	0.00	2.46	0.09	0.09	33.52	0.09	0.00	0.18	0.18	0.79	0.00
	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0	1	11	12	16	1	0	2	0	0	6	0	0	126	7	5	1
8	0.00	0.09	0.97	1.05	1.40	0.09	0.00	0.18	0.00	0.00	0.53	0.00	0.00	11.06	0.61	0.44	0.09
	0	2	5	3	5	0	0	1	0	0	1	0	0	0	80	11	0
9	0.00	0.18	0.44	0.26	0.44	0.00	0.00	0.09	0.00	0.00	0.09	0.00	0.00	0.00	7.02	0.97	0.00
	0	1	1	2	4	0	0	11	1	4	14	0	0	14	10	79	0
0A	0.00	0.09	0.09	0.18	0.35	0.00	0.00	0.97	0.09	0.35	1.23	0.00	0.00	1.23	0.88	6.94	0.00
	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
	0	6	19	50	65	2	0	103	4	22	428	2	0	188	108	141	1
TOTALS	0.00	0.53	1.67	4.39	5.71	0.18	0.00	9.04	0.35	1.93	37.58	0.18	0.00	16.51	9.48	12.38	0.09

CONTROL GROUP 17 x 17 POSTTEST MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	10A	10B
1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	2	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0
	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.09	0.00	0.00	0.00	0.00	0.00
3A	0	0	2	11	6	1	0	1	0	0	2	0	0	3	4	4	0
	0.00	0.00	0.17	0.94	0.51	0.09	0.00	0.09	0.00	0.00	0.17	0.00	0.00	0.26	0.34	0.34	0.00
3B	1	1	1	36	2	1	0	4	0	0	2	0	0	2	3	10	0
	0.09	0.09	0.09	3.08	0.17	0.09	0.00	0.34	0.00	0.00	0.17	0.00	0.00	0.17	0.26	0.86	0.00
3C	0	0	0	2	20	0	0	0	0	0	1	0	0	6	7	6	0
	0.00	0.00	0.00	0.17	1.71	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.51	0.60	0.51	0.00
3D	0	0	0	0	0	3	0	0	0	0	0	0	0	3	1	1	0
	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.09	0.09	0.00
3E	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00
4A	0	1	0	0	0	0	0	20	0	0	5	1	0	12	2	23	1
	0.00	0.09	0.00	0.00	0.00	0.00	0.00	1.71	0.00	0.00	0.43	0.09	0.00	1.03	0.17	1.97	0.09
4B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.17	0.00
5A	0	0	0	0	0	0	0	2	0	4	3	0	0	0	1	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.34	0.26	0.00	0.00	0.00	0.09	0.00	0.00

CONTROL GROUP 17 x 17 POSTTEST MATRIX (continued)

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
5B	0	2	2	0	0	0	0	17	1	1	305	1	0	10	7	12	0
	0.00	0.17	0.17	0.00	0.00	0.00	0.00	1.46	0.09	0.09	26.14	0.09	0.00	0.86	0.60	1.03	0.00
6	0	0	0	0	1	0	0	0	0	0	0	2	0	0	1	2	0
	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.09	0.17	0.00
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0	0	13	6	4	0	1	3	0	0	7	0	0	74	4	7	0
	0.00	0.00	1.11	0.51	0.34	0.00	0.09	0.26	0.00	0.00	0.60	0.00	0.00	6.34	0.34	0.60	0.00
9	0	0	12	7	4	2	1	2	0	0	10	0	0	1	169	26	0
	0.00	0.00	1.03	0.60	0.34	0.17	0.09	0.17	0.00	0.00	0.86	0.00	0.00	0.09	14.48	2.23	0.00
0A	0	0	4	1	5	0	0	16	2	5	17	1	0	8	34	121	0
	0.00	0.00	0.34	0.09	0.43	0.00	0.00	1.37	0.17	0.43	1.46	0.09	0.00	0.69	2.91	10.37	0.00
0B	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS	2	6	34	63	42	8	2	65	3	10	358	6	0	119	234	214	1
	0.17	0.51	2.91	5.40	3.60	0.69	0.17	5.57	0.26	0.86	30.68	0.51	0.00	10.20	20.05	18.34	0.09

EXPERIMENTAL GROUP 17 x 17 DIFFERENCE MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	18	-6	0	0	1	0	0	0	0	0	-1	1	1	0	1	-1	1	0
	1.21	0.35	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.06	0.08	0.07	0.00	0.07	0.06	0.07	0.00
3A	0	0	-4	-1	-9	-4	0	-2	0	0	-1	0	1	-12	-6	-9	0
	0.00	0.00	0.24	0.00	0.54	0.25	0.00	0.12	0.00	0.01	0.05	0.00	0.07	0.73	0.32	0.53	0.00
3B	0	-1	-1	57	5	-4	0	0	1	-4	4	-2	0	-3	-7	5	0
	0.00	0.06	0.06	4.26	0.38	0.24	0.00	0.02	0.07	0.24	0.29	0.12	0.00	0.17	0.38	0.35	0.01
3C	0	0	1	-4	-22	0	0	1	-1	0	3	0	0	-20	-8	-4	0
	0.00	0.00	0.07	0.25	1.29	0.00	0.00	0.07	0.06	0.00	0.20	0.00	0.00	1.15	0.48	0.20	0.00
3D	0	0	0	0	0	2	0	0	0	0	1	1	0	-11	0	-3	-1
	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.68	0.01	0.18	0.06
3E	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00
4A	0	1	0	0	0	0	0	-11	0	0	1	0	0	-4	-1	6	1
	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.00	0.09	0.00	0.00	0.21	0.06	0.48	0.07
4B	0	0	0	0	0	0	0	1	-9	0	-2	0	0	0	-5	-2	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.55	0.00	0.12	0.00	0.00	0.01	0.31	0.10	0.00
5A	0	1	0	0	0	0	0	-1	0	22	1	0	0	-3	-2	1	0
	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.76	0.12	0.00	0.00	0.19	0.12	0.07	0.00

EXPERIMENTAL GROUP 17 x 17 DIFFERENCE MATRIX (continued)

	* 1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
5B	* 0	2	0	1	-1	0	0	-1	-3	3	128	-3	3	1	6	0	0
	* 0.00	0.14	0.00	0.07	0.05	0.00	0.00	0.00	0.16	0.21	9.79	0.19	0.20	0.08	0.43	0.05	0.01
6	* 0	2	0	0	0	0	0	0	0	0	0	-3	0	-1	0	-1	0
	* 0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.18	0.00	0.06	0.00	0.05	0.00
7	* 0	0	0	1	1	0	0	0	0	0	3	0	5	1	0	1	0
	* 0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.34	0.07	0.00	0.07	0.00
8	* 0	1	-25	4	-12	0	0	2	0	-2	1	1	0	40	0	-11	-3
	* 0.00	0.07	1.44	0.36	0.71	0.02	0.00	0.13	0.00	0.12	0.08	0.07	0.00	1.77	0.02	0.67	0.19
9	* 0	-1	-16	-2	-8	-2	-2	2	-1	0	-3	0	0	2	-85	-7	0
	* 0.00	0.06	0.90	0.06	0.44	0.12	0.12	0.13	0.06	0.01	0.18	0.00	0.00	0.13	4.49	0.41	0.01
0A	* 0	-1	-2	-4	-8	-3	0	2	-4	0	-5	2	3	7	-12	14	1
	* 0.00	0.06	0.12	0.23	0.49	0.18	0.00	0.18	0.25	0.01	0.26	0.14	0.20	0.57	0.68	1.25	0.07
0B	* 0	-1	0	-2	-1	0	0	0	0	1	4	0	0	-1	-1	-1	0
	* 0.00	0.06	0.00	0.12	0.06	0.00	0.00	0.00	0.00	0.07	0.27	0.00	0.00	0.06	0.06	0.06	0.01
TOTALS	* 23	-3	-47	50	-54	-11	-2	-7	-17	19	136	-3	12	84	-123	-10	-2
	* 1.54	0.12	2.70	4.10	3.07	0.64	0.12	0.18	1.01	1.63	10.58	0.15	0.81	4.14	6.57	0.14	0.09

QUASI-EXPERIMENTAL GROUP 17 x 17 DIFFERENCE MATRIX

	* 1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
1	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	* 0	-6	0	0	0	0	0	-1	0	0	-1	-1	0	-3	-1	-2	0
	* 0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.08	0.00	0.24	0.08	0.16	0.00
3A	* 0	0	4	9	1	0	2	1	-1	0	1	0	0	0	-3	-2	0
	* 0.00	0.00	0.33	0.74	0.09	0.00	0.16	0.08	0.08	0.00	0.08	0.00	0.00	0.00	0.24	0.16	0.00
3B	* 0	0	1	30	6	0	0	1	0	2	-1	0	0	2	-2	3	0
	* 0.00	0.00	0.08	2.49	0.49	0.00	0.00	0.08	0.00	0.16	0.08	0.00	0.00	0.16	0.16	0.25	0.00
3C	* 0	0	1	2	6	0	0	-1	0	1	-1	-1	0	6	1	5	0
	* 0.00	0.00	0.08	0.16	0.50	0.00	0.00	0.08	0.00	0.08	0.08	0.08	0.00	0.50	0.08	0.41	0.00
3D	* 0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	1	0
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.08	0.00
3E	* 0	0	0	-1	1	0	-1	-1	0	0	2	0	0	0	0	0	0
	* 0.00	0.00	0.00	0.08	0.08	0.00	0.08	0.08	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00
4A	* 0	-1	0	0	0	0	0	-4	1	0	-2	-1	0	-2	-1	-6	-1
	* 0.00	0.08	0.00	0.00	0.00	0.00	0.00	3.22	0.08	0.00	0.16	0.08	0.00	0.16	0.08	0.48	0.08
4B	* 0	0	0	0	0	0	0	0	-3	0	-1	0	0	0	-2	7	0
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.08	0.00	0.00	0.00	0.16	0.58	0.00
5A	* 0	0	0	0	0	0	0	-2	2	16	-2	0	0	0	0	1	0
	* 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	1.35	0.16	0.00	0.00	0.00	0.00	0.09	0.00

QUASI-EXPERIMENTAL GROUP 17 x 17 DIFFERENCE MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	0	-2	-1	1	0	0	0	-1	0	-8	108	-5	-1	-6	0	-2	1
5B																	
	0.00	0.16	0.08	0.08	0.00	0.00	0.00	0.07	0.01	0.65	9.20	0.41	0.08	0.49	0.00	0.15	0.08
	0	-2	0	0	0	0	0	0	0	0	-3	-59	0	-2	-1	-2	0
6																	
	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	4.80	0.00	0.16	0.08	0.16	0.00
	0	0	0	0	0	0	0	0	0	0	-2	0	-3	0	1	0	0
7																	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.24	0.00	0.08	0.00	0.00
	0	-1	4	2	6	0	-1	1	1	-1	-7	-1	0	89	-5	0	1
8																	
	0.00	0.08	0.34	0.17	0.49	0.00	0.08	0.08	0.08	0.08	0.57	0.08	0.00	7.40	0.40	0.00	0.08
	0	-1	-2	-2	-1	0	-1	-2	0	0	-3	-1	0	0	-116	-2	-1
9																	
	0.00	0.08	0.16	0.16	0.08	0.00	0.08	0.16	0.00	0.00	0.24	0.08	0.00	0.00	9.31	0.15	0.08
	0	-1	5	1	0	0	1	-6	0	3	0	0	0	3	-3	3	0
0A																	
	0.00	0.08	0.41	0.08	0.00	0.00	0.08	0.64	0.00	0.25	0.00	0.00	0.00	0.25	0.23	0.29	0.00
	0	-1	0	0	0	0	0	0	1	2	-3	0	0	1	0	0	-7
0B																	
	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16	0.24	0.00	0.00	0.08	0.00	0.00	0.57
	0	-15	12	42	19	0	0	-53	1	15	84	-69	-4	88	-132	4	-7
TOTALS	0.00	1.22	1.00	3.49	1.58	0.00	0.00	4.26	0.11	1.23	7.29	5.67	0.32	7.36	10.59	0.43	0.56

CONTROL GROUP 17 x 17 DIFFERENCE MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	10A	10B
1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	2	0	0	-1	0	0	0	0	0	2	1	0	-1	-1	-2	0
	0.00	0.17	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.17	0.09	0.00	0.09	0.09	0.18	0.00
3A	0	0	2	3	3	1	0	-2	0	0	0	0	0	2	2	4	0
	0.00	0.00	0.17	0.24	0.25	0.09	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.17	0.17	0.34	0.00
3B	1	1	-1	11	-4	1	0	1	0	0	-5	0	0	-1	0	9	0
	0.09	0.09	0.09	0.89	0.36	0.09	0.00	0.08	0.00	0.00	0.44	0.00	0.00	0.09	0.01	0.77	0.00
3C	0	0	0	2	-9	0	0	-1	0	0	0	0	0	15	4	-4	0
	0.00	0.00	0.00	0.17	0.83	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	1.33	0.34	0.36	0.00
3D	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	1	0
	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.09	0.09	0.00
3E	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00
4A	0	0	0	0	0	0	0	-32	0	0	-7	1	0	-5	2	2	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	0.00	0.00	0.63	0.09	0.00	0.46	0.17	0.13	0.09
4B	0	0	0	0	0	0	0	0	-2	0	0	0	0	-1	1	1	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.09	0.09	0.08	0.00
5A	0	0	0	0	0	0	0	0	0	-13	3	0	0	-1	1	-2	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.26	0.00	0.00	0.09	0.09	0.18	0.00

CONTROL GROUP 17 x 17 DIFFERENCE MATRIX

	1	2	3A	3B	3C	3D	3E	4A	4B	5A	5B	6	7	8	9	0A	0B
	0	1	2	0	-1	0	0	-11	0	0	-77	0	0	8	5	3	0
5B	0.00	0.08	0.17	0.00	0.09	0.00	0.00	1.00	0.00	0.00	7.40	0.00	0.00	0.68	0.42	0.24	0.00
	0	0	0	0	1	0	0	0	0	0	-1	1	0	0	1	2	0
6	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.08	0.00	0.00	0.09	0.17	0.00
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0	-1	2	-6	-12	1	1	1	0	0	1	0	0	-52	-3	2	-1
8	0.00	0.09	0.15	0.54	1.06	0.09	0.09	0.08	0.00	0.00	0.07	0.00	0.00	4.72	0.27	0.16	0.09
	0	-2	7	4	-1	2	1	1	0	0	9	0	0	1	89	15	0
9	0.00	0.18	0.59	0.34	0.10	0.17	0.09	0.08	0.00	0.00	0.77	0.00	0.00	0.09	7.46	1.26	0.00
	0	-1	3	-1	1	0	0	5	1	1	3	1	0	-6	24	42	0
0A	0.00	0.09	0.25	0.09	0.08	0.00	0.00	0.41	0.08	0.08	0.23	0.09	0.00	0.54	2.04	3.43	0.00
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0	15	13	-23	6	2	-38	-1	-12	-70	4	0	-69	126	73	0
TOTALS	0.17	0.01	1.25	1.01	2.11	0.51	0.17	3.47	0.09	1.07	6.90	0.34	0.00	6.31	10.57	5.96	0.00

APPENDIX C

STUDENT EVALUATIONS

Technical Skills of Teaching Descriptions

Sample Student Evaluation Computer Printout

Factor Analysis Matrix of Student Evaluation Items

Pretest and Posttest Comparisons of Student Evaluations for Each Sub-group

SET INDUCTION

Set Induction is establishing in students an affective and cognitive predisposition to engage in a given instructional activity.

Set Induction requires knowing when and how to exercise the skill. It is appropriately exercised at the introduction of a course, class meeting, or new learning unit. Proper timing also demands an awareness of the need for reorientation because students seem to need their interest and motivation rekindled. Set Induction may be achieved by referring to previous activities to establish a useful frame of reference, by indicating the process to be used to obtain goals (discussion, lecturing, guided discovery, etc.), by relating the significance of particular goals to personal or course goals, by defining key terminology, by providing students with a course outline or syllabus, etc.

Set Induction is related to Making Expectations Clear in that the instructor's expectations for students' work, progress, standards and participation may be one function of Set Induction. However, Set Induction may also include teacher behaviors which arouse interest, motivate action, focus attention, establish relationships, etc.

LOGICAL ORGANIZATION

Logical Organization refers to the sequencing of material according to some internal structure in the subject matter, the principles of effective learning, and student characteristics and needs.

Effective performance of this skill requires not only that the instructor be able to sequence material and activities effectively, but also that students understand the logic of the organization. In some cases, the organizing principle may be self-evident; in others, the instructor may need to make those principles explicit. In any case, Logical Organization should allow students to distinguish digressions from main points, to take notes and make outlines with

relative ease, to see connections between topics covered at various times, and to recognize relationships between class content and course objectives.

Logical Organization is distinguished from Set Induction in that the latter establishes an initial frame of reference, while Logical Organization refers to the ability to maintain that frame of reference continuously.

PACING

Pacing is the rate at which new ideas are presented and the amount of instructional time spent on each of these ideas.

Skillful pacing involves an appropriate matching of the difficulty and significance of the material to the amount of instructional time necessary to ensure student understanding and interest in that material. To accomplish this, an instructor must be able to judge when adequate definitions, explanations, and applications are completed, to avoid spending more time on an idea than its significance and/or difficulty warrant(s), and to modify his pace according to situational demands.

Pacing is related to Level of Challenge in that the difficulty of the material and student ability to deal with that material will influence the rate at which new ideas are introduced and the time spent on those ideas.

ELABORATION

Elaboration refers to the development and clarification of an idea, definition, or process.

Effective performance of this skill involves knowing when to elaborate, as well as choosing appropriate ways to elaborate. Elaboration may be necessary when an idea is especially significant, when the material is difficult, or when students are particularly interested in a topic. Common Elaboration techniques include the use of greater detail, examples, and analogies, as well as rephrasing points, pointing out relationships, explaining relevance, illustrating applications, etc.

Related skills are Monitoring Student Response (to ascertain the necessity and effectiveness of Elaboration), Defining and Expanding Relevance (as a technique of Elaboration), Asking Questions (to check comprehension or to encourage

students to elaborate from their experience), and Answering Questions (which may provide occasion for Elaboration).

CLOSURE

Closure refers to the instructor's ability to "wrap things up" at appropriate points in a discussion or instructional activity.

Effective Closure depends upon a good sense of timing and the ability to choose an appropriate technique. Commonly, this skill is exercised at the end of an instructional activity, class, content unit, or course, but it is appropriate whenever there is a need to re-establish or maintain a sense of direction and purpose, or when clarification and review of preceding instructional activity seems necessary. Techniques of Closure include providing a summary, asking students to summarize main points, checking for comprehension or consensus, noting whether or not the topic will be pursued later, etc.

Closure is complementary to Set Induction in that good Set Induction makes Closure easier, and good Closure makes the subsequent Set Induction easier.

EXPRESSION

Expression refers to the techniques of verbal and nonverbal communication.

Effective Expression not only allows an instructor to convey information and ideas clearly, but also to communicate feelings and attitudes about the material. Characteristics of this skill include variations in body movement, facial gestures, and voice quality, use of silence and eye contact, selection of vocabulary appropriate to students' levels of sophistication, and other rhetorical skills.

Expression is related to several other teaching skills and behaviors in that effective performance in this skill may help promote effective performance of the other skills (Set Induction, Pacing Elaboration, etc.). Expression may be an especially important factor in Inspiration, which refers to a more general stylistic characteristic.

INSPIRATION AND CHARISMA

Inspiration and Charisma refers to the instructor's ability to bring excitement to his teaching and his subject matter, and to engage students' interest, trust and respect.

Inspiration and Charisma are most often characteristics of teachers who appear to enjoy teaching, who are enthusiastic about their chosen subject matter, who are concerned about what and how their students are learning, who demonstrate an involvement in the issues of their discipline or their profession, who have at once a commitment to the value of what they are doing and yet a readiness to re-examine that commitment, who have confidence in themselves and their students to engage successfully in a given task and who can exhibit an appropriate sense of humor about themselves, their students and the tasks at hand.

If an instructor is successful in inspiring students and communicating charisma, he may need to rely less on a variety of other skills to motivate and engage students in the learning process.

LEVEL OF CHALLENGE

Level of Challenge refers to the instructor's ability to select materials and design learning experiences which will challenge students' interests and abilities without making unrealistic demands upon their time, abilities, or chances for success.

To find the optimum level of challenge, an instructor must consider student characteristics (their experiential and informational readiness, their apparent ability level, their interest in the material or course, their time commitments, etc.), as well as characteristics of the subject matter (conceptual difficulty, background knowledge required, etc.). If level of Challenge is set too high, students may feel frustration and a sense of failure; if Level of Challenge is set too low, students may become bored and disinterested.

Level of Challenge is related to Set Induction (as an occasion for establishing the initial Level of Challenge), Pacing, (Level of Challenge will influence the rate at which new ideas are introduced and time spent on those ideas), Monitoring Student Response (as a way of checking whether the material is optimimally challenging), and Making Expectations

Clear (when an instructor may explicitly define the level at which he expects students to deal with the subject matter.).

TREATMENT OF DIVERGENT VIEWS

Treatment of Divergent Views refers to the instructor's ability to set his material in an intellectual and attitudinal context which permits and fosters open and honest treatment of that material by both teacher and students.

Teaching behaviors which may promote honest treatment of divergent views are acknowledging the existence of a variety of points of view, presenting facts and ideas in a representative context of divergent opinions, distinguishing between fact and opinion and between raw data and interpretation, making one's own biases explicit, encouraging students to examine a variety of points of view before making judgments or drawing conclusions, etc.

This teaching characteristic is related to Creative Inquiry in that Treatment of Divergent Views may provide students with the disposition and tools for independent, critical inquiry. Moreover, Treatment of Divergent Views may provide a context or occasion for Defining and Expanding Relevance, and the examination of divergent views may promote Student-Student and Teacher-Student Interaction.

DEFINING AND EXPANDING RELEVANCE

Defining and Expanding Relevance refers to the instructor's ability to help clarify how a particular idea or topic fits into broader personal, social and intellectual contexts.

Effective performance of this skill requires not only that an instructor be able to define and expand the relevance of a topic or idea, but also that he encourage students to engage in a constant search for larger contexts of relevance. Some techniques for Defining and Expanding Relevance are demonstrating the application of an idea in a variety of situations, explaining relationships between a topic and other academic disciplines, exploring how a topic fits in with student interests and goals, suggesting implications for various social issues, etc.

This skill is distinguished from Elaboration in that the latter involves filling an immediate instructional need, while

Defining and Expanding Relevance refers to relationships which extend beyond the course and subject matter itself. It is also distinguished from Ethical Context Skills in that here we are stressing understanding and relating ideas in various contexts without the particular emphasis on consequences for and of one's personal values and behaviors.

FACILITATING STUDENT PARTICIPATION

Facilitating Student Participation refers to the instructor's skills in eliciting student participation in the learning process, sustaining it at appropriate levels, and leading it in fruitful directions.

An instructor may wish students to participate in the learning process in various ways, ranging from asking and answering questions to sharing responsibility for class activities or discussions. The instructor needs to communicate when and how much student participation is appropriate, to encourage them to give such input, and to allow enough time for them to participate in the ways desired. Sustaining student participation involves maintaining a non-threatening environment and responding to student contributions in a reinforcing manner. Effective direction of student participation requires that the instructor know when and how to intervene productively (by asking questions, providing focus, tying student comments together, etc.).

Facilitating Student-Student Interaction is a related skill in that interaction among and between students is one, but not the only way, in which students may participate in the instructional process. Asking Questions is also a related skill when questions are used to invite student participation.

FACILITATING STUDENT-STUDENT INTERACTION

Facilitating Student-Student Interaction refers to the instructor's ability to promote discussion among students in the class.

Effective performance of this skill requires that an instructor establish a physical and attitudinal climate in which students may interact with one another. This may require anything from dividing the class into small groups or arranging chairs in a circle to providing a structure in which students are assigned specific discussion roles. To maintain student-

student interaction, an instructor may periodically have to remind students to listen to one another, prod them to examine and respond to one another's comments, throw teacher-directed questions/comments back to students, request summary or consensus, etc.. In order to help students become more effective discussion participants, an instructor may wish to make comments which focus on the discussion process itself (noting that someone's contributions were ignored, sharing his perceptions of group feeling, pointing out areas of confusion, requesting that other students summarize the process to that point, etc.).

Facilitating Student-Student Interaction is one means of Facilitating Student Participation. However, here we are focusing on those teaching behaviors which encourage students to interact with one another and to work as a group.

ASKING QUESTIONS

This skill refers to the instructor's ability to use a range of questioning techniques for a variety of instructional purposes.

Effective performance of this skill requires that the instructor understand and be able to use several types of questions, ranging from simple questions requesting factual information to higher order questions calling for integration and application of ideas. An instructor needs to know when to ask and how to construct questions to suit his purposes (to monitor student progress, to engage students in critical thought, to sustain student attention, etc.). Once he has formulated the question, he must be able to state it clearly and in a non-threatening manner and to direct it appropriately (to a whole class, or to an individual). An instructor may facilitate students' answering of questions by allowing enough time, by not interrupting, by rephrasing questions if necessary, by not being too insistent, etc.

Asking Questions focuses upon the specific techniques of effective questioning but is related to several other skills (Closure, Creative Inquiry, Facilitating Student Participation, Monitoring Student Response, Evaluation) in that an instructor may use questions in his performance of those skills.

ANSWERING QUESTIONS

This skill refers to the instructor's ability to listen to

students' questions for a variety of cues and meanings, to judge when and how questions should be answered, and to construct effective answers.

Students may ask questions because they are confused, curious, eager to contribute an idea indirectly, etc., and the instructor needs to be alert to the reasons behind their questions. He then needs to decide whether a question is best postponed, redirected to another student or to the inquiring student himself, or answered by the instructor. If the instructor chooses to answer the question, he may help the entire class benefit by rephrasing or elaborating on the question and then phrasing his answer in clear, concise, and generally understandable terms.

CHOOSING APPROPRIATE MODES AND MATERIALS

This skill involves the instructor's ability to maximize learning by integrating his objectives and personal resources, student characteristics and goals, situational limitations, and the availability of instructional materials.

Effective selection of modes and materials requires that an instructor be clear about his own objectives (to give information, to encourage discovery learning, to develop critical thinking skills, etc.) and select modes which will be most effective in reaching those objectives (discussion, lecture, reading, etc.). He needs to take into account student goals (do they want a quick introduction to the field or are they willing to engage in thorough exploration of it, etc.) and student characteristics (apparent ability, background knowledge, previous experiences, etc.). He must consider the situational limitations (class size, meeting time and place, etc.) and deal creatively with those limitations (break the class up into smaller groups, adjust meeting times or attendance rules, etc.). He must know his own strengths and weaknesses (good lecturer, but can't get discussions going; hates reading exams, but loves reading papers, etc.). And he must be aware of the availability of materials and resources (rules for books on reserve, supply shortages in book store, etc.). Once the instructor is clear about all of these factors, he can better design the course modes (lectured, discussions, panels, etc.) and select the course materials (reading lists, textbooks, paper assignments, etc.).

INSTRUCTIONAL FLEXIBILITY AND INDIVIDUALIZATION

Instructional Flexibility and Individualization refers to the

instructor's ability to assess individual students' characteristics to design and, adapt course objectives which are consistent with students' personal objectives, and to provide alternative ways for students to achieve course and/or personal objectives.

An instructor may become aware of individual student talents, interests and needs in a variety of ways--by devising questionnaires to elicit such information, by inviting students to meet with him individually, by providing time and communicating interest so that students feel free to approach him with their ideas and concerns, etc.. Once an instructor has such information, he may design course objectives which allow room for students to pursue their own interests and develop their talents, but he may encounter situations in which his effectiveness will depend upon his willingness to change those objectives or to allow students to substitute their own objectives. An instructor may provide alternative ways for students to meet objectives by suggesting several options, referring students to other resources when his own are inadequate, asking students to devise their own strategies, etc.. In general, effective performance of this skill requires an awareness of students as individuals, a willingness to be flexible in determining objectives and methods, and creativity in providing alternative courses of action.

Flexibility and Individualization is related to most of the other teaching skills in that effective performance of those skills often involves the behaviors and attitudes suggested here.

FACILITATING INDEPENDENT/CREATIVE INQUIRY

Facilitating Independent/Creative Inquiry refers to the instructor's ability to demonstrate, encourage and guide independent, original, and creative inquiry.

Facilitating Independent/Creative Inquiry implies not only that the instructor demonstrate creative treatment of the material, but also that he encourage students to approach the subject matter in imaginative and creative ways. An instructor might facilitate creative inquiry by suggesting and providing resources and materials for students to explore independently, by making explicit the processes he uses for considering ideas, designing strategies, and making decisions, by helping students to develop and utilize the scholarly tools and skills required for independent research, by making himself available for individual guidance and feedback sessions, etc..

Facilitating Independent/Creative Inquiry is distinguished from Inspiration in that the latter deals primarily with motivating students, while here we stress showing students how they, once they are motivated, may pursue individual, creative work.

MONITORING STUDENT RESPONSE

Monitoring Student Response refers to the instructor's skills in noticing nonverbal indicators of student response, in inviting and encouraging verbal feedback from students on all aspects of instruction, and in responding to such feedback in constructive ways.

Monitoring Student Response may provide an instructor with useful information with which he may make judgments and decisions about student progress, his own performance, class activities and assignments, and course design. An instructor may monitor student response by being alert to nonverbal indications of confusion, curiosity, frustration, etc., during lectures, discussion or other class activities. He may get more complete information about student reactions by inviting and encouraging students to ask questions, express their concerns, make suggestions, etc., about specific instructional activities or about the course as a whole. In order to maintain such a system of student feedback, the instructor also needs to attend to the ways in which he responds to student questions and suggestions. If he reacts defensively or simply ignores their suggestions, students will stop giving them. However, if he responds in non-threatening ways and experiments with alternative methods and activities on the basis of their suggestions, student feedback may provide continuous data for designing instructional activities to meet student needs.

This skill is important in the effective performance of most other skills because continuous awareness of student responses to teacher behaviors may inform an instructor when he makes decisions about how and when to exercise other skills.

MAKING EXPECTATIONS CLEAR

This skill involves the effective and timely communication of what the instructor expects students to do, to learn, to know, and to contribute as members of his class. The skill also includes the instructor's communication of his criteria for evaluating student performance.

Effective performance of this skill allows students to know what is expected from them in terms of assignments and class participation. Students should know what their responsibilities are for readings, papers, etc.; their range of options in format, content, and treatment of assignments; work deadlines; and, consequences for unsatisfactory or late work. They should also know when and how they will be expected to participate in class discussions, lectures, etc., and what preparation they need for effective participation. Finally, they should be aware of the instructor's methods of evaluation (quizzes, tests, papers, observation of class participation, etc.), the nature of evaluation instruments (multiple choice quizzes, essay exams, etc.), and the criteria for evaluation (the skills, knowledge, conceptual sophistication they will be asked to demonstrate).

This skill is complementary to Evaluation in that Making Expectations Clear refers to the communication of what is expected from students, while Evaluation deals with the assessment of how well students have fulfilled those expectations. It is also related to Set Induction, which may be an appropriate time for an instructor to make his expectations clear.

EVALUATION

This skill involves the instructor's ability to provide feedback to himself and to students about progress toward stated objectives.

Effective evaluation of student progress requires that an instructor inform students about evaluation procedures, that he select appropriate evaluation techniques, and that he keep students posted about their progress. Students should know <u>when</u> evaluation of their work may occur (surprise quiz anytime, mid-term exam, class observation anytime, etc.), what <u>kinds of evaluation procedures</u> may be used (multiple choice quiz, essay exams, oral questioning, self-evaluations, etc.), and what <u>objectives</u> will be evaluated (knowledge of facts, performance of skills, application of principles, etc.).

Secondly, effective evaluation of student work involves the instructor's ability to select or construct evaluation procedures which are appropriate for assessing desired performance and which are consistent with stated objectives. Lastly, an instructor needs to know when and how to give useful feedback to students about their progress, so that they know where they stand, what areas they need to work on, and how they may go about improving.

Evaluation also refers to the instructor's ability to provide ways of assessing his own performance and the effectiveness of his course. He may get such information by looking at student achievement, and by asking students for feedback on assignments (appropriateness, interest level, clarity of directions, etc.), on specific class activities (were they interesting, did students feel they learned anything, etc.), on teaching performance (does the instructor lecture too much, is he an effective leader in discussions, etc.).

Ideally, evaluation provides useful information for the instructor and for students which makes further progress and growth possible.

This skill is complementary to making Expectations Clear (see discussion of Making Expectations Clear) and related to Monitoring Student Response (as a way of evaluating teaching performance and course effectiveness.).

DEFINING AND EXPANDING ETHICAL CONTEXT

Defining and Expanding Ethical Context involves both an awareness of and explicit communication of the fact that the teaching and learning of a particular subject matter takes place in a particular social context.

The context in which a particular learning activity goes on (and of which it is a part) implies a host of values, problems obligations, challenges, etc., and the actions or non-actions of teachers and students have meanings and consequences within that context. An instructor who exercises this skill is aware of this fact, attempts to make students aware of it, and engages in an exploration of those meanings and consequences with students. The students themselves are, or course, a part of that social context and, therefore, the instructor's conduct of a course implies responsibility beyond the immediate course.

The instructor is the agent by which the value context of a given subject area is interpreted for the students. The students are conditioned by that interpretation, and by their own perception of the course goals, to make judgements concerning the relevance of the subject matter. Thus the relationship of the discipline to the instructor, and the instructor's interpretation of the course goals to the students, should be fully explored in the teaching process.

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT

CROSSTABULATIONS

	NO RESPONSE	E	S	I	I+	O
QUESTION 1	WHEN BEGINNING A CLASS, LESSON, OR NEW INSTRUCTIONAL ACTIVITY, THE INSTRUCTOR USUALLY MAKES CLEAR WHAT HE/SHE HOPES TO ACCOMPLISH.					
	1	2	8	3	1	0
		14.29	57.14	21.43	7.14	0.00
QUESTION 2	THE INSTRUCTOR USUALLY GETS ME INTERESTED AT THE BEGINNING OF EACH CLASS SESSION AND LEARNING ACTIVITY.					
	1	3	3	8	0	0
		21.43	21.43	57.14	0.00	0.00
QUESTION 3	THE INSTRUCTOR PRESENTS NEW IDEAS AND INFORMATION AT AN APPROPRIATE PACE, I.E. NEITHER TOO FAST NOR TOO SLOW.					
	1	5	8	1	0	0
		35.71	57.14	7.14	0.00	0.00
QUESTION 4	THE INSTRUCTOR ARRANGES AND PRESENTS MATERIAL IN A CLEAR, WELL-ORGANIZED FASHION.					
	1	5	7	2	0	0
		35.71	50.00	14.29	0.00	0.00
QUESTION 5	IN THIS INSTRUCTOR'S CLASS IT IS USUALLY POSSIBLE TO KNOW WHICH POINTS ARE MOST IMPORTANT, AND TO SEE THE RELATIONSHIPS BETWEEN TOPICS.					
	1	5	6	3	0	0
		35.71	42.86	21.43	0.00	0.00
QUESTION 6	THE INSTRUCTOR KNOWS WHEN TO ELABORATE ON A TOPIC AND HE/SHE ELABORATES EFFECTIVELY BY USING EXAMPLES, ETC.					
	1	6	8	0	0	0
		42.86	57.14	0.00	0.00	0.00
QUESTION 7	THE INSTRUCTOR PROVIDES USEFUL SUMMARIES AT APPROPRIATE TIMES, (E.G. AT END OF CLASS SESSION OR END OF UNIT.).					
	1	3	7	2	0	2
		21.43	50.00	14.29	0.00	14.29
QUESTION 8	WHEN THE INSTRUCTOR REACHES THE END OF ANY SEGMENT OF PRESENTATION, HE/SHE EFFECTIVELY WRAPS IT UP, BY SUMMARIZING, ETC.					
	1	3	6	4	0	1
		21.43	42.86	28.57	0.00	7.14

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

QUESTION 9 THE INSTRUCTOR HAS AN EFFECTIVE PRESENTATION STYLE (E.G. VOICE QUALITY, CHOICE OF WORDS, BODY MOVEMENTS, ETC.).

1	5	7	1	1	0
	35.71	50.00	7.14	7.14	0.00

QUESTION 10 THE INSTRUCTOR INSPIRES EXCITEMENT AND INTEREST IN THE SUBJECT MATTER.

1	2	3	6	3	0
	14.29	21.43	42.86	21.43	0.00

QUESTION 11 THE INSTRUCTOR IS CREATIVE AND IMAGINATIVE IN HIS/HER TEACHING METHODS.

1	0	8	6	0	0
	0.00	57.14	42.86	0.00	0.00

QUESTION 13 THE INSTRUCTOR GIVES OPEN-MINDED PRESENTATIONS, OF A VARIETY OF POINTS OF VIEW.

1	4	9	0	0	1
	28.57	64.29	0.00	0.00	7.14

QUESTION 14 THE INSTRUCTOR RELATES THE TOPICS TO A WIDE RANGE OF FIELDS, SITUATIONS, APPLICATIONS, AND INTERESTS.

1	0	10	2	0	2
	0.00	71.43	14.29	0.00	14.29

QUESTION 15 THE INSTRUCTOR ENCOURAGES INDEPENDENT THOUGHT AND, WHEN NECESSARY, HELPS STUDENTS FIND THE NECESSARY RESOURCES TO PURSUE INDEPENDENT STUDY.

1	0	8	2	0	4
	0.00	57.14	14.29	0.00	28.57

QUESTION 16 THE GENERAL DESIGN OF THIS INSTRUCTOR'S COURSE (NUMBER AND CHOICE OF LECTURES, DISCUSSIONS, READINGS, PAPERS, AND EXAMINATIONS) IS APPROPRIATE.

1	4	5	4	1	0
	28.57	35.71	28.57	7.14	0.00

QUESTION 17 THE LEVEL OF DIFFICULTY AND THE AMOUNT OF WORK IN THIS COURSE ARE ABOUT RIGHT FOR ME

1	4	8	0	1	1
	28.57	57.14	0.00	7.14	7.14

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

QUESTION 18 THE INSTRUCTOR ALLOWS STUDENTS TO WORK OUT ALTERNATIVE WAYS OF ACHIEVING COURSE OBJECTIVES AND HELPS STUDENTS WHO WANT TO DO THIS.

1	2	3	4	5	6
1 7.14	2 14.29	6 42.86	0 0.00	5 35.71	

QUESTION 19 THE INSTRUCTOR IS AN EFFECTIVE DISCUSSION LEADER (ENCOURAGES CONTRIBUTIONS, KEEPS THE DISCUSSIONS FOCUSED, DOESN'T DOMINATE, ETC.).

1	2	3	4	5	6
6 42.86	3 21.43	5 35.71	0 0.00	0 0.00	

QUESTION 20 THE INSTRUCTOR INVITES STUDENTS TO SHARE THEIR KNOWLEDGE, EXPERIENCES, AND OPINIONS AT APPROPRIATE TIMES.

1	2	3	4	5	6
8 57.14	6 42.86	0 0.00	0 0.00	0 0.00	

QUESTION 21 THE INSTRUCTOR ENCOURAGES STUDENTS TO LISTEN AND RESPOND TO EACH OTHER.

1	2	3	4	5	6
5 35.71	6 42.86	3 21.43	0 0.00	0 0.00	

QUESTION 22 THE INSTRUCTOR USES QUESTIONS EFFECTIVELY (E.G. TO FOCUS ATTENTION ON IMPORTANT POINTS, TO CHECK ON STUDENT UNDERSTANDING, ETC.).

1	2	3	4	5	6
6 42.86	6 42.86	1 7.14	1 7.14	0 0.00	

QUESTION 23 THE INSTRUCTOR RESTATES STUDENTS' QUESTIONS FOR CLARIFICATION AND ANSWERS THEM IN A WAY THAT THE WHOLE CLASS UNDERSTANDS.

1	2	3	4	5	6
7 50.00	5 35.71	2 14.29	0 0.00	0 0.00	

QUESTION 24 THE INSTRUCTOR PROVIDES ENCOURAGEMENT AND OPPORTUNITY FOR STUDENT QUESTIONS, SUGGESTIONS, COMMENTS OR CRITICISMS REGARDING ANY ASPECT OF THIS COURSE.

1	2	3	4	5	6
4 28.57	7 50.00	2 14.29	0 0.00	1 7.14	

QUESTION 25 THE INSTRUCTOR SEEMS TO KNOW WHEN STUDENTS ARE CONFUSED, BORED, OR FRUSTRATED.

1	2	3	4	5	6
4 28.57	5 35.71	2 14.29	3 21.43	0 0.00	

QUESTION 26 THE INSTRUCTOR ANSWERS QUESTIONS, OR ENCOURAGES AND HELPS OTHERS TO ANSWER THEM, WITH UNDERSTANDING AND CLARITY.

1	4	8	2	0	0
	28.57	57.14	14.29	0.00	0.00

QUESTION 27 THE INSTRUCTOR DEMONSTRATES HIS/HER ACTIVE INTEREST IN STUDENTS AS INDIVIDUALS BY BEING EASY TO APPROACH, PATIENT, AND WILLING TO HELP.

1	8	6	0	0	0
	57.14	42.86	0.00	0.00	0.00

QUESTION 28 THE INSTRUCTOR MAKES CLEAR TO STUDENTS WHAT IS EXPECTED OF THEM AND HOW THEIR PERFORMANCES ARE TO BE EVALUATED.

1	4	9	1	0	0
	28.57	64.29	7.14	0.00	0.00

QUESTION 29 THE INSTRUCTOR EVALUATES STUDENT WORK IN A CLEAR AND CONSISTENT WAY.

1	7	5	2	0	0
	50.00	35.71	14.29	0.00	0.00

QUESTION 30 THE INSTRUCTOR KEEPS THE STUDENTS POSTED ON THEIR PROGRESS THROUGH QUESTIONS IN CLASS, INDIVIDUAL CONFERENCES, AND APPROPRIATE QUIZZES AND TESTS.

1	6	4	3	0	1
	42.86	28.57	21.43	0.00	7.14

QUESTION 31 THE INSTRUCTOR OPENLY TALKS ABOUT QUESTIONS OF RIGHT AND WRONG AS THEY RELATE TO HIS/HER SUBJECT MATTER.

1	4	5	3	0	2
	28.57	35.71	21.43	0.00	14.29

B E S T S K I L L S

27. THE INSTRUCTOR DEMONSTRATES HIS/HER ACTIVE INTEREST IN STUDENTS AS INDIVIDUALS BY BEING EASY TO APPROACH, PATIENT, AND WILLING TO HELP. 100.00

20. THE INSTRUCTOR INVITES STUDENTS TO SHARE THEIR KNOWLEDGE, EXPERIENCES, AND OPINIONS AT APPROPRIATE TIMES. 100.00

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

12.	THE INSTRUCTOR MAKES STUDENTS FEEL FREE TO DISAGREE WITH HIM/HER, WITH FELLOW STUDENTS, OR WITH THE READINGS.	100.00
6.	THE INSTRUCTOR KNOWS WHEN TO ELABORATE ON A TOPIC AND HE/SHE ELABORATES EFFECTIVELY BY USING EXAMPLES, ETC.	100.00
28.	THE INSTRUCTOR MAKES CLEAR TO STUDENTS WHAT IS EXPECTED OF THEM AND HOW THEIR PERFORMANCES ARE TO BE EVALUATED.	92.86
13.	THE INSTRUCTOR GIVES OPEN-MINDED PRESENTATIONS, OF A VARIETY OF POINTS OF VIEW.	92.86
3.	THE INSTRUCTOR PRESENTS NEW IDEAS AND INFORMATION AT AN APPROPRIATE PACE, I.E. NEITHER TOO FAST NOR TOO SLOW.	92.86
29.	THE INSTRUCTOR EVALUATES STUDENT WORK IN A CLEAR AND CONSISTENT WAY.	85.71
26.	THE INSTRUCTOR ANSWERS QUESTIONS, OR ENCOURAGES AND HELPS OTHERS TO ANSWER THEM, WITH UNDERSTANDING AND CLARITY.	85.71
23.	THE INSTRUCTOR RESTATES STUDENTS' QUESTIONS FOR CLARIFICATION AND ANSWERS THEM IN A WAY THAT THE WHOLE CLASS UNDERSTANDS.	85.71
22.	THE INSTRUCTOR USES QUESTIONS EFFECTIVELY (E.G. TO FOCUS ATTENTION ON IMPORTANT POINTS, TO CHECK ON STUDENT UNDERSTANDING, ETC.).	85.71
17.	THE LEVEL OF DIFFICULTY AND THE AMOUNT OF WORK IN THIS COURSE ARE ABOUT RIGHT FOR ME.	85.71
9.	THE INSTRUCTOR HAS AN EFFECTIVE PRESENTATION STYLE (E.G. VOICE QUALITY, CHOICE OF WORDS, BODY MOVEMENTS, ETC.).	85.71
4.	THE INSTRUCTOR ARRANGES AND PRESENTS MATERIAL IN A CLEAR, WELL-ORGANIZED FASHION.	85.71
24.	THE INSTRUCTOR PROVIDES ENCOURAGEMENT AND OPPORTUNITY FOR STUDENT QUESTIONS, SUGGESTIONS, COMMENTS OR CRITICISMS REGARDING ANY ASPECT OF THIS COURSE.	78.57
21.	THE INSTRUCTOR ENCOURAGES STUDENTS TO LISTEN AND RESPOND TO EACH OTHER.	78.57
5.	IN THIS INSTRUCTOR'S CLASS IT IS USUALLY POSSIBLE TO KNOW WHICH POINTS ARE MOST IMPORTANT, AND TO SEE THE RELATIONSHIPS BETWEEN TOPICS.	78.57

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

30.	THE INSTRUCTOR KEEPS THE STUDENTS POSTED ON THEIR PROGRESS THROUGH QUESTIONS IN CLASS, INDIVIDUAL CONFERENCES, AND APPROPRIATE QUIZZES AND TESTS.	71.43
14.	THE INSTRUCTOR RELATES THE TOPICS TO A WIDE RANGE OF FIELDS, SITUATIONS, APPLICATIONS, AND INTERESTS.	71.43
7.	THE INSTRUCTOR PROVIDES USEFUL SUMMARIES AT APPROPRIATE TIMES, (E.G. AT END OF CLASS SESSION OR END OF UNIT.).	71.43
1.	WHEN BEGINNING A CLASS, LESSON, OR NEW INSTRUCTIONAL ACTIVITY, THE INSTRUCTOR USUALLY MAKES CLEAR WHAT HE/SHE HOPES TO ACCOMPLISH.	71.43
31.	THE INSTRUCTOR OPENLY TALKS ABOUT QUESTIONS OF #RIGHT AND WRONG# AS THEY RELATE TO HIS/HER SUBJECT MATTER.	64.29
25.	THE INSTRUCTOR SEEMS TO KNOW WHEN STUDENTS ARE CONFUSED, BORED, OR FRUSTRATED.	64.29
19.	THE INSTRUCTOR IS AN EFFECTIVE DISCUSSION LEADER (ENCOURAGES CONTRIBUTIONS, KEEPS THE DISCUSSIONS FOCUSED, DOESN*T DOMINATE, ETC.).	64.29
16.	THE GENERAL DESIGN OF THIS INSTRUCTOR*S COURSE (NUMBER AND CHOICE OF LECTURES, DISCUSSIONS, READINGS, PAPERS, AND EXAMINATIONS) IS APPROPRIATE.	64.29
8.	WHEN THE INSTRUCTOR REACHES THE END OF ANY SEGMENT OF PRESENTATION, HE/SHE EFFECTIVELY #WRAPS IT UP# BY SUMMARIZING, ETC.	64.29
15.	THE INSTRUCTOR ENCOURAGES INDEPENDENT THOUGHT AND, WHEN NECESSARY, HELPS STUDENTS FIND THE NECESSARY RESOURCES TO PURSUE INDEPENDENT STUDY.	57.14
11.	THE INSTRUCTOR IS CREATIVE AND IMAGINATIVE IN HIS/HER TEACHING METHODS.	57.14
2.	THE INSTRUCTOR USUALLY GETS ME INTERESTED AT THE BEGINNING OF EACH CLASS SESSION AND LEARNING ACTIVITY.	42.86
10.	THE INSTRUCTOR INSPIRES EXCITEMENT AND INTEREST IN THE SUBJECT MATTER.	35.71
18.	THE INSTRUCTOR ALLOWS STUDENTS TO WORK OUT ALTERNATIVE WAYS OF ACHIEVING COURSE OBJECTIVES AND HELPS STUDENTS WHO WANT TO DO THIS.	21.43

WEAKEST SKILLS

10.	THE INSTRUCTOR INSPIRES EXCITEMENT AND INTEREST IN THE SUBJECT MATTER.	64.29
2.	THE INSTRUCTOR USUALLY GETS ME INTERESTED AT THE BEGINNING OF EACH CLASS SESSION AND LEARNING ACTIVITY.	57.14
18.	THE INSTRUCTOR ALLOWS STUDENTS TO WORK OUT ALTERNATIVE WAYS OF ACHIEVING COURSE OBJECTIVES AND HELPS STUDENTS WHO WANT TO DO THIS;	42.86
11.	THE INSTRUCTOR IS CREATIVE AND IMAGINATIVE IN HIS/HER TEACHING METHODS.	42.86
25.	THE INSTRUCTOR SEEMS TO KNOW WHEN STUDENTS ARE CONFUSED, BORED, OR FRUSTRATED.	35.71
19.	THE INSTRUCTOR IS AN EFFECTIVE DISCUSSION LEADER (ENCOURAGES CONTRIBUTIONS, KEEPS THE DISCUSSIONS FOCUSED, DOESN*T DOMINATE, ETC.).	35.71
16.	THE GENERAL DESIGN OF THIS INSTRUCTOR*S COURSE (NUMBER AND CHOICE OF LECTURES, DISCUSSIONS, READINGS, PAPERS, AND EXAMINATIONS) IS APPROPRIATE.	35.71
8.	WHEN THE INSTRUCTOR REACHES THE END OF ANY SEGMENT OF PRESENTATION, HE/SHE EFFECTIVELY *WRAPS IT UP* BY SUMMARIZING, ETC.	28.57
1.	WHEN BEGINNING A CLASS, LESSON, OR NEW INSTRUCTIONAL ACTIVITY, THE INSTRUCTOR USUALLY MAKES CLEAR WHAT HE/SHE HOPES TO ACCOMPLISH.	28.57
31.	THE INSTRUCTOR OPENLY TALKS ABOUT QUESTIONS OF *RIGHT AND WRONG* AS THEY RELATE TO HIS/HER SUBJECT MATTER.	21.43
30.	THE INSTRUCTOR KEEPS THE STUDENTS POSTED ON THEIR PROGRESS THROUGH QUESTIONS IN CLASS, INDIVIDUAL CONFERENCES, AND APPROPRIATE QUIZZES AND TESTS.	21.43
21.	THE INSTRUCTOR ENCOURAGES STUDENTS TO LISTEN AND RESPOND TO EACH OTHER.	21.43
5.	IN THIS INSTRUCTOR*S CLASS IT IS USUALLY POSSIBLE TO KNOW WHICH POINTS ARE MOST IMPORTANT, AND TO SEE THE RELATIONSHIPS BETWEEN TOPICS.	21.43

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

29.	THE INSTRUCTOR EVALUATES STUDENT WORK IN A CLEAR AND CONSISTENT WAY.	14.59
26.	THE INSTRUCTOR ANSWERS QUESTIONS, OR ENCOURAGES AND HELPS OTHERS TO ANSWER THEM, WITH UNDERSTANDING AND CLARITY.	14.59
24.	THE INSTRUCTOR PROVIDES ENCOURAGEMENT AND OPPORTUNITY FOR STUDENT QUESTIONS, SUGGESTIONS, COMMENTS OR CRITICISMS REGARDING ANY ASPECT OF THIS COURSE.	14.59
23.	THE INSTRUCTOR RESTATES STUDENTS' QUESTIONS FOR CLARIFICATION AND ANSWERS THEM IN A WAY THAT THE WHOLE CLASS UNDERSTANDS.	14.59
22.	THE INSTRUCTOR USES QUESTIONS EFFECTIVELY (E.G. TO FOCUS ATTENTION ON IMPORTANT POINTS, TO CHECK ON STUDENT UNDERSTANDING, ETC.).	14.59
15.	THE INSTRUCTOR ENCOURAGES INDEPENDENT THOUGHT AND, WHEN NECESSARY, HELPS STUDENTS FIND THE NECESSARY RESOURCES TO PURSUE INDEPENDENT STUDY.	14.59
14.	THE INSTRUCTOR RELATES THE TOPICS TO A WIDE RANGE OF FIELDS, SITUATIONS, APPLICATIONS, AND INTERESTS.	14.59
9.	THE INSTRUCTOR HAS AN EFFECTIVE PRESENTATION STYLE (E.G. VOICE QUALITY, CHOICE OF WORDS, BODY MOVEMENTS, ETC.).	14.59
7.	THE INSTRUCTOR PROVIDES USEFUL SUMMARIES AT APPROPRIATE TIMES, (E.G. AT END OF CLASS SESSION OR END OF UNIT.).	14.59
4.	THE INSTRUCTOR ARRANGES AND PRESENTS MATERIAL IN A CLEAR, WELL-ORGANIZED FASHION.	14.59
28.	THE INSTRUCTOR MAKES CLEAR TO STUDENTS WHAT IS EXPECTED OF THEM AND HOW THEIR PERFORMANCES ARE TO BE EVALUATED.	7.34
17.	THE LEVEL OF DIFFICULTY AND THE AMOUNT OF WORK IN THIS COURSE ARE ABOUT RIGHT FOR ME.	7.34
3.	THE INSTRUCTOR PRESENTS NEW IDEAS AND INFORMATION AT AN APPROPRIATE PACE, I.E. NEITHER TOO FAST NOR TOO SLOW.	7.34
27.	THE INSTRUCTOR DEMONSTRATES HIS/HER ACTIVE INTEREST IN STUDENTS AS INDIVIDUALS BY BEING EASY TO APPROACH, PATIENT, AND WILLING TO HELP.	0.00
20.	THE INSTRUCTOR INVITES STUDENTS TO SHARE THEIR KNOWLEDGE, EXPERIENCES, AND OPINIONS AT APPROPRIATE TIMES.	0.00

SAMPLE STUDENT EVALUATION COMPUTER PRINTOUT (continued)

13.	THE INSTRUCTOR GIVES OPEN-MINDED PRESENTATIONS, OF A VARIETY OF POINTS OF VIEW.	0.00
12.	THE INSTRUCTOR MAKES STUDENTS FEEL FREE TO DISAGREE WITH HIM/HER, WITH FELLOW STUDENTS, OR WITH THE READINGS.	0.00
6.	THE INSTRUCTOR KNOWS WHEN TO ELABORATE ON A TOPIC AND HE/SHE ELABORATES EFFECTIVELY BY USING EXAMPLES, ETC.	0.00

FACTOR ANALYSIS MATRIX OF STUDENT EVALUATION ITEMS

VARIMAX ROTATED FACTOR MATRIX
AFTER ROTATION WITH KAISER NORMALIZATION

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7
VAR001	0.23431	0.54889	0.10181	0.36797	-0.11239	0.22021	-0.10086
VAR002	0.66340	0.30401	0.02145	0.21899	0.25598	-0.01476	0.08385
VAR003	0.39211	0.42205	0.29028	0.23981	0.12362	-0.04757	0.11020
VAR004	0.29157	0.56745	-0.00927	0.07734	0.23601	0.05704	0.02385
VAR005	0.12094	0.60809	-0.01866	0.05600	0.23482	0.20687	0.08697
VAR006	0.20892	0.59376	0.29928	-0.03733	0.02978	0.06900	0.13761
VAR007	0.12477	0.65314	0.27596	0.19640	0.09425	0.00575	0.05273
VAR008	0.06419	0.65873	0.16479	0.17465	0.03532	0.11773	0.11181
VAR009	0.70631	0.13133	0.11913	0.07904	0.00392	0.19666	0.01481
VAR010	0.77760	0.19032	0.11809	0.16646	0.11045	0.07561	0.04767
VAR011	0.66779	0.16018	0.34524	0.09761	0.04057	0.13743	0.14229
VAR012	0.36461	0.09306	0.52038	-0.14961	0.26282	0.13089	0.21246
VAR013	-0.06259	0.32207	0.49183	-0.17924	0.12182	0.31585	0.22957
VAR014	0.13183	0.15648	0.64049	-0.07534	0.05856	0.22003	-0.08667
VAR015	0.62738	0.15315	0.50707	0.05163	0.24353	-0.32488	0.11420
VAR016	0.12519	-0.04416	0.03353	0.39568	0.13122	0.10817	0.06803
VAR017	0.09039	0.26903	0.08417	-0.05329	0.03597	0.03550	0.75287
VAR018	0.12490	0.08414	0.68376	0.27854	-0.01961	0.16764	0.12277
VAR019	0.49925	0.14365	0.11225	0.20176	0.46523	0.18385	0.01535
VAR020	0.11637	0.19753	0.19566	0.10342	0.76060	0.00368	0.07169
VAR021	0.08746	0.08004	0.18931	-0.01017	0.77245	0.27179	0.12850
VAR022	0.20282	0.39771	0.07156	0.09847	0.41848	0.29413	-0.13248
VAR023	0.04543	0.27335	0.09573	0.17030	0.22002	0.60773	-0.14590
VAR024	0.17721	-0.00665	0.46362	0.33433	0.27103	0.30785	0.03344
VAR025	0.35072	0.19005	0.20860	0.28316	-0.00742	0.49311	0.07541
VAR026	0.25244	0.32720	0.01231	0.06358	0.25503	0.51285	0.23160
VAR027	0.15992	0.01415	0.30655	0.08093	0.15292	0.59083	0.24988
VAR028	0.12162	0.30071	-0.01155	0.51904	-0.00436	0.26220	0.19391
VAR029	0.09045	0.29231	0.14519	0.65699	0.10644	0.06988	0.17082
VAR030	0.26316	0.05422	0.05592	0.76714	0.09216	0.02927	-0.09259
VAR031	0.23969	0.17344	0.54385	0.22625	0.12779	0.04927	0.15225

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP

GROUP 1 = FIRST 83 CASES
GROUP 2 = NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR001												
GROUP 1	83	2.0482	1.047	0.115	1.51	0.080	1.32	150	0.188	1.35	149.94	0.179
GROUP 2	69	1.8406	0.851	0.102								
VAR002												
GROUP 1	83	1.9277	0.823	0.090	1.54	0.068	-0.35	150	0.725	-0.36	149.87	0.720
GROUP 2	69	1.9710	0.664	0.080								
VAR003												
GROUP 1	83	1.7349	0.898	0.099	1.58	0.052	1.05	150	0.294	1.08	149.71	0.284
GROUP 2	69	1.5942	0.714	0.086								
VAR004												
GROUP 1	83	1.7952	0.823	0.090	1.08	0.728	-0.54	150	0.587	-0.54	142.74	0.588
GROUP 2	69	1.8696	0.856	0.103								
VAR005												
GROUP 1	83	1.9639	1.029	0.113	1.91	0.007	1.61	150	0.109	1.66	147.36	0.099
GROUP 2	69	1.7246	0.745	0.090								
VAR006												
GROUP 1	83	1.5904	0.842	0.092	1.68	0.028	-0.03	150	0.975	-0.03	149.21	0.975
GROUP 2	69	1.5942	0.649	0.078								
VAR007												
GROUP 1	83	2.2771	1.252	0.137	2.81	0.000	1.61	150	0.109	1.69	137.00	0.094
GROUP 2	69	2.0000	0.748	0.090								
VAR008												
GROUP 1	83	2.2530	1.091	0.120	1.26	0.326	0.90	150	0.372	0.90	149.26	0.367
GROUP 2	69	2.1014	0.972	0.117								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP (continued)

GROUP 1 = FIRST 83 CASES
GROUP 2 = NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR009												
GROUP 1	83	1.4819	0.612	0.067	1.14	0.591	-1.31	150	0.193	-1.31	147.78	0.191
GROUP 2	69	1.6087	0.574	0.069								
VAR010												
GROUP 1	83	1.9518	0.779	0.086	1.76	0.017	0.34	150	0.734	0.35	148.66	0.727
GROUP 2	69	1.9130	0.588	0.071								
VAR011												
GROUP 1	83	1.5422	0.786	0.086	1.43	0.129	-1.05	150	0.297	-1.06	149.99	0.289
GROUP 2	69	1.6667	0.657	0.079								
VAR012												
GROUP 1	83	1.2289	0.477	0.052	1.27	0.299	-1.44	150	0.151	-1.43	137.34	0.155
GROUP 2	69	1.3478	0.538	0.065								
VAR013												
GROUP 1	83	1.7349	0.871	0.096	1.15	0.562	1.23	150	0.220	1.24	147.95	0.217
GROUP 2	69	1.5652	0.813	0.098								
VAR014												
GROUP 1	83	2.2169	1.148	0.126	1.69	0.027	1.97	150	0.051	2.02	149.16	0.045
GROUP 2	69	1.8841	0.883	0.106								
VAR015												
GROUP 1	83	2.1687	1.351	0.148	1.23	0.382	0.73	150	0.465	0.74	148.97	0.461
GROUP 2	69	2.0145	1.219	0.147								
VAR016												
GROUP 1	83	2.0723	0.934	0.103	1.54	0.068	1.87	150	0.064	1.90	149.87	0.059
GROUP 2	69	1.8116	0.753	0.091								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 83 CASES
GROUP 2 - NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR017												
GROUP 1	83	1.8193	0.872	0.096	1.66	0.032	-0.50	150	0.615	-0.52	140.32	0.607
GROUP 2	69	1.8841	0.676	0.081								
VAR018												
GROUP 1	83	2.7108	1.634	0.179	1.26	0.330	0.48	150	0.688	0.41	146.24	0.685
GROUP 2	69	2.6087	1.457	0.175								
VAR019												
GROUP 1	83	1.5181	0.632	0.069	1.20	0.422	-0.71	150	0.480	-0.70	139.30	0.484
GROUP 2	69	1.5942	0.693	0.083								
VAR020												
GROUP 1	83	1.3373	0.501	0.055	1.13	0.583	0.05	150	0.962	0.05	141.27	0.962
GROUP 2	69	1.3333	0.511	0.064								
VAR021												
GROUP 1	83	1.4157	0.666	0.073	1.03	0.907	-0.01	150	0.992	-0.01	144.29	0.992
GROUP 2	69	1.4348	0.675	0.081								
VAR022												
GROUP 1	83	1.5904	0.606	0.066	1.07	0.781	-0.78	150	0.434	-0.79	148.97	0.432
GROUP 2	69	1.6667	0.586	0.071								
VAR023												
GROUP 1	83	1.9880	1.088	0.119	2.79	0.000	2.74	150	0.007	2.86	137.18	0.005
GROUP 2	69	1.5797	0.651	0.078								
VAR024												
GROUP 1	83	1.5542	0.769	0.084	1.74	0.020	0.14	150	0.873	0.14	148.83	0.870
GROUP 2	69	1.5362	0.584	0.070								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 83 CASES
GROUP 2 - NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR025												
GROUP 1	83	1.7952	0.866	0.095	1.30	0.268	0.42	150	0.675	0.42	149.54	0.672
GROUP 2	69	1.7391	0.760	0.092								
VAR026												
GROUP 1	83	1.6145	0.678	0.074	1.62	0.042	-0.52	150	0.604	-0.53	149.58	0.596
GROUP 2	69	1.6667	0.533	0.064								
VAR027												
GROUP 1	83	1.3976	0.661	0.073	1.15	0.562	0.34	150	0.736	0.34	147.95	0.735
GROUP 2	69	1.3623	0.618	0.074								
VAR028												
GROUP 1	83	2.1446	1.049	0.115	2.01	0.003	2.70	150	0.008	2.78	146.36	0.006
GROUP 2	69	1.7391	0.741	0.089								
VAR029												
GROUP 1	83	2.0602	1.028	0.113	2.00	0.004	1.59	150	0.114	1.64	146.41	0.103
GROUP 2	69	1.8261	0.727	0.087								
VAR030												
GROUP 1	83	2.2410	1.175	0.129	1.68	0.028	1.06	150	0.292	1.00	149.20	0.318
GROUP 2	69	2.0580	0.906	0.109								
VAR031												
GROUP 1	83	2.0482	1.324	0.145	1.27	0.307	-0.05	150	0.962	-0.05	149.35	0.962
GROUP 2	69	2.0580	1.174	0.141								
F1 TOTAL SCAT												
GROUP 1	83	1.8469	0.354	0.039	1.12	0.638	1.53	150	0.129	1.54	147.49	0.127
GROUP 2	69	1.7609	0.335	0.040								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 83 CASES
GROUP 2 - NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
F2 CLARITY AND PRESENTATION												
GROUP 1	83	1.9518	0.563	0.062	1.37	0.185	1.55	150	0.123	1.58	149.87	0.117
GROUP 2	69	1.8181	0.482	0.058								
F3 INTEREST												
GROUP 1	83	1.7590	0.519	0.057	1.39	0.160	-0.51	150	0.613	-0.51	149.74	0.608
GROUP 2	69	1.7797	0.439	0.053								
F4 CLARITY												
GROUP 1	83	2.0265	0.609	0.067	1.52	0.074	1.91	150	0.058	1.95	149.91	0.053
GROUP 2	69	1.8522	0.493	0.059								
F5 EVALUATION												
GROUP 1	83	2.1483	0.764	0.084	1.45	0.115	2.38	150	0.019	2.42	150.00	0.017
GROUP 2	69	1.8739	0.635	0.076								
F6 RELATING TO STUDENT RESPONSES												
GROUP 1	83	1.8012	0.685	0.075	2.03	0.003	1.82	150	0.071	1.88	146.09	0.063
GROUP 2	69	1.6239	0.481	0.058								
F7 RELATING TO STUDENT NEEDS												
GROUP 1	83	1.5964	0.571	0.063	1.05	0.834	0.50	150	0.620	0.50	148.21	0.619
GROUP 2	69	1.5507	0.537	0.067								
F8 DISCUSSION LEADING												
GROUP 1	83	1.4499	0.483	0.044	1.13	0.584	-0.55	150	0.581	-0.55	141.31	0.583
GROUP 2	69	1.5072	0.429	0.052								
F9 OPENNESS FLEXIBILITY												
GROUP 1	83	1.9011	0.497	0.055	1.19	0.455	1.28	150	0.202	1.29	148.57	0.198
GROUP 2	69	1.8012	0.455	0.055								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 83 CASES
GROUP 2 - NEXT 69 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
F10 COURSE DESIGN												
GROUP 1	83	1.9458	0.765	0.084	2.08	0.002	0.90	150	0.370	0.93	145.58	0.355
GROUP 2	69	1.8478	0.531	0.064								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP

GROUP 1 = FIRST 68 CASES
GROUP 2 = NEXT 63 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR001												
GROUP 1	68	2.0000	0.846	0.103	1.01	0.972	0.00	129	1.000	0.00	128.33	1.000
GROUP 2	63	2.0000	0.842	0.106								
VAR002												
GROUP 1	68	2.1912	0.738	0.090	1.27	0.340	-0.69	129	0.492	-0.69	124.29	0.494
GROUP 2	63	2.2857	0.831	0.105								
VAR003												
GROUP 1	68	2.0147	1.113	0.135	1.42	0.167	0.70	129	0.487	0.70	127.81	0.484
GROUP 2	63	1.8889	0.935	0.118								
VAR004												
GROUP 1	68	1.7941	0.744	0.090	1.47	0.129	0.27	129	0.788	0.27	127.37	0.787
GROUP 2	63	1.7619	0.615	0.077								
VAR005												
GROUP 1	68	1.8824	0.820	0.099	1.26	0.358	0.42	129	0.676	0.42	128.81	0.675
GROUP 2	63	1.8254	0.730	0.092								
VAR006												
GROUP 1	68	1.5000	0.820	0.099	1.41	0.165	-1.77	129	0.079	-1.76	121.56	0.081
GROUP 2	63	1.7778	0.975	0.123								
VAR007												
GROUP 1	68	2.1618	1.114	0.135	1.33	0.253	0.54	129	0.592	0.54	128.43	0.590
GROUP 2	63	2.0635	0.965	0.122								
VAR008												
GROUP 1	68	2.0294	1.036	0.126	1.69	0.734	-0.70	129	0.486	-0.70	127.20	0.486
GROUP 2	63	2.1587	1.081	0.136								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP
(continued)

GROUP 1 - FIRST 68 CASES
GROUP 2 - NEXT 63 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR009												
GROUP 1	68	1.6618	0.745	0.090	1.59	0.063	-1.97	129	0.051	-1.95	118.12	0.054
GROUP 2	63	1.9524	0.941	0.119								
VAR010												
GROUP 1	68	2.1618	0.940	0.114	1.07	0.802	-0.47	129	0.638	-0.47	128.74	0.638
GROUP 2	63	2.2381	0.911	0.115								
VAR011												
GROUP 1	68	1.9853	0.872	0.106	1.13	0.627	-0.53	129	0.599	-0.53	128.97	0.598
GROUP 2	63	2.0635	0.821	0.103								
VAR012												
GROUP 1	68	1.3824	0.599	0.073	1.99	0.006	-2.11	129	0.037	-2.08	110.91	0.040
GROUP 2	63	1.6508	0.845	0.107								
VAR013												
GROUP 1	68	1.7647	0.979	0.119	1.08	0.755	-0.71	129	0.478	-0.71	127.30	0.479
GROUP 2	63	1.8889	1.018	0.128								
VAR014												
GROUP 1	68	2.3971	1.394	0.169	1.34	0.246	0.28	129	0.781	0.28	128.39	0.780
GROUP 2	63	2.3333	1.205	0.152								
VAR015												
GROUP 1	68	2.2059	1.356	0.164	1.17	0.520	-1.10	129	0.275	-1.09	125.91	0.277
GROUP 2	63	2.4762	1.469	0.185								
VAR016												
GROUP 1	68	2.1912	0.981	0.119	1.03	0.907	0.56	129	0.580	0.55	127.94	0.580
GROUP 2	63	2.0952	0.995	0.125								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 68 CASES
GROUP 2 - NEXT 63 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR017												
GROUP 1	68	1.8824	0.873	0.106	1.43	0.154	-1.27	129	0.206	-1.26	121.32	0.209
GROUP 2	63	2.0952	1.043	0.131								
VAR018												
GROUP 1	68	2.4118	1.385	0.168	1.02	0.941	-0.93	129	0.356	-0.93	128.42	0.356
GROUP 2	63	2.6349	1.371	0.173								
VAR019												
GROUP 1	68	1.7206	0.844	0.102	1.38	0.202	0.39	129	0.695	0.39	128.11	0.694
GROUP 2	63	1.6667	0.718	0.091								
VAR020												
GROUP 1	66	1.3088	0.496	0.060	2.31	0.001	-2.51	129	0.013	-2.48	105.97	0.015
GROUP 2	63	1.5873	0.754	0.095								
VAR021												
GROUP 1	68	1.6471	0.877	0.106	1.52	0.094	0.43	129	0.670	0.43	126.78	0.668
GROUP 2	63	1.5873	0.710	0.089								
VAR022												
GROUP 1	68	1.6324	0.689	0.084	1.06	0.805	-0.42	129	0.673	-0.42	128.73	0.673
GROUP 2	63	1.6825	0.658	0.084								
VAR023												
GROUP 1	68	1.8235	1.007	0.122	1.18	0.496	-1.83	129	0.070	-1.82	125.73	0.071
GROUP 2	63	2.1587	1.096	0.138								
VAR024												
GROUP 1	68	1.8235	1.007	0.122	1.02	0.946	-0.19	129	0.848	-0.19	128.40	0.848
GROUP 2	63	1.8571	0.998	0.126								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 68 CASES
GROUP 2 - NEXT 63 CASES

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR025													
	GROUP 1	68	2.0000	0.898	0.109	1.19	0.486	-0.58	129	0.562	-0.58	125.66	0.564
	GROUP 2	63	2.0952	0.979	0.123								
VAR026													
	GROUP 1	68	1.7500	0.853	0.103	1.38	0.198	-0.86	129	0.393	-0.85	122.23	0.396
	GROUP 2	63	1.8889	1.002	0.126								
VAR027													
	GROUP 1	68	1.4706	0.743	0.090	1.38	0.200	-0.94	129	0.349	-0.93	122.27	0.352
	GROUP 2	63	1.6032	0.871	0.110								
VAR028													
	GROUP 1	68	1.9853	0.985	0.119	1.29	0.311	-0.58	129	0.564	-0.58	128.67	0.562
	GROUP 2	63	2.0794	0.867	0.109								
VAR029													
	GROUP 1	68	2.0294	0.897	0.109	1.38	0.203	0.96	129	0.338	0.97	128.12	0.335
	GROUP 2	63	1.8889	0.764	0.096								
VAR030													
	GROUP 1	68	2.2059	1.377	0.167	1.15	0.582	-2.04	129	0.043	-2.03	126.34	0.044
	GROUP 2	63	2.7143	1.475	0.186								
VAR031													
	GROUP 1	68	2.1618	1.378	0.167	1.23	0.418	-0.75	129	0.457	-0.75	128.92	0.455
	GROUP 2	63	2.3333	1.244	0.157								
F1	TOTAL SCAT												
	GROUP 1	68	1.9085	0.531	0.064	1.26	0.358	-1.16	129	0.248	-1.16	128.81	0.246
	GROUP 2	63	2.0106	0.473	0.060								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP (continued)

GROUP 1 - FIRST 68 CASES
GROUP 2 - NEXT 63 CASES

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
F2	CLARITY AND PRESENTATION												
	GROUP 1	68	1.9115	0.627	0.076	1.27	0.348	-0.13	129	0.895	-0.13	128.78	0.894
	GROUP 2	63	1.9252	0.557	0.070								
F3	INTEREST												
	GROUP 1	68	2.0000	0.615	0.075	1.05	0.840	-1.17	129	0.246	-1.17	127.68	0.246
	GROUP 2	63	2.1270	0.631	0.079								
F4	CLARITY												
	GROUP 1	68	1.9147	0.650	0.079	1.03	0.921	-0.45	129	0.657	-0.45	128.47	0.656
	GROUP 2	63	1.9651	0.642	0.081								
F5	EVALUATION												
	GROUP 1	68	2.0734	0.791	0.096	1.11	0.689	-1.14	129	0.258	-1.14	128.91	0.257
	GROUP 2	63	2.2268	0.752	0.095								
F6	RELATING TO STUDENT RESPONSES												
	GROUP 1	68	1.7868	0.735	0.089	1.25	0.376	-1.74	129	0.083	-1.74	124.67	0.085
	GROUP 2	63	2.0238	0.820	0.103								
F7	RELATING TO STUDENT NEEDS												
	GROUP 1	68	1.7353	0.666	0.081	1.32	0.266	-0.91	129	0.364	-0.91	123.35	0.367
	GROUP 2	63	1.8492	0.765	0.096								
F8	DISCUSSION LEADING												
	GROUP 1	68	1.5772	0.499	0.060	1.23	0.403	-0.58	129	0.560	-0.58	124.94	0.561
	GROUP 2	63	1.6310	0.553	0.070								
F9	OPENNESS FLEXIBILITY												
	GROUP 1	68	1.9566	0.748	0.091	1.32	0.264	-1.05	129	0.294	-1.06	128.49	0.291
	GROUP 2	63	2.0860	0.650	0.082								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR QUASI-EXPERIMENTAL GROUP
(continued)

GROUP 1 - FIRST 68 CASES
GROUP 2 - NEXT 63 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
FIC COURSE DESIGN												
GROUP 1	68	2.0368	0.730	0.088								
GROUP 2	63	2.0952	0.906	0.114	1.54	0.083	-0.41	129	0.684	-0.40	119.07	0.686

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP

GROUP 1 = FIRST 76 CASES
GROUP 2 = NEXT 56 CASES

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR001													
	GROUP 1	76	2.2368	0.831	0.095	1.26	0.370	0.80	130	0.425	0.81	125.31	0.417
	GROUP 2	56	2.1250	0.740	0.099								
VAR002													
	GROUP 1	76	2.4605	0.871	0.100	1.03	0.921	0.80	130	0.428	0.80	119.59	0.427
	GROUP 2	56	2.3393	0.859	0.115								
VAR003													
	GROUP 1	76	1.8684	0.838	0.096	1.26	0.343	-1.19	130	0.236	-1.17	118.32	0.245
	GROUP 2	56	2.0536	0.942	0.126								
VAR004													
	GROUP 1	76	2.2237	0.932	0.107	1.17	0.551	1.29	130	0.198	1.31	123.36	0.193
	GROUP 2	56	2.0179	0.863	0.115								
VAR005													
	GROUP 1	76	2.1579	0.834	0.096	1.40	0.177	-0.36	130	0.723	-0.35	106.54	0.730
	GROUP 2	56	2.2143	0.986	0.132								
VAR006													
	GROUP 1	76	1.8816	0.692	0.079	1.42	0.157	1.26	130	0.208	1.23	103.96	0.221
	GROUP 2	56	1.7143	0.825	0.110								
VAR007													
	GROUP 1	76	2.3289	0.870	0.100	1.31	0.275	-0.04	130	0.950	-0.06	108.98	0.951
	GROUP 2	56	2.3393	0.996	0.133								
VAR008													
	GROUP 1	76	2.5000	1.013	0.116	1.17	0.529	0.19	130	0.847	0.19	113.25	0.849
	GROUP 2	56	2.4643	1.095	0.146								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP (continued)

GROUP 1 - FIRST 76 CASES
GROUP 2 - NEXT 56 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR009												
GROUP 1	76	2.0000	0.800	0.092	1.31	0.292	1.47	130	0.144	1.50	126.22	0.136
GROUP 2	56	1.8036	0.699	0.093								
VAR010												
GROUP 1	76	2.4737	0.945	0.108	1.09	0.748	0.60	130	0.547	0.61	121.34	0.545
GROUP 2	56	2.3750	0.906	0.121								
VAR011												
GROUP 1	76	2.1053	0.946	0.109	1.16	0.572	0.10	130	0.921	0.10	123.14	0.921
GROUP 2	56	2.0893	0.880	0.118								
VAR012												
GROUP 1	76	1.4342	0.680	0.078	1.35	0.245	0.68	130	0.496	0.70	126.79	0.487
GROUP 2	56	1.3571	0.586	0.078								
VAR013												
GROUP 1	76	1.6184	0.848	0.097	2.02	0.007	0.22	130	0.826	0.23	129.75	0.817
GROUP 2	56	1.5893	0.596	0.080								
VAR014												
GROUP 1	76	2.0000	0.748	0.086	1.22	0.412	-0.52	130	0.605	-0.51	111.50	0.611
GROUP 2	56	2.0714	0.828	0.111								
VAR015												
GROUP 1	76	2.2763	1.250	0.143	1.22	0.421	-0.35	130	0.726	-0.35	111.63	0.730
GROUP 2	56	2.3571	1.381	0.185								
VAR016												
GROUP 1	76	2.1579	0.895	0.103	1.35	0.221	-1.60	130	0.112	-1.56	107.73	0.121
GROUP 2	56	2.4286	1.042	0.139								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP (continued)

GROUP 1 = FIRST 76 CASES
GROUP 2 = NEXT 56 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR017												
GROUP 1	76	2.0000	0.783	0.090	1.36	0.234	1.51	130	0.133	1.55	126.94	0.124
GROUP 2	56	1.8036	0.672	0.090								
VAR018												
GROUP 1	76	3.1316	1.360	0.156	1.21	0.450	0.89	130	0.380	0.89	124.42	0.373
GROUP 2	56	2.9286	1.234	0.165								
VAR019												
GROUP 1	76	2.0000	1.083	0.124	1.32	0.279	0.79	130	0.431	0.81	126.37	0.421
GROUP 2	56	1.8571	0.943	0.126								
VAR020												
GROUP 1	76	1.5789	0.735	0.084	1.34	0.242	0.05	130	0.957	0.05	108.24	0.958
GROUP 2	56	1.5714	0.850	0.114								
VAR021												
GROUP 1	76	1.6447	0.828	0.095	1.45	0.148	0.93	130	0.352	0.96	128.10	0.339
GROUP 2	56	1.5179	0.687	0.092								
VAR022												
GROUP 1	76	1.8947	0.810	0.093	1.16	0.558	1.18	130	0.242	1.19	123.28	0.537
GROUP 2	56	1.7321	0.751	0.100								
VAR023												
GROUP 1	76	2.2237	0.918	0.105	1.08	0.765	1.07	130	0.287	1.08	121.17	0.284
GROUP 2	56	2.0536	0.883	0.118								
VAR024												
GROUP 1	76	1.6974	0.817	0.094	1.52	0.107	-0.93	130	0.353	-0.96	128.71	0.338
GROUP 2	56	1.8214	0.664	0.089								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP (continued)

GROUP 1 = FIRST 76 CASES
GROUP 2 = NEXT 56 CASES

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
VAR025												
GROUP 1	76	2.1447	0.962	0.110	1.02	0.932	-0.93	130	0.352	-0.93	118.06	0.353
GROUP 2	56	2.3036	0.971	0.130								
VAR026												
GROUP 1	76	2.0526	0.878	0.101	1.66	0.050	1.51	130	0.133	1.57	129.61	0.119
GROUP 2	56	1.8393	0.682	0.091								
VAR027												
GROUP 1	76	1.5658	0.789	0.090	1.74	0.033	-0.04	130	0.964	-0.05	129.87	0.963
GROUP 2	56	1.5714	0.599	0.080								
VAR028												
GROUP 1	76	2.4605	0.944	0.108	1.34	0.238	2.19	130	0.030	2.14	108.14	0.035
GROUP 2	56	2.0714	1.093	0.146								
VAR029												
GROUP 1	76	2.2895	0.991	0.114	1.20	0.479	0.13	130	0.898	0.13	124.12	0.897
GROUP 2	56	2.2679	0.904	0.121								
VAR030												
GROUP 1	76	2.4211	1.181	0.135	1.58	0.077	-1.25	130	0.212	-1.30	129.19	0.197
GROUP 2	56	2.6607	0.940	0.126								
VAR031												
GROUP 1	76	2.0658	1.247	0.143	1.96	0.009	1.14	130	0.249	1.22	129.89	0.226
GROUP 2	56	1.8393	0.870	0.119								
F1 TOTAL SCAT												
GROUP 1	76	2.0937	0.554	0.064	1.77	0.027	-0.63	130	0.527	0.66	129.94	0.510
GROUP 2	56	2.0379	0.416	0.056								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP (continued)

GROUP 1 • FIRST 76 CASES
GROUP 2 • NEXT 56 CASES

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
F2	CLARITY AND PRESENTATION												
	GROUP 1	76	2.1713	0.581	0.067	1.02	0.954	0.37	130	0.709	0.37	119.25	0.709
	GROUP 2	56	2.1332	0.576	0.077								
F3	INTEREST												
	GROUP 1	76	2.2368	0.687	0.079	1.24	0.408	0.47	130	0.638	0.48	124.89	0.633
	GROUP 2	56	2.1821	0.618	0.083								
F4	CLARITY												
	GROUP 1	76	2.2211	0.591	0.068	1.00	0.987	0.48	130	0.634	0.48	118.64	0.635
	GROUP 2	56	2.1714	0.591	0.079								
F5	EVALUATION												
	GROUP 1	76	2.3903	0.826	0.095	1.18	0.519	0.41	130	0.686	0.41	123.69	0.682
	GROUP 2	56	2.3332	0.760	0.102								
F6	RELATING TO STUDENT RESPONSES												
	GROUP 1	76	2.1382	0.790	0.091	1.77	0.027	1.53	130	0.129	1.59	129.94	0.114
	GROUP 2	56	1.9464	0.593	0.079								
F7	RELATING TO STUDENT NEEDS												
	GROUP 1	76	1.8553	0.769	0.088	1.33	0.271	-0.64	130	0.522	-0.66	126.4	0.514
	GROUP 2	56	1.9375	0.668	0.089								
F8	DISCUSSION LEADING												
	GROUP 1	76	1.7796	0.734	0.084	1.51	0.111	0.92	130	0.360	0.95	128.65	0.345
	GROUP 2	56	1.6696	0.598	0.080								
F9	OPENNESS FLEXIBILITY												
	GROUP 1	76	2.0021	0.587	0.067	1.83	0.019	0.43	130	0.667	0.45	130.00	0.652
	GROUP 2	56	1.9620	0.434	0.058								

PRETEST/POSTTEST COMPARISONS OF STUDENT EVALUATIONS FOR CONTROL GROUP (continued)

GROUP 1 - FIRST 76 CASES
GROUP 2 - NEXT 56 CASES

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
F10	COURSE DESIGN												
	GROUP 1	76	2.0789	0.683	0.078								
	GROUP 2	56	2.1161	0.681	0.091	1.01	0.987	-0.31	130	0.758	-0.31	118.91	0.758

APPENDIX D

STUDENT ACHIEVEMENT TESTS

SCORES OF THREE RATERS ON STUDENT ACHIEVEMENT TESTS FOR EACH SUB-GROUP

Group	Test	Pretest Scores			Test	Posttest Scores		
Experimental	X	81	88	94 - 263	O	78	82	93 - 253
	O	78	80	85 - 243	X	79	82	90 - 251
	X	50	69	73 - 192	O	72	85	87 - 244
	X	80	88	88 - 256	O	82	86	90 - 258
	O	80	81	84 - 245	X	74	83	86 - 243
Control	O	80	93	97 - 270	X	88	92	96 - 276
	X	71	80	84 - 235	O	63	67	67 - 197
	O	79	80	86 - 245	X	58	71	72 - 201
	X	69	84	86 - 239	O	94	95	102 - 291
Quasi-Experimental	X	72	84	86 - 242	O	76	85	93 - 254
	O	59	66	81 - 206	X	49	56	64 - 169
	O	74	83	83 - 240	X	78	88	91 - 257
	O	59	66	72 - 197	X	64	69	70 - 203