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ABSTRACT

The Large Class Analysis Project was undertaken to provide instructors, administrators, and researchers with an in-depth look at the teaching techniques used in a variety of large (defined as having over 100 or more students) classes taught at The University of Texas at Austin. Data were collected concerning student attitudes toward such large classes: demographic characteristics, enjoyment rating, essentials for learning, preferred class size, and characteristics of large classes. In addition, direct observational data were collected, the cognitive levels of instructors' tests were studied, and instructor interviews were conducted. It was concluded that (1) most students and teachers prefer class size to be under 50 people; (2) adequate facilities and audiovisual support are important; (3) students enjoy large classes more if they are tested at higher cognitive levels as in essay tests; (4) student participation increases as class size decreases; and (5) effective instructors are enthusiastic and knowledgeable lecturers and interact with the students well. Appendices include the student attitude survey, the Cognitive Interaction Analysis System and a workbook for its use, and the instructor interview questions. (GDC)

The Large Class Analysis Project
(Final Report)

A Study Funded by

The Office of the President
The University of Texas at Austin

Conducted by

The Center for Teaching Effectiveness

Dr. Karron G. Lewis, Project Coordinator

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I. INTRODUCTION

The controversy over the effectiveness of teaching/learning in large classes (which are defined here as having 100 or more students) at the university level has been going on for decades. This controversy has resurfaced vigorously within the past few years as enrollments in colleges and universities continue to increase and budgets tighten. Confronting these large classes often produces frustration and a high level of anxiety for many of the faculty members who have to teach them. To assist these individuals, a study of the teaching techniques used in a variety of large classes at the University of Texas at Austin was conducted during the 1980-81 academic year. Though substantial research has been conducted on the relationship of class size to student achievement, few, if any, of these studies have provided an in-depth look at the methods which are successful for teaching and managing large classes. Without the existence of concrete data-based suggestions for the "care and maintenance" of large classes, new (and often experienced) instructors must experiment and "re-create the wheel" when they are confronted with a large class.

The Purpose of the Study

The Large Class Analysis Project (LCAP) was conducted primarily to accumulate and compile direct observational data concerning the methods and procedures used by instructors as they teach large classes at the university level. It was also designed to obtain information concerning the students' attitudes toward the learning environment in these large classes and their perceptions of the instructor qualities and skills needed to teach a large class effectively. The information gathered in this study was examined for commonalities and differences among large classes in different disciplines. The elements which combine to produce the best student attitudes and learning were also studied. These results will be reported in this document and will also be contained in a booklet which will be made available to the faculty members at UT who teach large classes.

A second set of data will be reported because of its relevance to the research community. This set is composed of the following: (1) a detailed description of the types of interaction patterns which were observed in the large classes which took part in the study; (2) a comparison of student attitudes by sex, classification (i.e., Freshman, Sophomore, etc.), college, and instructor; and (3) the factors which seem to affect instructor and student attitudes and behavior in large classes.

Finally, we have included a list of recommendations to the UT administration concerning assistance which can be provided to make the teaching/learning in these large classes more effective and rewarding.

Limitations of the Study

In conducting research on teaching in higher education, the researcher must design the study so it will interfere as little as possible in the normal routine of the classes. This means that such studies will have limitations imposed which may not result in the most effective research design and some of the information sought will be unobtainable. The limitations encountered in the LCAP study consisted of: (1) unequal representation in each college; (2) small sample size (N=43 instructors); (3) a skewed representation of teaching abilities (i.e., good teachers volunteered); and (4) uninterested and unsympathetic students.

In the original proposal for the study five classes from each of the four representative colleges were to be observed directly. However, because the instructors who participated were volunteers, the response to assist in such a study was limited and unequal. During the Fall semester, 1980, nine classes were observed directly - Business (2), Natural Science (5), Liberal Arts (1), and Engineering (1). Ten classes were observed during the Spring semester, 1981 - Business (3), Natural Science (0), Liberal Arts (6), and Engineering (1). Another 24 faculty members - Business (6), Natural Science (2), Liberal Arts (14), Engineering (2) - volunteered to be interviewed by one of the LCAP staff but did not want their classes observed directly. Because of this rather small sample size (observed = 19; total interviewed = 43) it may be difficult to relate the results of this study to other instructors or other institutions.

The motivation of the participants to take part in a study such as this most likely resulted in a skewed representation of teaching abilities. The LCAP staff were quite impressed with the overall quality of the teaching skills and techniques which were displayed by the observed participants. In the individual interviews with the observed participants they were, on the whole, quite confident that what they were doing in their classrooms was basically effective. However, all of them indicated that they had volunteered to participate in the study because they wanted feedback on their teaching techniques which contained suggestions for improvement. Thus, the data collected from the observations yielded very little information about what techniques obviously do not work in large classes.

Though there were 3820 students enrolled in the 19 classes which were observed, only 2571 filled out the Pre-semester Student Attitude Survey and 2163 filled out the Post-semester survey. (There were a total of 616 students -- in two classes in Natural Science -- whose classes were observed but did not fill out the survey because the instructors felt it would take too much class time.[1]) Many of the students felt that filling out a survey such as this was "wasting their time". Some students who stayed to fill out the survey commented that they felt cheated of valuable class time or that surveys such as this were a waste of the University's money. There were a large number of students, however, who thanked us for giving them the opportunity to express their opinions about the learning environment in large classes.

Sources of Data

Data were collected from several sources for this study. One of the primary sources was a Student Attitude Survey (SAS) which was developed by the LCAP staff with the assistance of the Measurement and Evaluation Center. (See sample survey form in Appendix B.) This survey asked students for demographic data, rating of elements in a course which enhance or deter their learning, the class size they prefer, and their feelings about large classes in general. These data were then compared by college, sex, classification, major, and preferred class size.

Another primary source of data was the direct observational codes and comments gathered by the LCAP staff. The verbal interactions which occurred in the classroom were categorized and coded using the expanded Cognitive Interaction Analysis System (CIAS) (see a listing of this system and an explanation of its use in Appendix C.) This gave us a detailed picture of the types of verbal activities which took place in each class. The classes were then compared by college to determine if there were types of interaction which were unique to a particular college. The interactions of instructors in the same or similar disciplines were also compared.

Interviews were conducted with the 19 instructors who allowed us to observe their classes as well as 24 other instructors who have taught large classes. A standard set of questions was developed for these interviews though sometimes additional information was obtained as the LCAP staff member encouraged the faculty member to expand on his or her answer. (A list of the questions asked during these interviews is included in Appendix D.) These interviews were designed to give us insight into the rewards and frustrations in teaching large classes as well as to obtain information concerning the "tricks of the trade" in managing the logistics and government of classes with over 100 students.

The exams and handouts from each observed class were collected and studied to determine the level of thinking (according to Bloom's Taxonomy) which was required in each class. These documents also provided information concerning: (1) the number of handouts used in large classes; (2) the format used in writing these handouts and exams; and (3) the type of exams which were given in these large classes.

Because much of the instructors' frustration with large classes seems to come from inadequate facilities and support assistance, we also mailed a "Support Assistance Needs" survey to 126 faculty members who were teaching large classes during the Spring semester,1981. (See copy of this survey in Appendix E.) (These faculty members included those who participated in LCAP but was not restricted to them.) This survey was designed to obtain information concerning the problems encountered in teaching large classes which are due to (1) poorly designed and equipped classrooms, (2) inadequate funds for supplies, and (3) inadequate secretarial, TA, and/or clerical assistance. The responses were analyzed by college and, in some cases, by department.

These five sources of data (Student Attitude Survey, direct observations, interviews, exams and handouts, and Support Assistance Needs Survey) provided a wealth of data about the techniques and procedures used in teaching large classes here at UT as well as information about the attitudes of some of the students and faculty members who are involved in these classes.

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[1]The Student Attitude Survey consumed about 25-30 minutes of class time each time it was administered. Because of this, two instructors in Natural Science allowed an LCAP observer to sit in on their classes but asked that we not conduct the survey. Also, one instructor who taught in the College of Liberal Arts during the Spring semester, 1981 requested that we only administer the survey to the class at the end of the semester because there were several surveys which related to the course content which were being administered at the beginning of the semester and it was felt another one would alienate the students.

II. REVIEW OF RELATED LITERATURE

The question of optimum class size has been plaguing educational researchers for more than 50 years. Research results indicate that student achievement in large lecture classes is not greatly different from that in smaller classes when traditional achievement tests (i.e., factual knowledge and comprehension) are used as a criterion. However, when one looks at the goals of higher-level thinking, application, motivation and attitudinal change, these are most likely achieved in smaller classes.

The literature which relates to the subject of optimum class size can be divided into (1) those studies which actually compare classes of different sizes, (2) those which look at teaching techniques which are more effective in large classes, and (3) the students' evaluations of large classes and large class instructors.

Class size Studies

As early as 1924 the effectiveness of the teaching/learning in large classes at the university level was being questioned (Edmonson and Mulder). In this study a comparison was made of the learning outcomes of students enrolled in a 109-student class with students enrolled in a 43-student class of the same course in education. Both sections of this course were taught by the same instructor. Results showed that student achievement in both classes was approximately equal but that the students felt that the small class was more efficient. The students also preferred the smaller class because there was more personal contact with the instructor and a greater opportunity to participate in the class.

The basic findings of Edmonson and Mulder have been reinforced in numerous subsequent studies. Most of these studies are summarized by McKeachie (1980) in his review of research on class size. At the end of this review McKeachie concludes that

> large lectures are not generally inferior to smaller lecture classes when traditional achievement tests are used as a criterion. When other objectives are measured, large lectures are on shakier ground. Goals of higher-level thinking, application, motivation, and attitudinal change are most likely to be achieved in small classes. Moreover, both students and faculty members feel that teaching is more effective in small classes (p. 26). ...analysis of research suggests that the importance of size depends upon educational goals. In general, large classes are simply not as effective as small classes for retention of knowledge, critical thinking, and attitude change (p. 27).

Some of the adverse consequences of the rising enrollments are discussed by Krabill (1981). He states that the voluminous university enrollments following World War II were handled by the acquisition of more faculty members. But, this solution is not readily available for most institutions today. Instead, he feels it is appropriate for us to assess the consequences of increased enrollments by listing them and then focusing on possible solutions. The adverse consequences which he discusses are the following:

1. Heavier teaching loads

2. Reduced research activity
3. Tighter operating budgets
4. Reduced student-faculty contact
5. Greater use of non-faculty personnel
6. Fewer requirements and course offerings
7. Inadequate facilities
8. More rapid deterioration of facilities and equipment
9. Decreased in-depth student learning

Kraybill provides no solutions to these problems, but does point out that we must know what the problems are before we can attack them. Some plausible solutions to several of these problems will be discussed in the Results section of the present study.

Studies on Improving Teaching in Large Classes

Most of the studies done on improving teaching in large classes have compared the "traditional" method (i.e., lecture) with an "innovative" method (e.g., Guided Design, programmed instruction, TV instruction, lecture-discussion, etc.) (Baker, 1976; Cheatham & Jordon, 1976; Macomber & Siegel, 1957; Siegel, Adams & Macomber, 1960; Ward, 1956). Not surprisingly, it is the "innovative" method which is found to be more effective (i.e., improves student test scores) for teaching large classes. This may be due to the notion that students in large classes *expect* to be lectured to and any deviation from this method engages their attention. It is also quite possible that the instructors spend more time preparing the "innovative" method and, thus, it is presented with more enthusiasm and polish.

Several researchers (Moore, 1977; McKeachie, 1980) have indicated that a variety of teaching methods should be used in large classes and that the methods chosen should be appropriate to the size class being taught. Moore (1977) demonstrated in her study that student negative attitudes toward a large class could be changed if the instructor varies the method of presentation from class period to class period and establishes a set of instructional and student objectives. McKeachie (1980) also notes, "Probably of more significance than class size per se is its relation to the teaching method used. For example, one would expect class size to be of minimal relevance in television teaching, of slight importance in lecturing, and of much importance in discussion" (pp. 26-27). Research also suggests that the optimum class size depends upon the instructor's educational goals. If an instructor is satisfied with students just "getting the facts" then a large class will probably present fewer problems to that instructor. Frustration may occur, however, if the instructor wants the students to be able to analyze and apply these facts in new situations.

Wales and Nardi (1981) present four variables which were defined by Benjamin Bloom (1980) as means by which instructors can improve their teaching, even in crowded classrooms. These four variables are Time, Intelligence, Testing, and Personality. Table 2.1 indicates the factors of these variables which may be changed to produce more effective teaching. It was hypothesized that the appropriate manipulation of these

TABLE 2.1

The Four Bloom Variables

Not easily Changed		Change is Possible
The time available for schooling	TIME	The time a student spends on a task or subject
Student intelligence	INTELLIGENCE	Student cognitive entry characteristics that serve as base for learning new concepts.
Testing for grades	TESTING	Testing to provide corrective feedback
Teacher personality characteristics	PERSONALITY	The characteristics of the teaching: cues, reinforcement, developing student participation

(Wales & Nardi, 1981, p.336)

four variables would positively influence student success. The first variable, TIME, concerns increasing the time a student spends learning outside of class. Bloom (1980) states that this time can be dramatically increased by improving the quality of the instructional materials (e.g., text appropriate to the needs of the student, objectives to guide the students' study, and handouts which model the skills the instructor expects the students to master). The second variable, INTELLIGENCE, deals with the cognitive entry characteristics which serve as the foundation for learning new concepts. This means that the instructor would focus on helping students develop the cognitive skills they will need to successfully master the content of the course (e.g., problem solving skills for students in Engineering). The third variable, TESTING, can be used to provide corrective feedback to the students instead of using it only to assign grades. If students have this kind of frequent feedback, Bloom claims that up to 90 percent of them can be successful in a course. The fourth variable, PERSONALITY, can be changed if the instructor changes the teaching-learning process. This can be done by increasing the cues to important material, providing variety, frequency and quality in the reinforcement given to each student, and encouraging student participation. Data collected from an engineering program at West Virginia University indicates that manipulating these variables as indicated above produces very high student performance. In their conclusions, Wales & Nardi suggest that "class size may be a constraint to accomplishing these ends but it should not be a deterrent" (p. 340). Large courses taught in this manner require a great deal of preparation to develop the initial materials but the outcome seems to be greater student achievement and a more positive attitude toward the course and instructor.

In 1977 Connor reviewed the research evidence on the effectiveness of various methods of teaching used at the university level. He concluded that the size of the class need not be a major factor in the effectiveness of teaching and that the teaching/learning process can be individualized and learning can be done independently if the correct procedures are used. There is, however, no single instructional method which is the most effective for all situations and all subjects. Since independence in learning by the student is the ultimate goal of all education, this fact should influence all instructional efforts.

The utilization of a variety of teaching techniques, geared to the size of the class, the content, and the skills of the instructor is important to the effectiveness of large class (or really, any size class) instruction. Thus, instructors should be assisted in acquiring the skills which are necessary to successfully and effectively guide the learning of their students.

Studies Focusing on Student Evaluation of Large Classes and Instructors

Studies dealing with the student evaluation of university classes and instructors have become increasingly numerous during the past decade due to the call for instructor accountability by students, parents, and administrators (Haslett, 1976; Marques, 1979; Marsh, 1977; Marsh, Overall & Kesler, 1979; Overall, 1977; and Romney, 1976). These studies provide evidence that the evaluations of students concerning the effectiveness of their instructors' teaching are valid. Moreover, in several studies cited by Connor (1977) in his review, it was reported that students' attitudes toward large classes are not necessarily influenced by the size of the class but by the course content and the ability of the instructor to handle large groups. Thus, instructors who enjoy teaching large classes and who can motivate large groups of students to delve into the content on their own should be encouraged to teach these classes and should be provided with incentives for doing so.

Summary of Related Literature

Though a majority of the university instructors and students believe that small classes are superior to large ones in almost every way, research indicates that by utilizing the proper teaching techniques most instructional objectives can be accomplished in any size class. The larger the class, however, the more time an instructor must spend on the development of a variety of teaching procedures and evaluation strategies. This fact must be taken into consideration by both the instructors and the administration if large classes are going to be taught effectively.

III. PROCEDURES

Instrument Development

Three instruments were developed to gather data in this study: The Expanded Cognitive Interaction Analysis System, the Student Attitude Survey, and the Support Assistance Needs Survey.

The first instrument is an expansion of the Cognitive Interaction Analysis System (CIAS) which was developed by Dr. Glenn Ross Johnson (1978) at Texas A&M University. His original instrument consists of 10 categories into which the verbal interactions which occur in a classroom may be coded (see Table 3.1). However, a more detailed description of the interactions was needed to provide beth a more complete picture to the faculty member during consultations and to assist the LCAP staff in determining the quality as well as the quantity of the verbal activities which took place in the classes being observed.

As the LCAP Coordinator observed various classes in her role as Faculty Development Specialist, she decided that the addition of subcategories to the original 10-category system would assist the faculty members' understanding of the little things which can affeet the quality of his/her teaching. These subcategories evolved as it was felt additional information would be useful in the interpretation of specific interactions. Thus, for example, subcategories for the various levels of questions were added, as were subcategories for the many types of

TABLE 3.1

Cognitive Interaction Analysis System (CIAS)*

TEACHER TALK	1. Accepting student attitudes. Comments that communicate a non-threatening acceptance of student attitudes; student attitudes may be positive or negative; "You appear to be upset about this." "I'm glad to see you all are happy about the results from last week's test."
	2. Positive reinforcement. Praising students; communicating a definite value judgment indicating that the instructor really likes what the student said or did; "Excellent!" "Very good!"
	3. Corrective/feedback. Includes negative statements which are nonpunitive and nonthreatening; saying "no" or "yes" or "that's correct" in a manner that provides feedback to students; repeating a student's response so all students know the answer was correct or acceptable.
	4. Questions. Includes rhetorical questions; all questions raised by the teacher; calling on student by name to respond to a question.
	5. Lecture. Communicating facts, expressing ideas, giving examples.
	6. Providing cues/directions. Words that signal importance; "This is important to remember." "These next four items are very important in our study." Directions the instructor expects the students to follow; includes procedural directions.
	7. Criticism. Negative, punitive comments; strong criticism; blaming students; saying "Ridiculous" or "That's silly" or "Don't interrupt me when I'm giving my lecture."
STUDENT TALK	8. Cognitive student talk. Talk by students which is subject-matter oriented; recalling facts; responding to teacher questions or directions with subject-matter responses or subject-matter questions; expressing opinion or ideas about topics under study; analyzing, synthesizing, evaluating; subject-matter questions raised by students.
	9. Non-cognitive student talk. Talk by students which is not related to subject matter; management comments by students; "Can we leave now?" or "Can we take a break?" or "Will we have the quiz tomorrow?" or "I went to the game Saturday and didn't have time to prepare my lesson."
SILENCE	0. Silence. Three seconds or more of silence; pauses, when no communication exists.

*No rating scale is implied; the numerals merely indicate the particular category of interaction in use during each three seconds. (Johnson, 1978, p.3) activities which would all be considered as "Lecture" in the broad 10-category system. The final system which evolved consists of the basic 10 categories with the addition of 35 subcategories (see Table 3.2).

To calculate the inter-observer reliability of the adapted CIAS, two observers were trained in its use using a programmed workbook (see Appendix E) and an audio-tape (which were developed for this purpose). After approximately 10 hours of training/practice the two observers were obtaining reliability agreements of .80 or over. During the summer and fall of 1979 this observation system was tested to determine its usefulness in the observation and analysis of large classes. The LCAP Coordinator and one observer coded the verbal interactions in the following classes: 2 Chemistry classes, 1 General Studies class, 1 Radio-TV-Film class, 1 History class, 1 Art History class, and 1 Music Appreciation class. It was determined from these observations that the Expanded CIAS was definitely a very useful tool for the in-depth analysis of classroom interactions in large university classes. For the LCAP study two additional observers were trained in CIAS observation and analysis techniques. At the end of the one-week training period, these observers were obtaining reliability agreements of .80 or over between themselves and with the two original observers.

The second instrument which was developed was a Student Attitude Survey (SAS). (See Appendix B.) The LCAP Coordinator was assisted in the development and testing of this survey by the Measurement and Evaluation Center (MEC). The survey was designed to obtain information concerning students' attitudes toward their learning experiences in large

TABLE 3.2

Expanded CIAS Categories

1 - Accepting Student Attitudes
   1h - Humor

2 - Positive Reinforcement
   2f - Affective Instructor Comments

3 - Repeating a Student Response
   3f - Corrective Feedback
   3b - Building on Student Response

4 - Questions
   4c - Knowledge/Comprehension
   4e - Application (Examples)
   4a - Analysis
   4y - Synthesis
   4j - Evaluation/Judgment
   4f - Affective
   4s - Process or Structure
   4r - Rhetorical
   4p - Probing
   4d - Calling on a Student

5 - Lecture
   5v - Simultaneous Visual and Verbal Presentation
   5e - Examples, Analogies
   5r - Review
   5x - Answering a Student Question
   5m - Mumbling
   5t - Reading from Visual or Text

6 - Providing Cues
   6m - Focusing on Main Points
   6d - Directions
   6s - Assignments, Process

7 - Criticism

8 - Cognitive Student Talk
   8c-8s - Answers to Instructor Questions
   8n - Doesn't Know
   8q - Student Question
   8h - Student Laughter

9 - Non-cognitive Student Talk

0 - Silence
   0b - Writing on Board without Talking
   0m - Mumbling (general low roar)
   0l - Listening/Watching

classes in general and their attitudes toward the particular large class which was involved in LCAP. The survey was administered at the beginning and end of each semester to determine whether the students' attitudes changed over time and after exposure to large classes. This instrument was tested in four large classes during August, 1980. After the data from these classes were analyzed, the MEC and the LCAP Coordinator made some final revisions on the SAS. Subsequently, the survey was administered to over 2500 students during the 1980-81 academic year.

The last instrument developed was the Support Assistance Needs Survey (see Appendix E). This survey was developed to obtain additional information concerning the support assistance (e.g., TAs, proctors, graders, secretaries, funds for duplication, supplies and visual aid development, etc.) which faculty members receive or do not receive from their respective departments. This survey was sent to 126 faculty members who were teaching large classes during the Spring semester, 1981. (This included those who were involved in the LCAP study as well as all of the other faculty members in the four target colleges who were listed in the 12th Day Class Roster as teaching large classes.) Sixty-nine faculty members returned the form for a response rate of 55%.

Observation and Data Collection Sequence

In 16 of the 19 LCAP classes the Student Attitude Surveys were administered on the first day of class (or as close to the first day as possible) and along with the Course/Instructor Survey from MEC at the end of the semester. In one class, the survey was only administered along with the Course/Instructor Survey at the end of the semester. The Fall Pre-semester survey was administered during the week of September 15-19, 1980 and the Post-semester survey was administered during the week of December 2-5, 1980. The Spring Pre-semester survey was administered during the weeks of January 19-23 and 26-30, 1981 and the Post-semester survey was administered duing the weeks of April 27- May 1 and May 4-8, 1981.

The students were told that this survey was being administered to discover what they liked or didn't like about large classes so we, in turn, could pass this information on to their instructors and the UT administration. They were also told that some of the information would be used to develop a "Handbook for Instructors of Large Classes."

Each LCAP observer attended from 1-4 courses throughout each semester. During the first class a descriptive Classroom Observation Form was filled out (see Figure 3.1). This form allowed the observer to become familiar with the techniques and style of the instructor's teaching and to acquaint him/herself with the room and the students. During all subsequent classroom observations the observer used CIAS to code what was taking place in the classroom. Each observer attended at least one class meeting per week, per course being observed. To ensure that each day of the week the class met was represented in the data, the observations were made such that the class was observed on Monday the first week, Wednesday the second week, and Friday the third week. Then

FIGURE 3.1

CENTER FOR TEACHING EFFECTIVENESS
CLASSROOM OBSERVATION FORM

1. THE COURSE. Number:______ Title:________________ Meeting time:_____

2. LEVEL. Freshman Sophomore Junior Senior Graduate

3. CLASS. Size:______ Description of room:____________________________________ Where students congregate:_______

4. SUBJECT FOR THE HOUR.____

5. METHOD:

6. THE INSTRUCTOR.

   Speaking style:

   Use of Movement/Gestures:

   Use of Media:

   Enthusiasm:

   Handouts:

7. THE STUDENTS.

   Attentiveness (beginning vs. end):

   Questions:

   Evidence of Understanding:

   Notetaking:

8. GENERAL COMMENTS.

the cycle began again. Classes which met on Tuesday and Thursday were observed Tuesday one week and Thursday the next week. Thus, each class was observed at least 13-14 times over the course of the semester.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER STUDY

Due to the fact that the volume of data generated in this study are so numerous, it was decided that this report would be easier to read and would make more sense if the Summary, Conclusions and Recommendations for Further Study were placed here rather than at the end. Each portion of the data analysis has been summarized in the Summary section and page numbers for the detailed descriptions which occur in the Analysis and Intepretation of the Data section are provided. Thus, if the reader is interested in reading the detailed analysis for a particular section, it is referenced and may be located rather quickly.

Summary

Though many studies have been conducted on the relationship of class size to student achievement, there are few which have looked specifically at the types of teaching techniques which can be used in large (100+) university classes to make them more enjoyable and effective. The Large Class Analysis Project (LCAP) was conducted to gather direct observational data concerning the methods and procedures used in teaching large classes and to ascertain the attitudes held by students and instructors toward the large class teaching/learning environment.

The LCAP study data were collected via five methods: (1) the Student Attitude Survey, (2) the Direct Observational Data, (3) the analysis of each instructor's Evaluation Instruments, (4) the Support Assistance Needs Survey, and (5) the Instructor Interview Data.

The Student Attitude Survey Data

The Student Attitude Survey was administered to the students at the beginning and end of each semester. The Survey consisted of five distinct sections, each of which was analyzed as a separate entity.

Section I: The Demographic Data (Items 5-8). The analysis of the demographic data indicated that the sample of students (about 2571) who were enrolled in the large classes which took part in the LCAP study consisted of: (1) 37% Freshmen, 21.5% Sophomores, 23.5% Juniors, 15.5% Seniors, and 2% Others; (2) 53% males and 46.5% females; (3) 22.5% had taken no large classes prior to the LCAP class, 9% had taken one, 10.5% had taken two, 10% had taken three, and 46.5% had taken four or more; and (4) 35% of these students were taking the LCAP classes as electives and 64% of them were taking them as a requirement for their degree programs. (For a detailed explanation of these data see p.39 in the Analysis section.)

Section I: Enjoyment Rating (Item 9). This question provided a great deal of information concerning the students' attitudes toward the large classes which were being observed for this study. It was found that, overall, the students indicated that they enjoyed their classes somewhat less at the end of the semester. It was also found that the students in the Colleges of Engineering and Business indicated that they enjoyed their classes less than did those in Natural Science or Liberal Arts. When these data were analyzed by student classification it was found that Sophomores indicated that they enjoyed their large classes most while Freshmen, Juniors, and Seniors enjoyed theirs least. Also, males said they enjoyed these large classes less than did the females.

Each of the classes was ranked based on the Post-semester ratings on Item 9 and this provided the basis for some further analysis. First, it was found that of the five (5) top-rated classes, only one was a required course. Of the bottom five (5) courses, three (3) were required and two (2) were elective. Thus, we can say that students seem to enjoy non-required courses more than required courses. Second, the class GPA was calculated and it was found that students do not make the highest grades in the classes they enjoy the most but they do tend to make lower grades in those they enjoy least. Third, when the rooms in which the LCAP classes were taught were analyzed by the class enjoyment ratings it was found that poor or inadequate facilities can be a detriment to learning and enjoyment but dynamism and enthusiasm on the instructor's part can overcome the problem of poor facilities to some extent. And finally, by comparing the direct observation codes with the enjoyment ratings of the classes it was found that students most enjoy classes in which (1) students are allowed and encouraged to ask questions and (2) the instructor provides plenty of positive reinforcement. It was also found that students least like classes in which (1) instructors ask a lot of questions or (2) use audio-visual aids a great deal. (For a detailed explanation of these data see p.42 in the Analysis section.)

<u>Section II: Essentials for Learning (Items 11-19).</u> This portion of the SAS yielded information concerning the types of activities and materials which the students felt were most important to their learning. The three items which the largest percentage of the students indicated were extremely important to their learning were:

Item 12 - Feeling at ease when you talk to the instructor individually. (41%)

Item 15 - Having the course material and assignments well-organized. (55%)

Item 19 - Having an instructor who is very knowledgeable in the subject. (71%)

When the items in this section were sorted and analyzed by college it was found that the students in Engineering felt that the outside readings and the text are more essential to their understanding of the content (Item 18) than did the students in the other three colleges. Some differences were also found when the responses to the items in Section II were analyzed by sex. Items 12 (feeling at ease when you talk to the instructor individually) and 15 (having the course material and assignments well-organized) were found to be more important to females in their learning than they were to males. (For a detailed explanation of these data see p.53 in the Analysis section.)

<u>Section III: Preferred Class Size (Items 20-24).</u> The students were asked to rate five class size ranges from the size they preferred most to

that which they preferred least in this section of the SAS. The students' responses indicated that they most prefer classes of from 16-30 students because they feel more a part of the class and they find this environment more conducive to learning. Their responses also indicated that they least prefer classes with over 100 students because (1) they get less feedback from the instrctor, (2) they do not feel like participating, (3) they feel distant from the instructor, and (4) they think that the course can be taught more efficiently in smaller groups. (For a detailed explanation of these data see p.65 in the Analysis section.)

<u>Section IV: Characteristics of Large Classes (Items 25-41).</u> Many statements have been made about the pros and cons of the large class teaching/learning environment. In this section the students were asked to react to statements about things which have been said to happen when classes increase in size. Their responses were on a scale from 1 (disagree strongly) to 5 (agree strongly). Their responses to these statements indicate that they feel the qulity of instruction in large classes is definitely determined by the instructor. Because of this the students believe that instructors who enjoy teaching and are truly concerned about the progress of their students make better large class instructors. The discipline (or lack of it) in large classes is also a concern of these students. Instructors who put up with noise, late-comers, talking during class, and cheating are <u>not</u> considered to be effective. In addition, these students indicated that though they do not rate large classes highly, they feel these classes can be improved if the

instructors are trained in effective teaching techniques. (For a detailed explanation of these data see p.76 in the Analysis section.)

The Direct Observation Data

One of the main goals of the LCAP study was to compile objective data on the teaching strategies used in large class instruction. This was accomplished through the use of the Cognitive Interaction Analysis System with which the verbal interactions which occurred in the classroom were recorded. As was expected, the bulk of the class time was spent in the instructors lecturing (with and without the aid of visuals). The interactions which occurred least frequently were "instructor use of criticism" and "non-cognitive student talk." On the average, the instructors spent 88.5% of the class time talking while the students only talked an average of 5.02% of the time. Periods of silence involved an average of 6.36% of the class time. It was also found that as the average class size decreases, the amount of student participation increases (from 2.7% of the time in the largest classes to 6.9% of the time in the smallest classes).

Several trends were noted when a comparison of the mean percentages of use (from the first and second half of the semester) for each of the 14 CIAS categories for each instructor were analyzed. Most of the instructors <u>increased</u> the use of Categories 1 (Accepting student attitudes), 2 (Positive reinforcement), 13 (Student asked questions), 10 (Silence), and 9 (Non-cognitive student talk) in their classrooms. On the other hand, <u>decreases</u> were found in their use of Categories 3

(Repeating a student response, providing corrective feedback), 11 (Humor), 8 (Cognitive student response), and 6 (Providing cues, giving directions). The use of Categories 4 (Instructor asked questions), 14 (Writing on board or overhead without talking), 5 (Lecture), 12 (Simultaneous use of visual and verbal presentation) and 7 (Criticism) remained constant over the semester.

When comparing the verbal interactions in lower-division vs. upper-division courses, it was found that lower-division instructors seem to be more student-oriented in that they use the following types of statements significantly more than do upper-division instructors:

Category 3 (Repeating student response; providing corrective feedback; building on a student response)

Category 4 (Asking questions)

Category 6 (Providing cues; focusing on main points; giving directions; assignments, process)

Category 12 (Simultaneous visual and verbal presentation)

Category 14 (Writing on board without talking)

(For a detailed explanation of these data see p.99 in the Analysis section.)

Cognitive Levels of Instructors' Evaluative Instruments

Each instructor who participated in the LCAP study was asked to provide copies of his/her exams, quizzes, homework assignments, and written assignments to be analyzed. Each item on these exams, etc. was examined and classified according to Bloom's Taxonomy of the Cognitive Domain. An overall percentage of each cognitive level required was then calculated for each instrument. It was found that the instructors in the College of Liberal Arts used the widest range of cognitive levels in their evaluative instruments and the lowest range was found in Business and Engineering.

The cognitive levels found in each instructor's evaluative instruments were then compared with the instructor's ranking on Item 9 on the SAS. From this comparison it was found that the instructors whose evaluation instruments required that the students use analysis-, synthesis-, and/or evaluation-level thinking processes were rated in the top half of the enjoyment rankings. The implication is that students who are challenged to use higher-level cognitive processes enjoy their courses more. (For a detailed explanaton of these data see p.164 in the Analsis section.)

Support Assistance Needs Survey Data

This survey was designed to acquire information concerning the adequacy of the support assistance which is or is not provided to instructors who teach large classes. The three major needs which were cited by the instructors who returned the survey are: TA/grader assistance is needed to test properly in these large classes; (2) additional funds need to be allocated to provide and maintain AV-equipment; and (3) the need for more comfortable/functional rooms in which to teach these large classes. (For a detailed explanation of these data see p.192 in the Analysis section.)

Instructor Interview Data

A total of 43 instructors who teach large classes were interviewed by a member of the LCAP staff to acquire first-hand information about some of the joys and frustrations of teaching large classes. The main concern of these instructors in teaching such large classes is the lack of personal contact with their students. Most feel that they really cannot adequately evaluate their students' understanding of the content because they frequently do not know who their students are. However, many of the instructors suggested ways which they have found useful in trying to personalize this mass instructional mode.

When asked what their main goals were for their students, most of the instructors stated goals which would be classified at the knowledge/comprehension level of Bloom's Taxonomy. On the average, these instructors gave between 3 and 4 exams during the semester and these exams consisted primarily of multiple-choice questions. They were unanimous in their feelings that giving and grading exams are the worst part of teaching large classes.

Of the 43 instructors interviewed, 59.5% stated that they would prefer to teach classes of from 1-50 students. More of the instructors in Liberal Arts and Business prefer larger classes than do those in Natural Science or Engineering.

When asked, "What are the characteristics of good large class instructors?", they listed the following qualities:

1. They care about their students.
2. They take their students very seriously and let them know that they take their teaching very seriously.
3. They maintain eye-contact with the class.
4. They are enthusiastic about their subject.
5. They have to be a performer with a persona that is somewhat different from the one they are from day to day.
6. They have confidence in themselves and what they are doing.

Suggestions for the novice large class instructor were also solicited during these interviews, as well as recommendations to the administration on how to improve the quality of teaching/learning in large classes on the UT-Austin campus. (For a detailed explanation of these data see p.198 in the Analysis section.)

Conclusions

Based on the data gathered in the Large Class Analysis Project the following can be concluded about current teaching practices in large university classes and suggestions for improvement:

1. Neither the students nor the instuctors particularly like classes with more than 50 students in them.

2. Large classes can be taught effectively if:

   a. the facilities are comfortable and designed for teaching/learning.

   b. the instructors are taught effective teaching strategies and techniques.

   c. the media support is available and is maintained.

   d. the instructors are given adequate TA/grader and monetary support.

   e. instructors who enjoy teaching and who like students are asked to teach these classes.

   f. the instructors set down strict guidelines for student behavior in class.

3. A majority of the large class instructors use multiple-choice exams and test only at the knowledge, comprehension, and/or application levels.

4. Students enjoy large classes more in which they are tested at higher cognitive levels (i.e., essay exams).

5. Student participation increases as the size of the class decreases.

6. The characteristics of an effective large class instructor are:

   a. Enthusiasm about subject.

   b. Knowledge of the subject <u>and</u> the ability to communicate this knowledge.

   c. Cares about the progress and welfare of the students.

   d. Dares to discipline (govern) to eliminate unnecessary talking, etc.

   e. Has a sense of humor.

   f. Uses a variety of instructional strategies.

   g. Interacts with the students during, as well as before and after class.

   h. Has confidence in him/herself and what he/she is doing.

7. Instructors lecture 85%-90% of each class period while students participate during about 5% of each class period.

8. Students indicate that they can learn more in a large class if:

   a. they feel at ease when they talk to the instructor individually.

   b. the instructor is very knowledgeable in the subject.

   c. the course material and assignments are well-organized.

Recommendations for Further Study

Though the <u>Large class Analysis Project</u> has provided a weath of data concerning the teaching/learning environment in large classes, there are still several recommendations which should be made for future study of this environment.

1. It would be very useful to conduct a similar study of smaller classes taught by the same people who taught the LCAP classes to determine exactly what these instructors do differently in a small class (i.e., what is the % of Teacher Talk vs. the % of Student Talk in the smaller classes). This would assist researchers in determining if any of the techniques used more frequently in small classes could be transfered to larger classes.

2. Further examination of the cognitve levels of exams and written work given in large classes is in order to discern the support assistance which is necessary in order to test the students at higher cognitive levels using something other than multiple-choice questions.

3. It would be very useful to study the level of knowledge retained about a subject by students in large classes who were tested via essay exams versus those who were tested via multiple-choice exams.

4. To determine whether the findings of this study concerning how to improve teaching/learning in large classes are valid, it would be useful to: (1) train a group of large class instructors in teaching techniques, (2) provide this group of instructors with adequate support assistance (monetary and personnel), and (3) provide a pleasant, colorful, functional teaching evironment for the purpose of studying the effects of these changes on the teaching/learning which occurs.

Because it appears that large classes are going to be a part of the teaching and learning environment in larger universities for some time, it is essential that ways be found to make these classes more productive (in terms of student learning) and enjoyable. The future leaders of the world are currently being educated in many of these large classes and what they learn or do not learn will affect the future of mankind. Thus, it behooves us to create an environment in which favorable attitudes toward learning are formed as well as providing for the optimum acquisition of knowledge.

V. ANALYSIS AND INTERPRETATION OF THE DATA

This study has produced a vast amount of data, the analysis of which has answered many of the questions we had hoped to answer as well as raised many additional questions about the teaching of large classes. The results of our analysis and our interpretation of the significance of those results will be discussed. The discussion has been divided into four sections: (1) the Student Attitude Survey Data, (2) the direct observations, (3) the Support Assistance Needs Survey, and (4) instructor attitudes, suggestions, and comments.

A Word of Caution Concerning Interpretation of the Data

When doing research in the area of human behavior it is well known that dramatic results or large between-group differences with small within-group variances are difficult to obtain. The vast number of external influences on the subjects tend to obscure the effects of the treatment thus making it difficult to interpret the results of the research. The results which are reported here are no exception.

There are very few times when the mean scores deviate far from 3 (no opinion) on a 5-point Likert Scale. The main thing to consider in interpreting the results is the direction and degree of the change. For example, if the means for several groups of respondents show a change in the same direction, that may indicate an outside variable is influencing the change even if the individual changes are not large. Also, if the attitudes indicated by the means shift from one side of 3 (no opinion) to the other, that shift is more meaningful. For example, if a group's mean shifts from 2 (disagree moderately) to 4 (agree moderately) the general disposition of their opinion has definitely changed while a shift from 4 (agree moderately) to 5 (agree strongly) does not indicate as strong a "value" shift.

In reporting results of tests of statistical significance, this report considers alphas of 0.01 or less to be significant. Even with that strict level the results show some statistically significant differences. However, the "real" differences are fewer in number because the statistical significance is a function of sample size rather than any real change in the students attitudes. The results which attain statistical significance are reported because they indicate that something other than chance is probably affecting those changes; however, the reader should primarily consider the practical significance of the results. Small differences in attitude between the Pre- and Post-semester means can probably be accounted for in the change in the number of students who filled out the attitude survey. Because of the external influences faced in this type of study, the researcher can only report the results and provide his/her own interpretation of them; it is then up to the reader to determine their practical significnce to his/her own situation.

Student Attitude Survey Data

The Student Attitude Survey (SAS) which was developed for this study is divided into five sections (see sample in Appendix B). Section I (Item 5-9) asked for demographic data and also contains a question (Item 9) concerning the students' attitudes toward the particular class in which the survey was conducted. Section II (Item 11-19) asked the students to rate the given statements based on their importance in helping them learn. They were to rate the statements from 1 (not important at all) to 5 (extremely important). In Section III (Items 20-24) the students were asked to rank the given class sizes in order of their preference (#1 = most preferred class size, #5 = least preferred class size). Section IV (Items 25-41) contains statements which are made about the pros and cons of large versus small classes. The students were asked to react to these statements using a 5-point scale ranging from 1 (disagree strongly) to 5 (agree strongly). And, Section V provides the students with the opportunity to include any additional written comments they had about large versus small classes.

Section I: The Demographic Data (Items 5-8)

The data gathered with this portion of the SAS provided basic information about the make-up of the students being surveyed and was also a means for more in-depth analysis of the rest of the survey.

Overall percentages. The overall percentages of student responses to these items is given in Table 5.1. This tells us that, overall, 37% of the student respondents were freshmen. It also shows that 53% of them were male. Even though many of the students were freshmen, 46.5% of the respondents had attended four or more large classes prior to the one in the LCAP study. Finally, for 64% of the students the LCAP course they were enrolled in was being taken as a requirement for their degree program.

By college. The means for Items 5-8 were computed by college to determine the typical population for the classes which were represented in the study. This information is given in Table 5.2.

As can be seen from this information, the sample of students from Natural Sciences were primarily sophomores (2.2), half males and half females (1.5), who had taken from 2-3 large classes prior to that LCAP class (3.45). Half these classes were required and half were being taken as electives (1.5).

In the College of Engineering, the students were primarily freshmen (1.35) and more were males than females (1.1). These students had previously been exposed to from 2-3 large classes (3.6) and most of these students were fulfilling a requirement (1.95) by taking the LCAP course.

The sample of students from the College of Business was made up primarily of juniors (3.4), half male and half female (1.5), who had

TABLE 5.1

Overall % responses to Items 5-8

	1	2	3	4	5
5. Year	37*	21.5	23.5	15.5	2
6. Sex	53*	46.5			
7. # lg. cl.	22.5	9	10.5	10	46.5*
8. Required	35	64*			

*Highest % response for that item.

TABLE 5.2

Response Means by College for Items 5-8

	NS	E	B	LA	AVG
5 - Year	2.2	1.35	3.4	2.25	2.3
6 - Sex	1.5	1.1	1.5	1.5	1.4
7 - # lg. cl.	3.45	3.5	4.65	3.9	3.9
8 - Required	1.5	1.95	1.75	1.75	1.7

The number of classes represented from each college are: Natural Science (NS) = 3; Engineering (E) = 2; Business (B) = 5; and Liberal Arts (LA) = 7.

previously taken 3-4+ large classes (4.65). For most of these students the LCAP course was a requirement for their major (1.75).

Finally, the sample from Liberal Arts was made up mostly of freshmen and sophomores (2.25), half male and half female (1.5). Most of these students had attended 2-3 large classes (3-9) prior to the LCAP class. These students were taking the courses participating in LCAP primarily as a requirement for their degree program (1.8).

Section I: Enjoyment Rating (Item 9)

The wording on Item 9 was changed slightly on the Pre- and Post-semester surveys to assist us in determining whether the students' attitudes about that particular class changed over time. On the Pre-semester survey the students were asked "Do you think you are going to enjoy attending this class?" and on the Post-semester survey they were asked "How did you enjoy attending this class?" Both versions of the question were to be responded to on a scale of 1 (yes, very much) to 5 (no, not at all).

This question was analyzed by overall percentages, and then the means of the responses were calculated by college, by instructor, by classification, and by sex.

Overall percentages. When the overall percentage of students' responses is looked at (see Table 5.3) there is a slight shift in the

TABLE 5.3

Percent of Students Responding to Each Degree of Scale on SAS Item 9.

	Pre-semester					Post-semester				
	1	2	3	4	5	1	2	3	4	5
9 Enjoyment	21	33	33	9	3	22	31	25	14	7

Pre- to Post-semester responses toward enjoying the classes less at the end of the semester.

By college. The shift which was seen in the overall percentages is evident again when the Pre- and Post-semester means for each college are analyzed (Table 5.4). This comparison shows that the students in the Colleges of Engineering and Business enjoyed their classes less by the end of the semester while those in Natural Science and Liberal Arts remained fairly constant in their evaluation. These data also show that the students in Business appear to enjoy their classes less than do the students in the other three colleges and they also expect to enjoy them less.

By classification. When the means for Item 9 are calculated by student classification we can see that the Freshmen and Juniors changed their minds about the classes they attended while the Sophomores, Seniors, and others did not (Table 5.5). On the Post-semester survey, the Sophomores indicated that they enjoyed their classes the most while the Freshmen, Juniors and Seniors enjoyed theirs least.

By sex. The means for Item 9 were also calculated by sex (Table 5.6). Though there was no significant difference between the means for males and females in the Pre-semester data we can note that the males indicated that they enjoyed their classes less in the Post-semester survey than did the females.

TABLE 5.4

Pre- and Post-semester SAS means by College for Item 9.

		NS	E	B	LA	AVG	Fvalue	p	df
9-Enjoyment	pre	2.2	2.2	2.6	2.4	2.4	17.74	.0000	3,2448
	post	2.3	2.6	2.9	2.4	2.5	26.463	.0000	3,2020

NS-Natural Science, E-Engineering, B-Business, LA-Liberal Arts

TABLE 5.5

Pre- and Post-semester SAS means by Student Classification for Item 9.

		Fr	So	Jr	Sr	O	Fvalue	p	df
9-Enjoyment	pre	2.3	2.3	2.4	2.6	2.4	6.692	.0000	4,2410
	post	2.6	2.3	2.6	2.6	2.4	5.246	.0003	4,1934

Fr-Freshmen, So-Sophomores, Jr-Juniors, Sr-Seniors, O-Others

TABLE 5.6

Pre- and Post-semester SAS Means by Sex for Item 9.

		M	F	Fvalue	p	df
9-Enjoyment	pre	2.4	2.4	2.574	.1089	1,2417
	post	2.6	2.5	4.903	.0270	1,1941

By instructor. Finally, the means were calculated by instructor (or class) (Table 5.7). This comparison indicates that for all of the instructors except #25 the students enjoyed the class less at the end of the semester. Those in class #25 enjoyed it more. The students in instructor #16's class showed the most variation between the Pre- and Post-semester surveys (3.1-pre, 4.1-post, 1.0-variation).

Three of the questions which we had hoped to answer in this study were:

1) whether students enjoy their classes more if they were taken as electives;
2) whether the students made higher grades in the classes they enjoyed the most; and
3) whether the room/facilities influenced their enjoyment of the class.

To answer these questions the Post-semester means for Item 9 were ranked from the course students enjoyed most to the one they enjoyed least. These rankings along with some additional information are given in Table 5.8.

Required vs Elective. First, of the five top-rated classes as seen in Table 5.8, (based on the Post-semester ratings on Item 9), only one was a required course. Of the five bottom-rated courses, three (3) were required and two (2) were elective. This leads us to answer the first question affirmatively: Yes, students enjoy non-required courses more than required courses.

TABLE 5.7

Pre- and Post-semester SAS Means by Instructor for Item 9

		NS			E		B					LA						
Instructor Code		11	12	15	13	29	14	17	21	22	26	16*	20	23	24	25*	27	28
Item 9	Pre	1.9	2.1	2.7	1.7	2.5	2.8	2.0	3.0	2.5	2.4	3.1	2.2	3.3		2.8	1.8	1.3
	Post	2.2	2.2	2.6	2.4	2.9	3.3	2.7	3.1	2.7	2.8	4.1	2.3	3.3	2.0	2.0	2.1	1.4

16* Most variation between pre- and post-semester surveys.

25* Change indicates more enjoyment at end of semester than at beginning.

Underlined means indicate at least a .3 change between pre- and post-semester SAS means.

TABLE 5.8

SAS Means for Q9 (Enjoyed Class)* By Instructor

	Mean	Type Class**	Required?	Days Held	College	Room	# Students	% Given A	B	C	D/F	Cr	Avg GPA	Instr. Code
1.	1.3548	U	N	TTh	LA	GAR 1	130	20	35	26	5	6	2.74	28
2.	2.0000	U	N	MWF	LA	BAT 7	200	8	28	22	11	24	2.32	24
3.	2.0057	L	R	MWF	LA	GAR 1	220	27	43	16	8	-	2.90	25
4.	2.1186	U	N	TTh	LA	GOL 105	90	20	23	26	13	9	2.51	27
5.	2.1688	L	N	TTh	NS	WEL 3.502	200	13	29	35	14	1	2.40	12
6.	2.2110	U	N	MWF	NS	GEA 105	140	26	43	16	5	9	2.87	11
7.	2.2281	L	R	MWF	LA	BUR 106	300	10	30	31	21	-	2.17	20
8.	2.3826	L	R	TTh	E	WRW 102	140	10	30	28	29	-	2.01	13
9.	2.5739	U	R	MWF	NS	RLM 4.102	130	18	21	30	27	1	2.18	15
10.	2.7059	U	N	TTh	B	CMA A2.320	140	13	54	26	3	-	2.78	17
11.	2.7113	U	R	TTh	B	JES A121A	350	32	36	23	5	1	2.95+	22
12.	2.8296	L	R	MWF	E	WEL 2.224	250	30	32	17	14	1	2.74	29
13.	2.8356	U	N	MWF	B	EDB 104	110	13	28	31	11	3	2.47	26
14.	2.9914	U	R	TTh	B	WEL 2.224	200	9	36	31	15	3	2.37	21
15.	3.2658	U	N	TTh	B	GSB 1.216	120	12	31	36	13	3	2.39	14
16.	3.3016	L	R	TTh	LA	BEB 166	120	6	12	22	44	2	1.47+	23
17.	4.0561	L	R	TTh	LA	BEB 151	130	10	12	33	38	1	1.83	16
18.		U	R	MWF	NS	WEL 2.224	300	13	19	31	18	1	2.23	18
19		L	R	MWF	NS	WEL 2.224	300	8	28	37	16	-	2.23	19

*Q9 - How did you enjoy attending this class?

Yes, very much No, not at all

1 2 3 4 5

**U = Upper division - Jr./Sr.

L = Lower division - Fr./Soph.

+Highest and lowest GPA.

GPA vs Enjoyment. The second question, whether students made higher grades in those classes they enjoy most, would have to be answered negatively based on the information in Table 5.8. (The Grade Point Average for each class was calculated on a four-point scale where A=4 and F=0. The class GPA is the mean of the final grades given in each particular class.) The class in which the highest class GPA (2.95) was given was ranked eleventh, the class with the second highest GPA (2.90) was ranked third, and the class with the third highest GPA (2.87) was ranked sixth. On the other hand, the class in which the lowest GPA (1.47) was given was ranked 16th and the one with the next-to-lowest GPA (1.83) was ranked 17th. We cannot say from this information, however, that students rank classes lowest in which they get the lowest grades, because the class with the third lowest GPA (2.01) was ranked eighth and the class which was ranked #2 in enjoyment had a lower GPA (2.32) than did the class which was ranked #15. Thus, there seems to be little or no correlation between a student's earned grade and whether or not he/she enjoys a class.

Facilities vs Enjoyment. Of the five top-rated classes, only one was taught in what is considered by students and instructors to be an excellent room (WEL 3.502). (This information was obtained through formal and informal interviews with students and instructors.) We feel that this demonstrates that the instructor can and does make a difference in the students' enjoyment and learning in a class. On the other hand, poor facilities can also be a detriment to learning and enjoyment. This can be seen in the two lowest-ranked classes. These courses were taught in what many instructors and students believe to be the two worst rooms on the UT-Austin campus. Several instructors who taught two sections of the same course, one in BEB 151 or 166 and the other in one of the GSB auditoriums, commented that the student evaluations on the Course/Instructor Survey from the Measurement & Evaluation Center were 10% lower from the students in BEB 151 or 166. Thus, dynamism and enthusiasm on the instructor's part can overcome the problem of poor facilities to some extent, but a poor room can also deter learning and stifle enjoyment.

Interactions vs Enjoyment. The ratings of the classes on Item 9 were also compared to the types of interactions which were coded by the LCAP observers (see Table 5.9). The correlations derived from this comparison showed some surprising results. For the correlation results to reflect a desired relationship, the *r* value must be negative (i.e., the more frequently an instructor uses a particular type statement the more students enjoy the course.) The enjoyment ratings ranged from 1 (enjoyed a lot) to 5 (did not enjoy). Thus, the data indicate that students say they most enjoy classes in which:

a. the instructor uses a lot of reinforcement (Category 2) $r = -.3215$, and

b. there are a large number of student-asked questions (Category 13) $r = -.3233$.

On the other hand, these calculations also indicate that students say they enjoy classes less (i.e., the *r* value is positive) if the instructor:

TABLE 5.9

Pearson Product Moment Correlation Coefficients for CIAS Categories and Item #9

Category		r	p
1	Accepting student attitudes	.0013	.498
*2.	Reinforcement	-.3215	.104
3.	Corrective feedback	.1779	.247
Δ4.	Questions	.4637	.030
5.	Lecture	-.1832	.241
6.	Providing cues/directions	-.1125	.334
7.	Criticism	-.0401	.439
8.	Cognitive student talk	-.0151	.477
9.	Non-cognitive student talk	-.0249	.462
10.	Silence	-.2916	.128
11.	Use of humor	-.2910	.129
Δ12.	Lecturing with visuals	.3334	.096
*13.	Student questions	-.3233	.103
14.	Writing on board or overhead	-.1575	.273

r = correlation coefficient
p = probability

*Interactions students prefer most in large classes.
ΔInteractions students prefer least in large classes.

a. asks a lot of questions (Category 4) r = .4637, and

b. lectures with the aid of visuals (Category 12) r = .3334.

As one would expect, students seem to enjoy classes in which the instructors are generous in their use of praise or reinforcement. They also seem to enjoy participating in class if their participation is self-activated. However, it seems they do not like to be put on-the-spot by instructors who ask them questions.

It was totally unexpected to discover that the students stated they dislike classes in which the instructors used visuals to enhance the lectures. It is difficult to ascertain from these data whether this dislike occurs because the instructors mis-use visuals (e.g., don't provide ample time for the students to copy what is written or drawn, put too much information on each transparency, or turn all of the lights out - making it impossible to take notes) or because the students have difficulty seeing the visual aid if they sit in the back of the room. this finding is also puzzling because much of the research indicates that students retain more if instructors use visual aids to point out key concepts, define words, show illustrative material, etc. (Antioch College, 1960; Chance, 1961). Perhaps this indicates a need to educate instructors in the correct methods and skills needed to use transparencies or slides effectively in their teaching.

Section II: Essentials for Learning (Items 11-19)

This portion of the Student Attitude Survey was designed to obtain information about the types of activities and materials which the students feel are most important in their acquisition of the necessary skills and content for their courses. They were asked to respond to these items using the following scale:

1 - not important at all

2 - somewhat important

3 - moderately important

4 - quite important

5 - extremely important

Overall percent. The overall percentage of students responding with each option to Items 11-19 is given in Table 5.10. As can be seen, the items which the students felt were most important to their learning (i.e., those with the highest response percentage in column 5) were:

Item 12 - Feeling at ease when you talk to the instructor individually (48%, 41%)*

Item 15 - Having the course material and assignments well-organized (61%, 55%)

Item 19 - Having an instructor who is very knowledgeable in the subject (75%, 71%).

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*(pre-semester % choosing option 5, post-semester % choosing option 5)

TABLE 5.10

Overall % of Students Responding with each Option to SAS Items 11-19

	Pre					Post				
	1	2	3	4	5	1	2	3	4	5
	NI	SI	MI	QI	EI	NI	SI	MI	QI	EI
Item 11 - topics aimed	2	9	23	40*	26	2	10	23	38*	27
Item 12 - feeling at ease	2	6	12	31	48*	4	5	14	36	41*
Item 13 - challenged	2	8	28	41*	21	3	9	27	42*	20
Item 14 - control pace	4	15	31	33*	18	4	14	34*	52	15
Item 15 - organization	2	2	6	29	61*	3	3	7	32	55*
Item 16 - participation	7	18	32*	26	16	7	18	32*	29	14
Item 17 - feedback	2	6	21	39*	32	3	6	18	40*	32
Item 18 - outside material	4	12	26	32*	26	5	12	26	32*	24
Item 19 - inst. knowledge	2	1	3	18	75*	3	1	4	21	71*

*Highest response percentage for that item.

NI - Not important at all
SI - Somewhat important
MI - Moderately important
QI - Quite important
EI - Extremely important

Pearson Correlation. When a Pearson Product Correlation Coefficient was calculated on the items in this section on the Post-semester data, it was found that Item-12 (Feeling at ease when you talk to the instructor individually) correlated highly (.36 - .48) with several other items. Thus, students will feel more at ease talking individually to an instructor if he/she has done the following:

a. geared the course toward the students' interest (Item 11) r = .36;

b. challenged the students to think for themselves (Item 13) r = .38;

c. organized the course well (Item 15) r = .48;

d. welcomed the students' participation (Item 16) r = .36;

e. provided frequent feedback on the students' performance (Item 17) r = .41; and,

f. conveyed to the students his/her consummate knowledge of the subject (Item 19) r = .46.

In other words, if the instructor shows a definite concern for the students and their needs then the students will respond to this concern.

By college. The response means for each item in Section II were calculated for each college represented in the study. These means along with the test for significant differences between the means of the colleges can be seen in Table 5.11.

In studying these data we see that there is a significant difference (p = .0002) between the means for the colleges on Item 18 (Having strong

TABLE 5.11

One-way ANOVA of Pre- and Post-Semester SAS Means by College for Items 11-19

		NS	E	B	LA	Fvalue	p	df
Item 11	Pre	3.7	3.8	3.9	3.8	1.854	.1357	3,2451
	Post	3.7	3.8	3.9	3.8	1.910	.1263	3,2029
Item 12	Pre	4.2	4.1	4.1	4.2	1.986	.1144	3,2452
	Post	4.1	4.0	4.0	4.1	2.961	.0314	3,2027
Item 13	Pre	3.6	3.8	3.7	3.7	3.445	.0163	3,2451
	Post	3.8	3.7	3.6	3.7	1.512	.2098	3,2033
Item 14	Pre	3.4	3.6	3.4	3.5	2.135	.0942	3,2451
	Post	3.3	3.4	3.4	3.4	1.222	.3003	3,2042
Item 15	Pre	4.5	4.1	4.5	4.5	.703	.5502	3,2454
	Post	4.4	4.4	4.3	4.3	.953	.4142	3,2043
Item 16	Pre	3.3	3.3	3.2	3.3	.984	.3994	3,2405
	Post	3.1	3.4	3.2	3.3	3.186	.0231	3,1939
Item 17	Pre	3.9	4.0	4.0	3.9	3.514	.0148	3,2456
	Post	4.0	4.1	3.9	3.8	4.698	.0029	3,2041
Item 18	*Pre	3.6	3.9	3.6	3.6	6.631	.0002	3,2450
	*Post	3.7	3.8	3.5	3.5	7.991	>.0001	3,2039
Item 19	Pre	4.6	4.7	4.6	4.7	.494	.6867	3,2440
	Post	4.6	4.6	4.5	4.6	3.733	.0110	3,2028

*Significant at $p \leq .001$.

NS (Natural Science), E (Engineering), B (Business), LA (Liberal Arts)

Scale: 1 (not important at all), 2 (somewhat important), 3 (moderately important), 4 (quite important), 5 (extremely important).

Underlined # indicate at least .3 difference between Pre- and Post-Semester Means.

outside support material, like the text and supplementary readings) both in the Pre- and Post-semester data. It seems that the students in Engineering find the outside readings and the text to be more essential to their understanding of the content than do the students in the other 3 colleges. One may speculate that this may be because there is a greater proportion of foreign students enrolled in this college and/or that the complexity of the material requires more thorough explanations which can only be acquired through these sources. There are no significant differences among the colleges on the other items in this secton.

An interesting and somewhat puzzling outcome was the students' response to Item 16 (Being able to actively participate in class). This item was rated overall as only moderately important on this section of the survey (3.3, 3.2), but in their written comments about the size class they prefer, about 50% - 60% stated that they prefer classes of from 16-50 because there are more opportunities to interact with the instructor on a more personal level. Also, 30% of the students wrote comments stating that one of the skills instructors should develop is the ability to interact effectively with students. It appears that, though they enjoy being able to interact and participate in class, they don't perceive this interaction as being an essential part of the learning process.

By classification. The response means in this section when broken down by student classification are given in Table 5.12. In the analysis of the means for each student classification we can see that there is a significant difference ($p = .0005$) between the means on Item 12 (Feeling

TABLE 5.12

One-way ANOVA of Pre- and Post-Semester SAS Means by Classification for Items 11-19

		Fr.	So.	Jr.	Sr.	Other	Fvalue	p	df
Item 11	pre	3.8	3.7	3.9	3.8	3.7	2.733	.0279	4,2411
	post	3.7	3.8	3.8	3.8	3.7	.620	.6487	4,1944
Item 12	*pre	4.2	4.2	4.3	4.0	4.0	5.082	.0005	4,2415
	post	4.1	4.1	4.0	4.0	3.7	2.547	.0380	4,1939
Item 13	pre	3.7	3.7	3.7	3.7	4.0	3.027	.0886	4,2413
	post	3.6	3.7	3.6	3.7	4.0	2.569	.0366	4,1947
Item 14	pre	3.5	3.4	3.5	3.4	3.4	1.335	.2548	4,2411
	post	3.4	3.4	3.4	3.4	3.6	.426	.7903	4,1952
Item 15	pre	4.5	4.5	4.5	4.4	4.3	2.237	.0632	4,2417
	post	4.4	4.4	4.3	4.3	4.3	1.370	.2424	4,1956
Item 16	pre	3.3	3.3	3.3	3.2	3.3	.989	.4128	4,2377
	post	3.3	3.3	3.2	3.2	3.3	1.618	.1674	4,1881
Item 17	pre	4.0	3.9	3.9	3.9	3.7	2.189	.0683	4,2417
	post	4.0	3.9	3.9	3.8	4.0	2.155	.0722	4,1953
Item 18	pre	3.7	3.6	3.5	3.7	3.7	2.595	.0351	4,2408
	*post	3.7	3.7	3.5	3.5	3.6	4.301	.0019	4,1950
Item 19	pre	4.7	4.7	4.6	4.6	4.6	2.031	.0881	4,2408
	post	4.7	4.6	4.5	4.5	4.5	3.613	.0062	4,1945

*Significant at $P \leq .001$.

Fr (Freshmen), So (Sophomores), Jr (Juniors), Sr (Seniors), Other (Grad. students, etc.).

Scale: 1 (not important at all); 2 (somewhat important): 3 (moderately important); 4 (quite important); 5 (extremely important).

Underlined # indicate at least .3 difference between Pre- and Post-Semester Means.

at ease when you talk to the instructor individually) in the Pre-semester data. Junior students evidently felt at that time that this was more important to their learning than did the students in the other classes. It is interesting to note, however, that these Junior students rate this as somewhat less important in the Post-semester data (pre = 4.3; post = 4.0). Also, this item does not show a significant difference between the different level students in the Post-semester data. There is also a significant difference among the student levels on Item 18 (Having strong outside support material) in the Post-semester analysis. On this item it appears that Freshmen and Sophomores found this outside support material to be more necessary than did the other students. From these data we see that Seniors and Others found such supporting materials to be less important at the end of the semester than at the beginning of the semester.

By sex. The response means for this section were also analyzed by sex (see Table 5.13). For the most part the responses do not differ much by sex. However, on Item 12 (Feeling at ease when you talk to the instructor individually) there is a significant difference both in the Pre- and Post-semester surveys. The means indicate that this is more important to females than to males in their learning. Item 15 (Having the course material and assignments well-organized) also shows a significant difference between the means for both surveys. Here again, the females indicated that this is more important to their learning than did the males.

TABLE 5.13

One-way ANOVA of Pre- and Post-Semester SAS Means by Sex for Items 11-19

		Male	Female	Fvalue	p	df
Item 11	Pre	3.8	3.8	.265	.6067	1,2418
	Post	3.7	3.8	5.555	.0186	1,1952
Item 12	*Pre	4.1	4.3	30.552	>.0001	1,2422
	*Post	4.0	4.2	16.175	.0001	1,1942
Item 13	Pre	3.7	3.7	3.009	.0831	1,2420
	Post	3.7	3.7	.853	.3560	1,1952
Item 14	Pre	3.5	3.5	.364	.5467	1,2418
	Post	3.4	3.4	2.917	.0880	1,1960
Item 15	*Pre	4.4	4.6	46.729	>.0001	1,2424
	*Post	4.2	4.5	32.286	>.0001	1,1964
Item 16	Pre	3.3	3.3	.237	.6268	1,2384
	Post	3.3	3.2	2.439	.1187	1,1888
Item 17	*Pre	3.9	4.0	14.862	.0001	1,2424
	Post	3.9	4.0	5.994	.0145	1,1960
Item 18	Pre	3.6	3.7	5.055	.0248	1,2415
	Post	3.6	3.6	.768	.3810	1,1950
Item 19	Pre	4.6	4.7	6.0567	.0140	1,2415
	*Post	4.5	4.6	12.785	.0004	1,1950

*Significant difference at $p \leq .001$.

Scale: 1 (not important at all), 2 (somewhat important), 3 (moderately important), 4 (quite important), 5 (extremely important).

On Item 17 (Getting frequent feedback on your progress) a significant difference between the means is indicated in the Pre-semester analysis but not in the Post-semester analysis even though the means remain the same. This is due to the shift in the number of degrees of freedom. A similar phenomenon can be seen on Item 19 (Having an instructor who is very knowledgeable in the subject).

By Instructor. Table 5.14 shows the Pre- and Post-semester means for each item. The means which change by at least .3 are underlined. Overall, 52% of the means at the end of the semester are lower (i.e., less important to their learning) than at the beginning of the semester while 19% increase and 28% remain the same. The only item on which more of the means increase than decrease is Item 16 (Being able to actively participate in class). On this item eight (8) of the means increased, six (6) decreased, and three (3) remained the same. None of these changes are very large, but they do indicate a slight shift in the students' attitudes toward feeling that participation is more important to their learning than they felt it was at the beginning of the semester. (It is interesting to note that all the means for the classes in Natural Sciences decreased on this item; indicating that these students felt participation was less important at the end of the semester than they had felt it was at the beginning of the semester.)

On Item 15 (Having course material and assignments well organized) all the means decrease except four which remain the same. Here again, these shifts are not extremely large except in the case of instructor #23

TABLE 5.14

Pre- and Post-Semester SAS Means by Instructor for Items 11-19

		NS			E		B					LA							Changes in Means
		11	12	15	13	29	14	17	21	22	26	16	20	23	24	25	27	28	
Item 11	pre	3.9	3.7	3.7	3.7	3.8	3.8	4.0	3.9	3.8	3.9	3.8	3.8	3.8		3.7	3.7	3.9	↑=5
	post	4.0	3.5	3.7	3.9	3.7	3.8	3.9	4.0	3.8	3.8	3.9	3.7	3.8	3.8	3.7	3.8	3.8	↓=6 −=6
Item 12	pre	4.2	4.2	4.2	4.3	4.0	3.9	4.4	4.0	4.2	4.2	4.3	4.2	4.2		4.3	4.1	4.2	↑=1
	post	4.3	4.1	3.9	4.1	3.9	3.9	4.0	4.0	4.0	3.9	4.2	4.2	4.2	4.1	4.1	4.0	4.1	↓=11 −=5
Item 13	pre	3.5	3.5	3.8	3.7	3.9	3.6	3.9	3.8	3.6	3.8	3.4	3.8	3.6		3.5	3.7	4.3	↑=4
	post	3.6	3.8	3.8	3.6	3.8	3.6	3.8	3.8	3.5	3.7	3.3	3.7	3.6	3.7	3.7	3.8	4.2	↓=8 −=5
Item 14	pre	3.5	3.3	3.4	3.6	3.5	3.5	3.4	3.4	3.4	3.5	3.6	3.4	3.5		3.5	3.4	3.6	↑=1
	post	3.5	3.1	3.4	3.4	3.5	3.3	3.3	3.4	3.3	3.5	3.5	3.3	3.5	3.4	3.5	3.4	3.7	↓=7 −=9
Item 15	pre	4.6	4.4	4.6	4.5	4.4	4.4	4.6	4.4	4.5	4.5	4.6	4.4	4.7		4.6	4.4	4.1	↑=0
	post	4.6	4.2	4.4	4.4	4.4	4.3	4.4	4.3	4.4	4.3	4.6	4.3	4.2	4.3	4.4	4.2	4.1	↓=12 −=4
Item 16	pre	3.2	3.3	3.3	3.5	3.2	3.2	3.4	3.0	3.2	3.4	3.2	3.1	3.3		3.3	3.1	3.6	↑=8
	post	3.1	3.2	3.0	3.5	3.3	3.1	3.3	3.9	3.3	3.5	3.2	3.3	3.4	3.2	3.4	3.2	3.7	↓=6
Item 17	pre	4.0	3.9	4.0	4.1	4.0	3.9	4.1	4.0	3.9	4.1	4.1	3.9	3.9		3.8	3.8	3.8	↑=4
	post	4.1	4.0	3.9	4.2	3.9	3.8	4.1	3.9	3.9	3.8	4.2	3.8	3.9	3.7	3.8	3.7	3.4	↓=8 −=5
Item 18	pre	3.6	3.5	3.9	3.7	4.0	3.6	3.6	3.9	3.5	3.4	3.7	3.6	3.6		3.8	3.6	3.6	↑=4
	post	3.8	3.6	3.7	3.8	3.9	3.4	3.5	3.8	3.4	3.1	3.9	3.5	3.4	3.4	3.6	3.5	3.6	↓=11 −=2
Item 19	pre	4.7	4.6	4.7	4.8	4.6	4.5	4.8	4.6	4.6	4.7	4.7	4.6	4.7		4.7	4.5	4.7	↑=2
	post	4.8	4.6	4.5	4.8	4.5	4.4	4.6	3.5	4.5	4.4	4.6	4.5	3.4	4.5	4.7	4.4	4.8	↓=10 −=4

Underlined means indicate at least a .3 change between pre- and post-semester SAS means.
↑ = # of means for that item which increase between the pre- and post-semester surveys.
↓ = # of means for that item which decrease between the pre- and post-semester surveys.
− = # of means for that item which remain constant between the pre- and post-semester surveys.

Total ↑=29 (19%) ↓=79 (52%) −=43 (28%)

where the mean decreases from 4.7 to 4.2. This decrease in the means seems to indicate that more of the students felt this instructional quality was a little less important at the end of the semester than they had thought it was at the beginning of the semester.

Items 12 (Feeling at ease when you talk to the instructor individually), 18 (Having strong outside support material, like the text and supplementary readings), and 19 (Having an instructor who is very knowledgeable in the subject) show the greatest number of classes with decreases in their means. Of these, all the classes in the College of Business indicate decreases on Items 18 and 19.

By scanning Table 5.14 we notice that most of the larger changes in the means take place in the College of Business and particularly in the class of instructor #26. Of these larger shifts in the means, all of them decrease except for the one on Item 13 (Being challenged by the material and the instructor to think for yourself) under Instructor #12. The students in this class felt that this was more important to their learning at the end of the semester than at the beginning.

Written comments. A number of the students who filled out the SAS provided written comments in Section V concerning other things which they felt were important to their learning. These comments have been summarized and are listed below. The percentage of students responding whose statements could be categorized into each summary statement are also given.

Other things which are important to learning are:

1. Instructors of large classes need to develop good communication skills, interaction skills, and teaching skills. (29% of the 643 responding students)

2. Instructors of large classes need to develop a good attitude toward the class (the emphasis is on enthusiasm and sincere concern for the students' welfare). (10% of the 643 responding students)

3. Instructors of large classes need to provide more and different stimuli (field trips, movies, overhead transparencies, slides, etc.). (8% of the 643 responding students)

4. Classrooms need to have the proper equipment for learning. (5% of the 643 responding students)

5. Evaluation of students' performances in large classes needs to be improved (having more homework, providing more feedback, having more essay items than multiple-choice items, and abolishing the "bell-shaped curve" distribution of grades). (5% of the 643 responding students)

Summary: Section II. On the whole, the students agree that the thing which most affects their learning in university classes is having an instructor who is knowledgeable in the subject and can communicate this knowledge to the students. The second most important aspect is having the course material and assignments well-organized and the third most important aspect is feeling at ease when talking to the instructor individually.

Section III: Preferred Class Size (Items 20-24)

In this section the students were given five class size categories which they were asked to rank from 1 (most preferred size) to 5 (least preferred size). The responses in this section were analyzed by the percent of the total responses and then the means were calculated by College, classification, sex and instructor.

Overall percentages. The percent of students responding in each category is given in Table 5.15. There is a definite preference for classes of size 16-30 and a majority of the students ranked the last three class size categories 3rd, 4th, and 5th. There seems to be some undecidedness about very small classes (size 1-15). On the Pre-semester survey, a larger portion of the students (26%) indicated that they preferred that size class (i.e., ranked it #1), whereas on the Post-semester survey the larger portion (24%) ranked it 5th. Overall, there is a fairly even spread over the five ranks on Item 20 (size 1-15).

By college. Table 5.16 shows the means for this section when broken down by College. These data indicate that there is a significant difference between the means on Item 20 (size 1-15) and Item 23 (size 51-100) in both the Pre- and Post-semester surveys. The students in the College of Business prefer small classes (Item 20) less than do the students in the other three colleges and the means for all of the colleges increase on this item in the Post-semester data. On the other hand, the students in the College of Business prefer classes size 51-100

TABLE 5.15

Percentage of Student Responses to Items 20-24

	Pre					Post				
	1	2	3	4	5	1	2	3	4	5
Item 20 (Size 1-15)	26*	24*	18	12	21	23	23	19	11	24*
Item 21 (Size 16-30)	43*	35	10	10	2	43*	33	10	13	1
Item 22 (Size 31-50)	21	24	48*	5	3	21	26	46*	3	3
Item 23 (Size 51-100)	7	12	17	58*	6	8	14	17	57*	4
Item 24 (Size 100+)	5	5	9	13	68*	6	5	9	14	66*

*Highest response percentage for that item.

TABLE 5.16

One-way ANOVA of Pre- and Post-Semester SAS Means by College for Items 20-24

		NS	E	B	LA	Fvalue	p	df
Item 20 (Size 1-15)	*Pre	2.6	2.5	3.0	2.7	15.498	>.0001	3,2438
	*Post	2.7	2.7	3.1	2.9	7.878	>.0001	3,2010
Item 21 (Size 16-30)	Pre	1.9	1.9	2.0	1.9	.8145	.4859	3,2445
	*Post	1.9	1.7	2.1	2.0	5.163	.0015	3,2009
Item 22 (Size 31-50)	*Pre	2.6	2.6	2.3	2.5	12.295	>.0001	3,2445
	Post	2.4	2.5	2.3	2.4	3.915	.0086	3,2011
Item 23 (Size 51-100)	*Pre	3.5	3.6	3.3	3.4	7.947	>.0001	3,2444
	*Post	3.4	3.5	3.2	3.4	5.559	.0009	3,2015
Item 24 (Size 100+)	Pre	4.4	4.4	4.3	4.4	1.056	.3670	3,2439
	Post	4.3	4.5	4.2	4.3	2.256	.0804	3,2019

*Siginficant difference at $p \leq .001$.

Scale: 1 (class size liked best) - 5 (class size liked least).

NS (Natural Science), E (Engineering), B (Business), LA (Liberal Arts).

(Item 23) more than do the students in other colleges. The students in Enginee .ig definitely prefer classes of 16-30 students (Item 21) as is indicated by their rankings of 1.9 in tne Pre-semester data and 1.7 in the Post-semester data. Natural Science and Engineering students prefer classes of 31-50 (Item 22) and 51-100 (Item 23) less than do the students in Business and Liberal Arts. This is probably because the content they must learn is more problem oriented and it helps their understanding if they can interact more with the instructor. All of the rankings follow the same pattern in each College (i.e., #1 = Item 21, #2 = Item 20, #3 = Item 22, #4 = Item 23, and #5 = Item 24).

By classification. When the means for Items 20-24 are analyzed by student classification there some significant differences between the means, as indicated ir Table 5.17. On Item 20 (size 1-15) all of the students except those in the "Other" category indicate that they like the smallest classes less at the end of the semester than they did at the beginning. It is difficult to say why this occurs except that perhaps the students feel less pressure to perform in a class of 16-30 than in a class of 1-15. Also, the students in the "Other" group were primarily at the graduate level and they felt they profit more from more one-to-one contact with the instructor. On Item 22 (size 31-50) in the Post-semester data there is a significant difference between the means because it appears that the "Other" group likes this size class less than do the rest of the students.

By sex. Table 5.18 shows the analysis of the means by sex. It is interesting to observe that the ans for females change quite a bit from

TABLE 5.17

One-way ANOVA of Pre- and Post-Semester SAS Means by Classification for Items 20-24

		Fr.	So.	Jr.	Sr.	Other	Fvalue	p	df
Item 20	*Pre	2.6	2.8	2.9	2.9	2.3	5.438	.0002	4,2396
(Size 1-15)	Post	2.8	3.0	3.0	3.0	2.2	3.695	.0054	4,1925
Item 21	Pre	1.9	1.9	1.9	2.0	1.8	.832	.5047	4,2403
(Size 16-30)	Post	1.9	2.0	2.0	2.1	1.9	2.428	.0463	4,1933
Item 22	*Pre	2.6	2.4	2.3	2.4	2.5	6.757	>.0001	4,2402
(Size 31-50)	*Post	2.5	2.4	2.3	2.3	2.7	5.655	.0002	4,1927
Item 23	Pre	3.5	3.5	3.4	3.3	3.5	3.342	.0099	4,2401
(Size 51-100)	Post	3.4	3.3	3.3	3.3	3.6	2.735	.0278	4,1934
Item 24	Pre	4.3	4.4	4.4	4.4	4.6	1.297	.2692	4,2400
(Size 100+)	Post	4.3	4.3	4.3	4.3	4.5	.529	.7144	4,1937

*Significant difference at $p \leq .001$.

Scale: 1 (class size liked best) - 5 (class size liked least)

Fr (Freshmen), So (Sophomores), Jr (Juniors), Sr (Seniors), Other (Grad. students, etc.)

TABLE 5.18

One-way ANOVA of Pre- and Post-Semester SAS Means by Sex for Items 20-24

		Male	Female	Fvalue	p	df
Item 20 (Size 1-15)	*Pre	2.6	3.0	23.090	>.0001	1,2403
	*Post	2.7	3.1	31.454	>.0001	1,1933
Item 21 (Size 16-30)	Pre	1.9	1.9	.311	.5775	1,2410
	*Post	1.9	2.1	10.308	.0014	1,1941
Item 22 (Size 31-50)	*Pre	2.5	2.3	25.436	>.0001	1,2409
	*Post	3.4	3.2	21.076	>.0001	1,1942
Item 23 (Size 51-100)	*Pre	3.5	3.3	18.171	>.0001	1,2408
	*Post	3.4	3.2	21.076	>.0001	1,1942
Item 24 (Size 100+)	Pre	4.4	4.4	.0013	.9713	1,2407
	Post	4.4	4.2	7.122	.0077	1,1945

*Significant difference at $p \leq .001$.

Scale: 1 (class size liked best) - 5 (class size liked least).

the beginning of the semester to the end. For example, though they rank Item 21 (size 16-30) lowest both times (1.9, 2.1), they seem to like that size less at the end of the semester than they did at the beginning of the semester. Also, females indicated that they like very small classes (size 1-15) less than males do. This is somewhat surprising because the females rated Item 12 (Feeling at ease when talking individually to the instructor) as more important to their learning than did the males (see Table 5.13).

By instructor. The means for Items 20-24 are presented for each instructor in Table 5.19. (The instructors have been grouped by college to facilitate analysis of the data.) In Item 20 (size 1-15) all of the means increase except those for Instructor #14 in Business. This indicates that most of the students liked this size class less at the end of the semester than they did at the beginning of the semester. The students in classes #15 and #28 like this size class more (2.5) than do the other students.

For the most part the means for Item 21 (size 16-30) either remain the same or increase (i.e., the students liked this size class less at the end of the semester). The major deviation from this pattern occurs in Instructor #12's class where the mean decreases. The students in this class seem to think classes of 16-30 students are the ideal size.

The means for Item 22 (size 31-50) remained pretty steady over the semester. The changes which stand out occur in class #25, where the mean

TABLE 5.19

Pre- and Post-Semester SAS Means by Instructor
for Items 20-24

	Instructor Code	NS 11	NS 12	NS 15	E 13	E 29	B 14	B 17	B 21	B 22	B 26	LA 16	LA 20	LA 23	LA 24	LA 25	LA 27	LA 28		
Item 20 (Size 1-15)	pre	2.9	2.6	2.3	2.3	2.6	3.2	2.8	3.0	3.1	2.5	2.9	2.8		2.7	3.2	2.4	2.4	↑=12	-=1
	post	3.0	2.7	2.5	2.6	2.9	3.0	3.1	3.2	3.3	2.7	2.8	2.7	3.1	3.0	3.1	2.5	2.5	↓=4	
Item 21 (Size 16-30)	pre	2.0	1.9	1.8	1.9	1.9	2.1	1.9	1.9	2.0	1.8	1.9	1.7		1.8	2.1	2.0	2.0	↑=6	-=7
	post	2.0	1.9	1.8	1.6	1.9	2.0	2.0	2.0	2.2	1.8	1.9	2.0	2.1	2.0	2.2	1.8	1.8	↓=4	
Item 22 (Size 31-50)	pre	2.3	2.7	2.8	2.7	2.5	2.3	2.5	2.2	2.2	2.4	2.4	2.5		2.5	2.2	2.7	2.7	↑=4	-=5
	post	2.3	2.6	2.4	2.6	2.5	2.2	2.4	2.2	2.3	2.4	2.5	2.6	2.1	2.3	2.5	2.6	2.6	↓=8	
Item 23 (Size 51-100)	pre	3.3	3.5	3.6	3.7	3.6	3.2	3.4	3.4	3.3	3.6	3.5	3.3		3.5	3.1	3.6	3.6	↑=2	-=3
	post	3.2	[illegible]	3.6	3.7	3.4	3.3	3.3	3.3	3.1	3.5	3.4	3.5	3.3	3.3	3.0	3.5	3.5	↓=12	
Item 24 (Size 100+)	pre	4.4	[illegible]	4.4	4.5	4.4	4.3	4.1	4.4	4.4	4.6	4.3	[illegible]		4.5	4.3	4.4	4.4	↑=8	-=5
	post	4.3	4.2	4.6	4.6	4.4	4.4	4.2	4.4	4.0	4.7	4.4	4.1	4.3	4.3	4.3	4.5	4.5	↓=4	
																		Total	↑=32 (38%) ↓=32 (38%)	-=21 (25%)

Instructor codes 11-17 taught classes during the Fall, 1980 semester.
Instructor codes 20-29 taught classes during the Spring, 1981 semester.
Underlined means indicate at least a .3 change between pre- and post-semester SAS means.
↑ = # of means for that item which increase between the pre- and post-semester surveys.
↓ = # of means for that item which decrease between the pre- and post-semester surveys.
- = # of means for that item which remain constant between the pre- and post-semester surveys.
Scale: 1(class size liked best) - 5(class size liked least).

increases from 2.2 to 2.5 (i.e., the students like that size <u>less</u> at the end of the semester), and in class #15, where the mean decreases from 2.8 to 2.4 (i.e., the students like that size class <u>more</u> at the end of the semester).

The means for Item 23 (size 51-100) decreased in all but five of the classes. This is somewhat surprising because that indicates that the students liked this size class <u>more</u> at the end of the semester; though overall, it is still ranked fourth.

Finally, the means for Item 24 (size 100+) remained quite stable. At the end of the semester the students in classes #15, #13, and #26 indicated that they really do not care for this size class: their means are 4.6, 4.6, and 4.7 respectively. The students in class #22, with a Post-semester mean of 4.0, indicated that they enjoy this size class more than do the rest of the students.

<u>Written comments.</u> Many students provided written comments in Section V of the SAS concerning their reasons for their first class size choice. These comments have been summarized and are listed below. The percentage of students responding whose statements could be categorized into each summary statement are also given.

Class size 1-15 ranked #1 because:

1. The environment is more conducive to learning (i.e., students get more feedback, hear different

views on various issues, and interact more due to the class size). (57% of 742 students responding)

2. Students are able to interact with instructor on a more personal level. (49% of 742 students responding)

3 Because students are noticed more by the instructor, they are more motivated to be prepared for class and to participate. (10% of 742 students responding)

4. Students are able to get to know each other on a more personal level. (10% of 742 students responding)

Class size 16-30 ranked #1 because:

1. The environment is more conducive to learning (i.e., students get more feedback, hear different views on various issues, interact more, and feel more relaxed and comfortable). (43% of 1,323 students responding)

2. Students are able to interact with the instructor on a more personal level. (40% of 1,323 students responding).

3. Students are able to know each other on a more personal level. (25% of 1,323 students responding)

4. Students have more control over when they want to participate in class (i.e., students feel either less inhibited or less pressure to voice their opinions). (24% of 1,323 students responding)

Class size 31-50 ranked #1 because:

1. The environment is more conducive to learning (i.e., students get more feedback, hear different

views on various issues, interact more, and feel more relaxed and comfortable). (44% of 540 students responding)

2. Students have more personal contact with the instructor. (29% of 540 students responding)

3. Students have more control over when they want to participate (i.e., students feel less inhibited to participate). (27% of 540 students responding)

4. Students have more personal contact with each other. (19% of 540 students responding)

5. Students are accustomed to this class size (not too big nor too small). (19% of 540 students responding)

Class size 51-100 ranked #1 because:

1. The instructor is more organized. (26% of 209 students responding)

2. Students have more control over when they want to participate in class (i.e., students feel less inhibited to participate). (23% of 209 students responding)

3. Students are accustomed to this class size and, thus, are more comfortable. (17% of 209 students responding.)

Class size 100+ ranked #1 because:

1. The atmosphere is more casual and relaxed since participation from each student is not required. (24% of 122 students responding)

2. The instructor is more organized and more qualified to teach. (20% of 122 students responding)

3. Students have more control over when they want to participate in class. (14% of 122 students responding)

Summary: Section III. The data presented above for Section III of the SAS indicate that students most prefer classes of 16-30 students because they feel more a part of the class and they find this environment more conducive to learning. These students least prefer classes with over 100 students because (1) they get less feedback from the instructor, (2) they do not feel like participating, (3) they feel distant from the instructor, and (4) they think that the course can be taught more efficiently in smaller groups.

Section IV: Characteristics of Large Classes (Items 25-41)

There have been a number of statements made about the pros and cons of large classes. In this segment of the SAS the students were asked to react to statements about things which happen as classes increase in size. Their responses were on a scale from 1 (disagree strongly) to 5 (agree strongly). Again, the students' responses were analyzed by total percent responding to each item, by College, by classification, by sex, and by instructor.

Overall percentages. The percent of students responding to each scale option for each item is given in Table 5.20. It appears that the students had somewhat stronger convictions or reactions during the Pre-semester survey than they did during the Post-semester survey. This is evidenced by the number of asterisks (*) in column 5 for each survey. The only item with which they "strongly agree" both times is Item 41 (As classes get larger, a student's inability to take good notes in class

TABLE 5.20

Percent of Students Responding To Each Degree
Of Scale On SAS Items 25-41

	Pre 1	Pre 2	Pre 3	Pre 4	Pre 5	Post 1	Post 2	Post 3	Post 4	Post 5
Item 25 - less feedback	2	11	12	44*	30	3	15	11	42*	29
Item 26 - not participate	3	11	12	37*	36	4	12	13	37*	34
Item 27 - more organized	6	19	32*	31	13	6	18	32*	32*	12
Item 28 - mostly facts	8	23	21	33*	15	9	25	18	32*	17
Item 29 - more resp.	3	9	20	43*	24	4	10	20	45*	21
Item 30 - text	3	8	13	37	39*	4	10	14	40*	33
Item 31 - pace	4	11	18	33	35*	4	12	21	34*	30
Item 32 - more control	18	23	22	25*	11	17	21	23	28*	11
Item 33 - don't know other stud.	6	16	13	32	33*	7	18	14	33*	28
Item 34 - more efficient	23	36*	25	11	4	20	36*	29	11	4
Item 35 - less challenge	17	32*	24	19	8	16	33*	23	19	9
Item 36 - more freedom	13	21	26	29*	12	12	20	27	30*	12
Item 37 - lower int. level	17	34*	31	12	6	18	37*	27	11	6
Item 38 - not ask help	7	16	11	38*	28	7	18	12	39*	25
Item 39 - quality better	15	30	37*	13	5	15	30	36*	13	5
Item 40 - feel distant	4	9	11	39*	37	4	12	12	39*	33
Item 41 - notetaking	4	7	15	34	40*	[illegible]	8	15	35	38*

*Highest response percentage for that item.
Scale: 1(disagree strongly), 2(disagree moderately), 3(no opinion), 4(agree moderately), 5(agree strongly)

makes it difficult for him/her to do well on exams). Items 30, 31, and 33 are agreed with in the Post-semester data but not as strongly as they were in the Pre-semester responses.

Many of the students disagreed with Items 34 (As classes get larger, the material in the course can be covered more efficiently), 35 (As classes get larger, I'm less challenged to think for myself), and 37 (As classes get larger, the course is usually taught at a lower intellectual level than I like). These responses show that many students feel they <u>are</u> being challenged to develop their thinking skills in large classes; perhaps more than an observer would expect.

<u>Pearson correlation.</u> When a Pearson Product Moment Correlation Coefficient was calculated on the Post-semester data for the items in this section it was found that Items 39 and 40 correlated highly (.31 - .47) with several of the other items. For Item 39 (As classes get larger the overall quality of instruction seems to get better) students feel that the quality of the course gets better when:

a. the instructor puts more effort into the course's organization (Item 27) $r = .31$; and

b. the course is covered more efficiently (Item 34) $r = .47$.

However, this comparison also indicates that:

c. the ability of students to interact with the instructor on a more personal level (Item 40) is <u>not</u> seen as improving the overall quality of the course ($r = -.30$).

In other words, from the students' point of view the quality of instruction gets better if the instructor is well-organized and doesn't waste class time, but it is not really affected by the instructor's interest in interacting with the students on a personal level.

On Item 40 (As classes get larger I feel more distant from the instructor) students feel that their relationship with the instructor is distant when:

a. the instructor gives them less feedback on their performance (Item 25) r = .31;

b. the students do not feel part of the class (Item 26) r = .38;

c. students are only required to memorize facts for the course (Item 28) r = .35;

d. the course's pace is not in harmony with the students' learning pace (Item 31) r = .43;

e. students are unable to know other members of the class (Item 33) r = .32; and,

f. students lack skills in notetaking (Item 41) r = .30.

Thus, instructors can make students feel less distant from them if they will: (1) provide frequent feedback on their performance, (2) have students introduce themselves to the others sitting around them, (3) challenge the students to think and not just memorize facts, (4) ask for feedback on how the students feel the course is progressing <u>before</u> the end of the semester, and (5) employ the services of RASSL to teach the students notetaking skills.

By college. The response means are reported for each college in Table 5.21 and significant differences between the means are seen on quite a few of the items. On Item 28 (As classes get larger the course content becomes mostly facts to be memorized) p = .0007 (Pre) and >.0001 (Post). Though the mean average is 3.2 (no opinion) the students in Engineering lean toward "disagree moderately" while those in Business lean more toward "agree moderately". The Engineering students seem to feel that the content of their courses does not consist of just facts to be memorized but also problems to be solved, while those in Business see the content as primarily facts.

Item 30 (As classes get larger a good textbook and relevant outside readings become more important to my understanding of the content) also shows a significant difference (p =>.0001 Pre and Post) among the colleges. In this case, the students in Engineering "agree moderately" (4.2) that this statement is true while those in Liberal Arts are less sure that this is so (3.9). This may be because the exams in Engineering tend to be based more on the text and the lectures more closely follow the text than do those in Liberal Arts.

Item 31 (As classes get larger the pace of the course becomes less geared to the students' pace of learning) shows a significant difference (p = .0004) in the Post-semester responses but not in the Pre-semester. This is because all of the means drop between the Pre- and Post-semester except in Business, which remains constant. Evidently, the instructors in the other three colleges were perceived as having attempted to pace

TABLE 5.21

One-way ANOVA for Pre- and Post-Semester SAS Means by College for Items 25-41

		NS	E	B	LA	Fvalue	p	df
Item 25	Pre	3.8	3.8	3.9	3.9	1.720	.1613	3,2458
	Post	3.6	3.8	3.9	3.8	4.592	.0034	3,2037
Item 26	Pre	3.9	3.9	4.0	3.9	1.417	.2362	3,2417
	Post	3.8	3.9	4.0	3.8	3.960	.0080	3,1931
Item 27	Pre	3.3	3.4	3.2	3.2	1.975	.1160	3,2454
	Post	3.4	3.2	3.2	3.3	4.110	.0065	3,2038
Item 28	*Pre	3.2	3.1	3.4	3.2	5.756	.0007	3,2454
	*Post	2.9	3.2	3.5	3.2	22.794	>.0001	3,2035
Item 29	Pre	3.9	3.9	3.7	3.7	4.796	.0025	3,2452
	Post	3.8	3.8	3.6	3.6	3.642	.0124	3,2037
Item 30	*Pre	4.0	4.2	4.0	3.9	7.847	>.0001	3,2449
	*Post	3.9	4.2	3.9	3.8	11.270	>.0001	3,2031
Item 31	Pre	3.8	3.9	3.9	3.8	1.040	.3742	3,2451
	*Post	3.7	3.7	3.9	3.6	6.071	.0004	3,2039
Item 32	*Pre	3.0	2.8	2.8	2.9	2.373	.0688	3,2446
	*Post	3.2	2.9	2.8	3.0	5.218	.0014	3,2028
Item 33	Pre	3.6	3.6	3.7	3.7	1.318	.2673	3,2450
	Post	3.6	3.4	3.6	3.6	1.995	.1131	3,2032
Item 34	Pre	2.4	2.3	2.4	2.4	.8815	.4501	3,2444
	Post	2.5	2.4	2.5	2.4	.631	.5950	3,2028
Item 35	*Pre	2.5	2.5	2.9	2.6	17.564	>.0001	3,2442
	*Post	2.5	2.5	3.0	2.7	22.048	>.0001	3,2034
Item 36	Pre	3.1	3.0	3.1	3.1	.924	.4285	3,2442
	Post	3.2	3.0	3.1	3.1	1.373	.2495	3,2027
Item 37	Pre	2.5	2.6	2.5	2.6	2.065	.1032	3,2436
	*Post	2.4	2.4	2.7	2.5	6.832	.0001	3,2024
Item 38	*Pre	3.4	3.7	3.7	3.7	6.121	.0004	3,2437
	*Post	3.5	3.6	3.8	3.4	8.395	>.0001	3,2029
Item 39	*Pre	2.8	2.7	2.5	2.6	5.588	.0008	3,2435
	*Post	2.8	2.6	2.5	2.6	5.394	.0011	3,2021
Item 40	Pre	3.9	4.1	4.1	3.9	2.511	.0573	3,2435
	*Post	3.8	3.9	4.0	3.8	8.003	>.0001	3,2021

TABLE 5.21 (continued)

		NS	E	B	LA	Fvalue	p	df
Item 41	Pre	4.0	3.9	3.9	4.1	4.663*	.0030	3,2345
	Post	4.0	3.8	3.9	4.0	2.149	.0925	3,1983

*Significant difference at p ≤ .001.

Scale: 1 (disagree strongly, 2 (disagree moderately), 3 (no opinion), 4 (agree moderately), 5 (agree strongly).

Underlined # indicate at least .3 difference between Pre- and Post-Semester Means.

the course more to the students' needs. Perhaps they encouraged student input on how the course was going and made changes accordingly.

Item 32 (As classes get larger I have more control over how involved I am in the class) also shows a significant difference ($p = .0014$) in the Post-semester responses. The mean in the College of Business remained stable (2.8 - disagree moderately) while the means in the other colleges moved slightly toward 3 (no opinion). The students in large classes often do not see themselves as being involved while in the class. They just go to class and sit there taking notes. Thus, the "no opinion" response seems most appropriate.

The next item which shows a significant difference among the four colleges is Item 35 (As classes get large I'm less challenged to think for myself) where $p = .0001$ for both Pre- and Post semester responses. The overall response to this item is 2.7 (disagree moderately), however the means for the College of Business (2.9, 3.0) indicate that those students really have "no opinion" about this statement. It is somewhat surprising that the students in Natural Science and Engineering disagree with this statement. Perhaps as their classes get larger they find that they must take the initiative and do things on their own if they are going to learn the content.

Item 37 (As classes get larger the course is usually taught at a lower intellectual level than I like) shows a significant difference ($p = .0001$) among the colleges in the Post-semester data but not in the Pre-semester. For this statement all of the means move more toward 2 (disagree moderately) except those in the College of Business, which moves toward 3 (no opinion). This is encouraging information because many instructors feel they have to compromise on some of their goals for the class when it gets larger. The students, however, seem to feel that the courses are still intellectually stimulating.

A significant difference among the colleges in both the Pre- and Post-semester responses ($p = .0004$, $p = .0001$) is indicated for Item 38 (As classes get larger I am less likely to seek out the instructor for individual help). In the Pre-semester data the students in the Natural Sciences rated this statement 3.4 (no opinion) while those in the other three colleges leaned more toward 4 (agree moderately). However, in the Post-semester means the students in Liberal Arts responded at 3.4 (no opinion); a decrease from 3.7 in the Pre-semester data. Evidently these students found their instructors to be quite accessible whereas the students in the other three colleges found their instructors to be less accessible.

Item 39 (As classes get larger the overall quality of instruction seems to get better) also shows a significant difference ($p = .0008$; $p = .0011$) among the means of the four colleges. Here, the students in the College of Business disagree most with this statement ($\bar{X} = 2.5$) while those in Natural Science lean more toward 3 (no opinion). Overall, the students do not feel that the quality of instruction in large classes is better than that in smaller classes.

Finally, there is a significant difference in the Post-semester data among the colleges ($p = .0001$) on Item 40 (As classes get larger I feel more distant from the instructor). Though all of the students tend to agree with this statement, those in Business agree more fervently (4.0). All of the means for this item decrease from the Pre- to the Post-semester responses with the responses of the students in Engineering changing the most (4.1, 3.9). Evidently, some of the students did not feel as distant from the instructor at the end of the semester as they had at the beginning.

By classification. The students' response means are presented by classification in Table 5.22. The first item which shows a significant difference ($p = .0001$) among the means by classification is Item 27 (As classes get larger instructors seem to put more effort into the organization of the course). There is a significant difference on this item in the Pre-semester data but not in the Post-semester data. The Freshmen seemed to agree with this statement (3.4) more than did the other students (3.2) though the means really indicate primarily "no opinion" responses.

Item 28 (As classes get larger the course content becomes mostly facts to be memorized) shows a significant difference among the means ($p = .0001$) in the Post-semester responses. The Freshmen and Sophomores tend to disagree with this statement while the Juniors and Others agree to a greater extent. It is interesting to note that the means for Freshmen and Sophomores decreased on this item from the Pre- to

TABLE 5.22

One-way ANOVA for Pre- and Post-Semester SAS Means by Classification for Items 25-41

		Fr.	So.	Jr.	Sr.	Other	Fvalue	p	df
Item 25	Pre	3.9	3.9	3.9	3.9	3.5	2.504	.0408	4,2415
	Post	3.8	3.7	3.8	3.7	3.6	1.537	.1894	4,1948
Item 26	Pre	3.9	3.9	4.0	4.0	3.7	2.311	.0561	4,2383
	Post	3.8	3.9	3.9	3.8	3.9	1.320	.2605	4,1872
Item 27	*Pre	3.4	3.2	3.2	3.2	3.2	6.191	.0001	4,2411
	Post	3.3	3.4	3.3	3.2	3.1	1.104	.3532	4,1948
Item 28	Pre	3.2	3.2	3.3	3.3	3.2	1.952	.0997	4,2410
	*Post	3.0	3.1	3.4	3.3	3.4	9.385	>.0001	4,1946
Item 29	*Pre	4.0	3.7	3.7	3.6	3.5	11.4571	>.0001	4,2409
	*Post	3.8	3.8	3.7	3.5	3.5	7.383	>.0001	4,1947
Item 30	*Pre	4.1	3.9	4.0	3.9	4.0	4.446	.0014	4,2407
	Post	4.0	3.9	3.9	3.9	3.8	1.221	.3001	4,1947
Item 31	Pre	3.9	3.8	3.8	3.9	3.7	.880	.4755	4,2407
	Post	3.8	3.7	3.8	3.7	3.9	.955	.4315	4,1949
Item 32	Pre	2.9	2.9	2.9	2.9	2.9	.045	.9961	4,2402
	Post	3.0	3.1	2.9	3.0	2.8	1.383	.2377	4,1939
Item 33	Pre	3.7	3.7	3.7	3.7	3.6	.280	.8910	4,2406
	Post	3.5	3.5	3.7	3.5	3.7	2.067	.0831	4,1944
Item 34	Pre	2.4	2.3	2.4	2.4	2.3	.484	.7477	4,2399
	Post	2.5	2.4	2.4	2.4	2.4	.442	.7782	4,1940
Item 35	*Pre	2.5	2.6	2.8	2.9	3.0	14.485	>.0001	4,2398
	*Post	2.5	2.6	2.9	3.0	3.0	14.1819	>.0001	4,1944
Item 36	Pre	3.1	3.1	3.1	2.9	2.8	2.466	.0434	4,2399
	Post	3.1	3.1	3.1	3.0	2.8	.923	.4496	4,1938
Item 37	Pre	2.5	2.5	2.6	2.5	2.8	2.058	.0843	4,2393
	*Post	2.3	2.4	2.6	2.7	3.0	9.5838	>.0001	4,1936
Item 38	Pre	3.7	3.6	3.6	3.6	3.6	1.092	.3591	4,2397
	Post	3.5	3.5	3.7	3.5	3.8	1.718	.1438	4,1940
Item 39	*Pre	2.8	2.5	2.5	2.6	2.3	7.161	>.0001	4,2391
	Post	2.7	2.6	2.6	2.5	2.5	1.156	.3286	4,1934
Item 40	Pre	4.0	4.0	4.0	4.0	4.0	.309	.8723	4,2395
	Post	3.9	3.8	3.9	3.8	4.0	1.377	.2398	4,1933

TABLE 5.22 (Continued)

		Fr.	So.	Jr.	Sr.	Other	Fvalue	p	df
Item 41	*Pre	4.1	4.0	4.0	3.8	3.7	5.913	.0001	4,2307
	*Post	4.1	3.9	4.0	3.8	3.5	6.674	>.0001	4,1896

*Siginficant difference at $p \leq .001$.

Fr (Freshmen), So (Sophomores), Jr (Juniors), Sr (Seniors), Other (Grad. students, etc.).

Scale: 1 (disagree strongly), 2 (disagree moderately), 3 (no opinion), 4 (agree moderately), 5 (agree strongly).

Post-semester survey while those of the other three classifications either increased or stayed the same. This is probably due to the lack of experience of these lower-division students in the arts of notetaking, studying, and test-taking.

Item 29 (As classes get larger I have the opportunity to take more responsibility for my own learning) shows a significant difference among the means in both the Pre- (p = .0001) and Post-semester (p =.0001) data. At the beginning of the semester the Freshmen "agree moderately" (4.0) with this statement while at the end of the semester they lean more toward "no opinion" (3.8). The other students' responses remain relatively stable around the 3.5 - 3.6 level.

Item 30 (As classes get larger a good textbook and relevant outside readings become more important to my understanding of the content) reflects a significant difference (p = .0014) only in the Pre-semester data. Here, though all of the students basically agree with this statement the Freshmen agree most fervently (4.1). Though there is no significant difference among the means on the Post-semester survey, the mean for the students in the "Other" group drops from 4.0 to 3.8. This indicates that they found the text and outside readings less of a necessity in a larger class by the end of the semester than they thought they would at the beginning.

A significant difference among the means is indicated for both the Pre- and Post-semester surveys for Item 35 (As classes get larger I am less challenged to think for myself). It is noteworthy that the means for each classification on this item increase with the level of the students (i.e., Fr. = 2.5, So. = 2.6, Jr. = 2.8, Sr. = 2.9, O. = 3.0). Thus, the lower the level of the student the more they feel they are challenged to think in their large classes.

On Item 37 (As classes get larger the course is usually taught at a lower intellectual level than I like) there is a significant difference ($p = .0001$) among the means in the Post-semester data. When the Pre- and Post-semester survey means are scrutinized, the means for Freshmen and Sophomores decrease while those for Juniors, Seniors, and Others remain the same or increase. Again, this is probably due to the level of experience of the students; the older, more experienced students find their large courses less of a challenge.

There is quite a bit of difference among the Pre-semester means ($p = .0001$) on Item 39 (As classes got larger the overall quality of instruction seems to get better). The Freshmen (2.8) disagree with this statement less than do the Others (2.3). However, in the Post-semester data the Others indicate that they agree more (2.5) while the Freshmen agree less (2.7).

Finally, Item 41 (As classes get larger a student's inability to take good notes in class makes it difficult for him/her to do well on exams) shows a significant difference in both the Pre- ($p = .0001$) and Post-semester data ($p = .0001$). Again, the mean responses on this item seem to reflect the experience of the students. Freshmen "agree moderately" (4.1, 4.1) while the Other students have "no opinion" (3.7, 3.5).

By sex. In Table 5.23 the response means for Items 25-41 are broken down by sex. As we can see, there is basically very little difference between the responses for males and females (e.g., only four items indicate significant differences in the Pre-semester survey and three in the Post-semester survey).

The first item showing a significant difference between the means is Item 29 (As classes get larger I have the opportunity to take more responsibility for my own learning). On this item in the Pre-semester data the mean for the females is very close to "agree moderately" (3.9) while that for the males indicates more of them have "no opinion" (3.7). There is no significant difference in the Post-semester data.

Item 32 (As classes get larger I have more control over how involved I am in the class) reflects a significant difference between the means (p = .0014) on the Pre-semester data but not on the Post-semester data. Here, the males "disagree moderately" (2.8) while the females' responses reflect "no opinion" (3.0). Thus, the males seem to feel that they have less control over their in-class involvement than do the females.

There is a significant difference (p = .0012) between the means for Item 33 (As classes get larger I am less likely to know other students in the class) in the Post-semester data. The mean responses for this item

TABLE 5.23

One-way ANOVA for Pre- and Post-Semester SAS Means by Sex for Items 25-41

		Male	Female	Fvalue	p	df
Item 25	Pre	3.9	3.9	.273	.6012	1,2422
	Post	3.8	3.8	.259	.6109	1,1956
Item 26	Pre	3.9	3.9	.0003	.9868	1,2390
	Post	3.8	3.9	1.118	.2905	1,1880
Item 27	Pre	3.2	3.3	3.395	.0657	1,2418
	Post	3.3	3.3	.016	.9010	1,1956
Item 28	Pre	3.2	3.3	5.737	.0168	1,2417
	Post	3.2	3.3	3.972	.0465	1,1954
Item 29	*Pre	3.7	3.9	19.355	>.0001	1,2416
	Post	3.7	3.7	1.639	.2008	1,1955
Item 30	Pre	4.0	4.0	1.9606	.1618	1,2414
	Post	3.9	3.9	.419	.5174	1,1955
Item 31	Pre	3.8	3.9	3.432	.0643	1,2414
	Post	3.7	3.8	.293	.5887	1,1957
Item 32	*Pre	2.8	3.0	10.259	.0014	1,2409
	Post	2.9	3.1	10.075	.0015	1,1947
Item 33	Pre	3.6	3.8	7.444	.0065	1,2413
	*Post	3.5	3.7	10.502	.0012	1,1952
Item 34	Pre	2.3	2.4	3.994	.0459	1,2406
	Post	2.4	2.4	.415	.5197	1,1948
Item 35	Pre	2.7	2.7	.0003	.9868	1,2405
	Post	2.7	2.7	1.207	.2723	1,1952
Item 36	*Pre	3.0	3.2	16.307	.0001	1,2406
	*Post	3.0	3.2	11.556	.0007	1,1946
Item 37	*Pre	2.7	2.3	55.478	>.0001	1,2400
	*Post	2.6	2.4	32.0632	>.0001	1,1944
Item 38	Pre	3.6	3.6	.2997	.5842	1,2404
	Post	3.5	3.6	.452	.5017	1,1948
Item 39	Pre	2.6	2.6	.197	.6575	1,2398
	Post	2.6	2.6	.103	.7486	1,1942
Item 40	Pre	4.0	4.0	.767	.3812	1,2402
	Post	3.9	3.9	.003	.9572	1,1940

TABLE 5.23 (Continued)

		Male	Female	Fvalue	p	df
Item 41	Pre	4.0	4.0	1.148	.2843	1,2314
	Post	3.9	4.0	3.427	.0644	1,1904

*Significant difference at p ≤ .001.

Scale: 1 (disagree strongly), 2 (disagree moderately), 3 (no opinion), 4 (agree moderately), 5 (agree strongly).

indicate that females agree more with this statement (3.7) than do the males (3.5); however, technically, the responses all fall within the "no opinion" range.

Item 36 (As classes get larger I feel I have more freedom because I am part of a crowd and not so noticeable) shows a significant difference between the means in both the Pre- and Post-semester responses ($p = .0001$; $p = .0007$). Evidently more females agreed with this statement than did the males. The means of 3.0 (males) and 3.2 (females) however represent a predominately "no opinion" response from both sexes.

Finally, Item 37 (As classes get larger the course is usually taught at a lower intellectual level than I like) also shows a significant difference between the means on both the Pre- and Post-semester surveys. Both sexes disagree with this statement but the females tend to disagree more fervently than the males. The means show a slight change between the Pre- and Post-semester surveys with the mean for males decreasing from 2.7 to 2.6 and the mean for females increasing from 2.3 to 2.4. This change would indicate that more males disagreed with the statement at the end of the semester than did at the beginning of the semester (i.e., they feel that large classes are <u>not</u> taught at a lower intellectual level). On the other hand, more females agreed with the statement at the end of the semster (i.e., they felt that large classes <u>are</u> taught at a lower intellectual level).

<u>By instructor</u>. The response means for each item are broken down by instructor in Table 5.24. The Pre- and Post-semester means for each item

TABLE 3.24

Pre- and Post-semester SAS Means By Instructor
for Items 25-41

		NS			E		B					LA							Change in Means
		11	12	15	13	29	14	17	21	22	26	16	20	23	24	25	27	28	
Item 25	pre	4.0	3.8	3.7	3.7	3.9	4.0	3.9	3.8	3.9	4.1	3.9	3.9	4.1		4.0	3.6	3.9	↑=3
	post	3.9	3.4	3.6	3.9	3.7	3.8	4.0	3.6	3.9	4.0	4.2	3.7	3.8	3.8	3.6	3.6	3.7	↓=11 −=3
Item 26	pre	3.9	3.8	4.0	4.0	3.9	4.0	3.7	3.9	4.1	4.1	3.8	3.9	4.0		3.9	3.7	3.8	↑=4
	post	3.9	3.6	3.8	3.4	4.0	3.9	4.0	3.9	4.0	4.0	4.0	3.7	3.6	3.9	3.7	3.8	3.5	↓=10 −=3
Item 27	pre	3.2	3.4	3.1	3.4	3.4	3.3	3.4	3.2	3.2	3.2	3.3	3.0	3.0		3.3	3.1	3.2	↑=8
	post	3.3	3.5	3.3	3.3	3.0	3.1	2.9	3.2	3.4	3.0	3.1	3.4	3.1	3.2	3.5	3.3	2.1	↓=7 −=2
Item 28	pre	3.4	3.1	2.9	3.3	3.0	3.6	3.8	3.1	3.3	3.4	3.5	3.0	3.3		3.3	3.3	3.1	↑=7
	post	3.4	2.6	2.8	3.3	3.1	3.7	3.9	2.9	3.7	3.6	3.4	3.1	3.0	3.4	3.1	3.3	2.7	↓=6 −=4
Item 29	pre	3.9	3.9	3.7	4.0	3.8	3.7	4.0	3.6	3.6	3.4	4.1	3.7	3.7		3.6	3.6	3.5	↑=5
	post	3.8	3.8	3.7	3.9	3.7	3.6	3.5	3.7	3.7	3.5	3.9	3.7	3.6	3.5	3.7	3.7	3.3	↓=9 −=3
Item 30	pre	4.0	3.9	4.1	4.1	4.3	3.9	4.1	4.2	4.0	4.0	4.3	3.9	4.0		3.8	3.9	3.8	↑=1
	post	3.9	3.8	4.1	4.3	4.2	3.9	3.7	4.2	3.8	3.7	4.2	3.7	3.9	3.8	3.6	3.9	3.6	↓=11 −=5
Item 31	pre	3.9	3.7	3.8	4.0	3.8	3.9	3.9	3.9	3.9	4.0	3.9	3.7	4.0		3.9	3.7	3.8	↑=3
	post	3.9	3.6	3.7	4.0	3.5	4.0	3.9	3.8	3.8	4.1	4.2	3.5	3.9	3.6	3.6	3.3	3.3	↓=10 −=4
Item 32	pre	3.1	3.1	2.7	2.8	2.8	2.9	3.0	2.9	2.8	2.6	2.8	2.9	2.6		2.8	3.1	3.1	↑=10
	post	3.2	3.3	3.0	2.8	2.9	2.9	2.8	2.9	2.8	2.8	2.9	2.8	3.2	3.0	2.9	3.4	3.2	↓=2 −=5
Item 33	pre	3.6	3.8	3.3	3.5	3.6	3.6	3.9	3.7	3.7	3.9	3.7	3.7	3.9		3.8	3.7	3.8	↑=3
	post	3.8	3.6	3.4	3.4	3.4	3.4	3.7	3.5	3.8	3.2	3.7	3.5	3.6	3.8	3.5	3.6	3.6	↓=12 −=2
Item 34	pre	2.4	2.5	2.3	2.3	2.3	2.5	2.6	2.2	2.3	2.0	2.5	2.4	2.2		2.2	2.5	2.3	↑=11
	post	2.3	2.7	2.4	2.3	2.4	2.4	2.3	2.4	2.6	2.2	2.2	2.5	2.3	2.3	2.5	2.7	2.4	↓=4 −=2

TABLE 5.24 (continued)

		NS			E		B					LA							Change in Means	
		11	12	15	13	29	14	17	21	22	26	16	20	23	24	25	27	28		
Item 35	pre	2.7	2.5	2.3	2.4	2.5	3.0	2.9	2.8	3.0	3.0	2.4	2.6	2.7		2.8	2.8	2.7	↑=7	-=7
	post	2.7	2.2	2.5	2.6	2.5	3.1	3.1	2.8	3.0	3.1	2.6	2.7	2.7	2.9	2.8	2.5	2.6	↓=3	
Item 36	pre	3.3	3.2	2.8	3.0	3.0	3.0	3.2	2.9	3.2	2.8	3.3	3.1	3.0		3.2	2.9	2.9	↑=7	-=6
	post	3.2	3.4	3.0	3.0	3.0	3.0	3.2	3.2	3.1	2.9	3.0	3.1	3.3	3.1	3.0	3.3	3.0	↓=4	
Item 37	pre	2.3	2.5	2.5	2.5	2.7	2.4	2.6	2.4	2.6	2.7	2.4	2.6	2.4		2.5	2.5	3.0	↑=3	-=6
	post	2.2	2.5	2.4	2.3	2.6	2.8	2.8	2.4	2.6	2.9	2.1	2.5	2.4	2.5	2.5	2.2	2.8	↓=8	
Item 38	pre	3.3	3.4	3.4	3.7	3.5	3.6	3.7	3.7	3.7	3.7	3.8	3.7	3.9		3.7	3.5	3.5	↑=5	-=4
	post	3.8	3.2	3.6	3.6	3.5	3.8	3.6	3.7	4.0	3.5	3.9	3.3	3.5	3.5	3.4	3.3	3.5	↓=8	
Item 39	pre	2.7	3.0	2.5	2.8	2.6	2.9	2.5	2.4	2.5	2.2	2.7	2.7	2.4		2.5	2.7	2.4	↑=7	-=5
	post	2.6	3.0	2.7	2.6	2.6	2.4	2.5	2.6	2.7	2.1	2.2	2.7	2.5	2.5	2.7	2.8	2.7	↓=5	
Item 40	pre	3.9	3.8	4.1	4.0	4.1	3.9	4.1	3.9	4.1	4.1	4.2	3.8	4.1		4.0	3.8	3.9	↑=4	-=4
	post	4.0	3.5	3.8	4.0	3.9	4.0	4.1	4.0	4.0	4.1	4.3	3.7	3.9	3.9	3.7	3.3	3.5	↓=9	
Item 41	pre	4.2	4.0	3.9	3.9	3.9	3.9	4.1	3.5	4.0	4.2	4.2	4.0	4.3		4.1	4.0	3.8	↑=5	-=4
	post	4.0	4.0	3.9	4.1	3.5	3.8	4.2	3.4	4.1	3.9	4.1	4.2	4.3	4.0	3.8	4.1	3.6	↓=8	

Underlined means indicate at least a .3 change between pre- and post-semester SAS means.
↑= # of means for that item which increase between the pre- and post-semester surveys.
↓= # of means for that item which decrease between the pre- and post-semester surveys.
-= # of means for that item which remain constant between the pre- and post-semester surveys.

Total ↑=93 (32%) ↓=127 (44%) -=69 (24%)

which change by at least .3 are underlined. Overall in this section 44% of the means decrease, 32% increase, while 24% remain the same.

First, there are five items in which a majority of the means decrease. On Item 25 (As classes get larger I get less feedback on how well I understand the material during the semester), 11 of the 17 sets of means show a decrease. These decreases take the means from around 4 (agree moderately) toward 3 (no opinion). Thus, while the students felt at the beginning of the semester they would get little feedback on their progress, many of them decided that they actually received more feedback than they had anticipated.

On Item 26 (As classes get larger I feel less like a participant in the class), 10 of the 17 sets of means show a decrease. Even after the decreases, however, the means are still very close to 4 (agree moderately) so the students who changed their minds probably switched from 5 (agree strongly) to 4 (agree moderately). Participation of some type in class seems to be quite important to most students and many large class instructors have indicated in interviews that they tend to stifle it because they are afraid it will get out of hand.

The response means to Item 30 (As classes get larger a good textbook and relevant outside readings become more important to my understanding of the content) show that 11 of the 17 sets decrease. Again, however, these decreases are usually quite small and the Post-semester means are all relatively close to 4 (agree moderately).

On Item 31 (As classes get larger the pace of the course becomes less geared to the students' pace of learning), 10 of the 17 sets of means decrease. The means on the Pre-semester survey were centered around 4 (agree moderately) but on the Post-semester survey the means were closer to 3.5 (no opinion). This change probably indicates that the students either found that it didn't matter if the course was paced to their learning speed or that the instructors seemed to be attempting to individualize to some extent.

Item 33 (As classes get larger I am less likely to know other students in the class) is the last one which shows a decrease in a majority of the mean pairs. The Pre-semester means hover around 3.6 - 3.9 while the Post-semester means move toward 3.2 - 3.5. Evidently, more of the students disagreed with this statement at the end of the semester than had at the beginning. Perhaps they found that they actually did get to know some of the other students, or, they found they were comfortable not knowing the person sitting beside them.

The majority of the response means only increased on two items: Item 32 (As classes get larger I have more control over how involved I am in the class) and Item 34 (As classes get larger the material in the course can be covered more efficiently). On Item 32, 10 of the 17 sets of means show an increase. These increases move from 2 (disagree moderately) toward 3 (no opinion). This indicates that the students seem to have discovered that they can control their involvement in these large classes more than they thought they could. On the other hand, it may indicate that more of the students decided that it really didn't matter.

On Item 34, 11 of the 17 sets of means show an increase. Overall, however, these increases do not make much difference because the average Pre-semester mean (for all classes) is 2.3 and the average Post-semester mean is 2.4. Thus, the students still "disagree moderately" that the material can be covered more efficiently in large classes.

Written comments. Quite a few of the students who filled out the SAS wrote additional comments in Section V about some of their other feelings about large classes. These comments have been summarized and are listed below. The percentage of students responding whose statements could be categorized into each summary statement are also given.

1. Large classes are "hazardous to your learning": first, they are impersonal, rigidly structured, poorly organized, and noisy; second, instructors who teach large classes are usually uncaring, inaccessible, boring, and give terrible tests with little constructive feedback on students' performance; and third, students in large classes are competitive and sometimes lack integrity on tests. (19% of the 871 responding students)

2. Instructors should possess good teaching techniques (e.g., leading class discussions, developing good evaluative instruments, using multi-media equipment effectively, and having more control over students' behavior in the classroom). (17% of the 871 responding students)

3. A good class is determined by the effectiveness of the instructor. (11% of the 871 responding students)

4. Instructors of large classes should devote more class time to discussions or should incorporate more discussion sections into the course. (8% of the 871 responding students)

Summary: Section IV. The data presented above for Section IV of the SAS indicate that students feel the quality of instruction in large classes is definitely determined by the instructor. Because of this they indicate that instructors who enjoy teaching and are concerned about the progress of the students make better large-class instructors. The governing (i.e., discipline) of a large class seems to be important too. Instructors who put up with noise, late-comers, talking during class, and cheating are not considered to be effective. There also seems to be a feeling that large classes, while they are not rated highly, can be improved if the instructors are trained in effectve teaching techniques.

Direct Observation Data

During each semester of the study an LCAP observer sat in on from one (1) to four (4) large classes. Each class was observed at least once a week and data were collected via the Expanded Cognitive Interaction Analysis System (CIAS). In addition, each observer collected copies of the homework assignments, quizzes, and exams which were used in the class. These were analyzed to determine the level of thinking (according to Bloom's Taxonomy of the Cognitive Domain) which was required in each course. The CIAS data were analyzed by overall means, by College, by instructor, and by course level.

CIAS Coding and Compiling Procedures

The Expanded CIAS category system allows an observer to code the verbal interactions which occur in a classroom. Each verbal statement which is made is placed into one of 45 categories. A category is recorded every three seconds or when the interaction changes (whichever occurs first). Thus, in a typical 50-minute class an observer would record approximately 950 categories and in a 90-minute class approximately 1250 categories would be recorded.

Because it would be almost impossible to generate and analyze a 45 x 45 matrix, the subcategories were condensed into the original 10 categories for data analysis purposes. Four of the subcategories which appeared to influence classroom climate and student enjoyment were then extracted and coded as categories 11 (Humor), 12 (Use of visuals with lecture), 13 (Student questions), and 14 (Writing on board without talking).

To compile and analyze these data a computer program was developed with assistance from the Computation Center. After the data were entered, the program generated the percent of teacher talk (%TT) which took place, the percent of student talk (%ST), and a 14 x 14 matrix which showed the totals for each category as well as the percentage of the total tallies for each category (see Figure 5.1). The teacher-talk categories consist of Categories 1-7, 11 and 12 while the student-talk categories consist of Categories 8, 9, and 13. (The numbers in the individual cells of the matrix and the actual coding - which included all

NAME OF THE DATA FILE ?HAS10

I N T E R A C T I O N   A N A L Y S I S --- 306

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 \	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 \	0	13	2	7	19	1	0	4	0	1	0	3	2	0
3 \	0	1	1	0	2	0	0	0	0	0	0	2	1	0
4 \	0	1	1	2	14	2	0	12	0	0	1	0	8	0
5 \	0	13	1	25	880	10	0	4	0	0	16	22	2	0
6 \	0	2	0	1	10	44	0	1	0	1	0	2	0	0
7 \	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 \	0	11	1	5	22	1	0	81	0	0	3	1	0	0
9 \	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 \	0	0	0	0	0	2	0	0	0	0	0	0	0	0
11 \	0	0	0	0	0	0	0	21	0	0	1	0	0	0
12 \	0	3	0	1	23	1	0	1	0	0	1	64	0	0
13 \	0	3	1	0	8	0	0	1	0	0	0	0	21	0
14 \	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUM	0	52	7	41	976	61	0	125	0	2	22	94	34	0
	0.0	3.7	0.5	2.9	69.1	4.3	0.0	8.8	0.0	0.1	1.6	6.6	2.4	0.0

****

TOTAL ENTRIES: 1416

% TT: 88.6299

% ST: 11.2288

FSSR: 64.1509

TSSR: 80.0797

I/C : 9.72112E-2

****

Figure 5.1. Computer-generated CIAS Matrix.

the subcategories - were only used in our one-to-one consultations with the participant instructors and not in the anlysis which follows.)

Overall mean percentages. The overall mean percentages for the 14 CIAS categories are shown in Table 5.25 and Figure 5.2. As would be expected in a large university class, the bulk of the class time was spent in Categories 5 (Lecture) and 12 (Lecture with visuals). The interactions which occurred least frequently are represented by Category 9 (Non-cognitive student talk) and Category 7 (Criticism). The total represented by Teacher Talk categories is 88.46% of the class time; the total represented by the Student Talk Categories is 5.02% of the class time; and, the total represented by the Silence Categories is 6.36% of the class time. Thus, overall, the amount of student participation is quite limited.

By college. The CIAS mean percetages by College are given in Table 5.26 and graphed in Figure 5.3. Though the mean percentages are quite small for Category 1 (Accepting student attitudes), the instructors in the College of Business use verbal statements of this nature more frequently (1.14) than do those in the other colleges. The instructors in the College of Engineering use this type of verbal statemeant less than .1% of the time. (Statements which would be included in this category are those such as --"I understand that this section is somewhat more difficult than the previous sections, but I'm sure it will become clearer as we go along"; or "You seem a little anxious about the upcoming exam..."). Note: Because there were only two instructors from the College of Engineering who volunteered to let an observer attend

TABLE 5.25

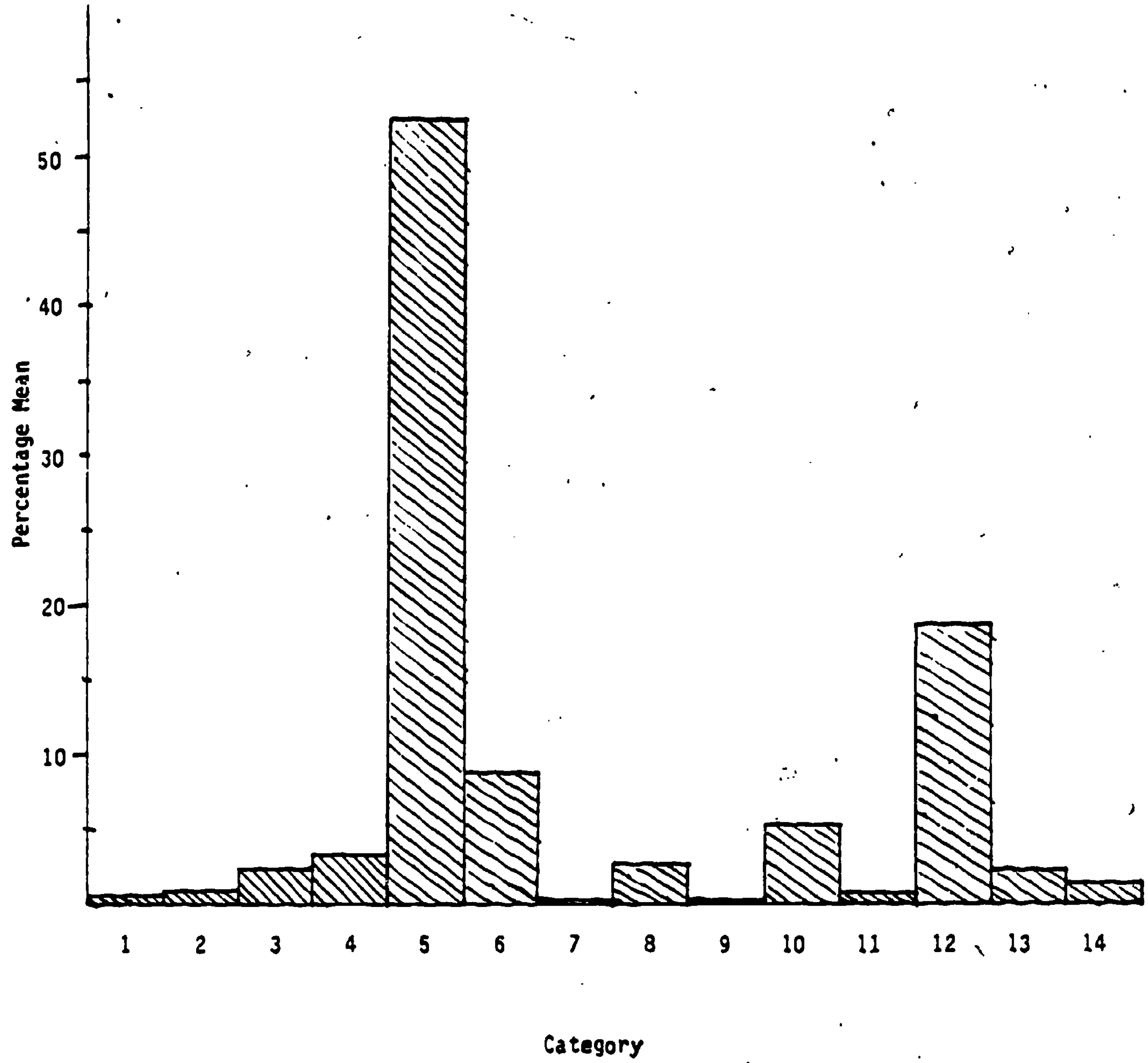
Overall Means for CIAS Categories

Teacher Talk Category	Mean	Student Talk Category	Mean	Silence Category	Mean
1	.77	8	2.93	10	5.03
2	.99	9	.03	14	1.33
3	2.18	13	2.06	Total	6.36
4	3.12	Total	5.02		
5	52.59				
6	8.94				
7	.04				
11	.90				
12	18.93				
Total	88.46				

1 - Accepting student attitudes
2 - Positive reinforcement; affective instructor comments
3 - Repeating a student response; providing corrective feedback; building on a student response
4 - Questions asked by instructor
5 - Lecture
6 - Providing cues; focusing on main points; giving directions; assignments, process
7 - Criticism
8 - Cognitive student talk
9 - Non-cognitive student talk
10 - Silence; listening or watching
11 - Teacher use of humor
12 - Simultaneous visual and verbal presentation
13 - Student question
14 - Writing on board without talking

Figure 5.2

Overall percentage mean* for CIAS Categories



1 - Accepting student attitudes
2 - Positive reinforcement; affective instructor comments
3 - Repeating a student response; providing corrective feedback; building on a student response
4 - Questions asked by instructor
5 - Lecture
6 - Providing cues; focusing on main points; giving directions, assighments, process
7 - Criticism
8 - Cognitive student talk
9 - Non-cognitive student talk
10 - Silence; listening or watching
11 - Teacher use of humor
12 - Simultaneous visual and verbal presentation
13 - Student question
14 - Writing on board without talking

TABLE 5.26

CIAS Means by College

Category	Nat. Sci.	Engineering	Business	Liberal Arts
1	.69	.096	1.14*	.83
2	.95	.68	.99	1.08*
3	1.22	4.09*	1.33	2.86
4	3.21	2.10	3.33*	3.25
5	42.20	36.10	60.20*	59.90
6	9.76	10.61*	8.12	8.38
7	.03	.19*	.04	.009
8	1.63	1.92	2.56	4.36*
9	.02	.01	.07*	.02
10	2.98	10.75*	5.04	4.86
11	.71	.50	1.29*	.92
12	33.31*	29.18	13.27	8.61
13	1.07	2.76*	2.39	2.29
14	12.83*	1.04	.04	1.61

*Highest mean percentage for each CIAS Category.
1 - Accepting student attitudes
2 - Positive reinforcement; affective instructor comments
3 - Repeating a student response; providing corrective feedback; building on a student response
4 - Questions asked by instructor
5 - Lecture
6 - Providing cues; focusing on main points; giving directions; assignments, process
7 - Criticism
8 - Cognitive student talk
9 - Non-cognitive student talk
10 - Silence; listening or watching
11 - (1h) - Humor
12 - (5v) - Visual and verbal presentation
13 - (8q) - Student question
14 - (10b) - Writing on board without talking

their classes, the results obtained for this College may not be representative of the College as a whole.

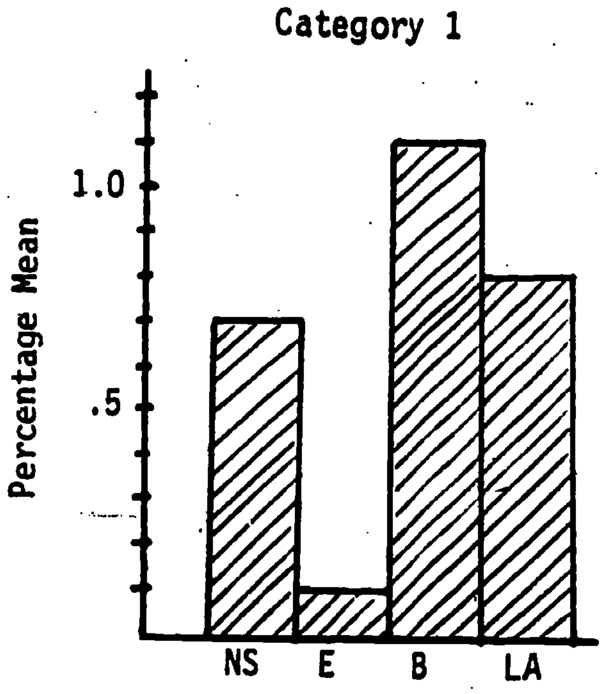
Category 2 (Positive reinforcement; affective instructor comments) is used most frequently by the instructors in the College of Liberal Arts (1.08). However, as can be seen in Figure 5.3(b) there is not a great deal of diffeence among the colleges. Again, the instructors in the College of Engineering use this type statement less frequently.

In Figure 5.3(c) the mean percentages for Category 11 (Humor) are graphed next. The use of humor in the classroom is a means of putting the students at ease and is listed frequently by students as a characteristic of effective teachers (Eble, 1974; Sheffield, 1974; Ebro, 1977). However, even though the instructors in the College of Business use humor more than do the instructors in the other colleges, they still only use it 1.29% of the time.

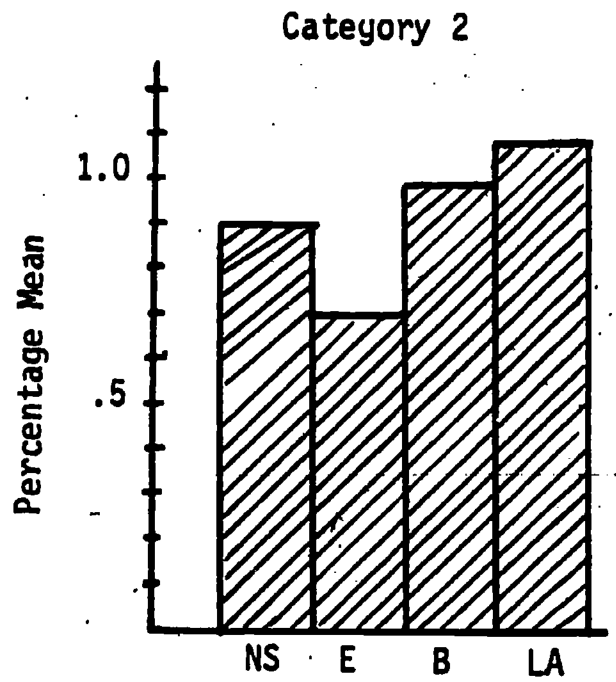
The reader should note that the scale for Category 3 (Repeating a student response; providing corrective feedback; building on a student response) in Figure 5.3(d) is different than that for Categories 1 and 2. The instructors in Engineering use this type statement quite a bit more (4.09) than do those instructors in the other colleges. For the most part, the statements used by the instructors in Engineering which were coded as 3's consisted of repeating a student's response. This was done to let the student know his/her response was acceptable and also to make sure the other students in the class heard the response.

Figure 5.3 (a, b, & c)

Mean percentages for each CIAS category by college



(a)



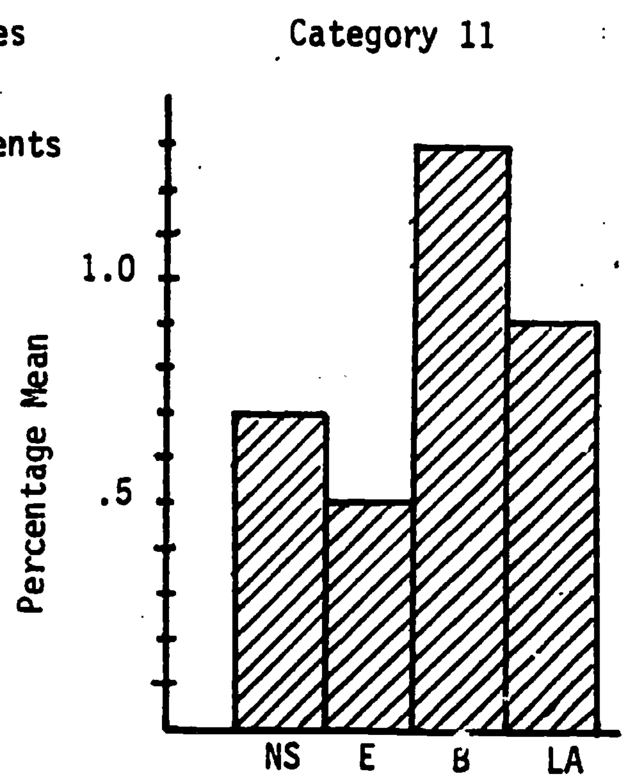
(b)

Category 1 - Accepting student attitudes

Category 2 - Positive reinforcement; affective instructor comments

Category 11 - Teacher use of humor

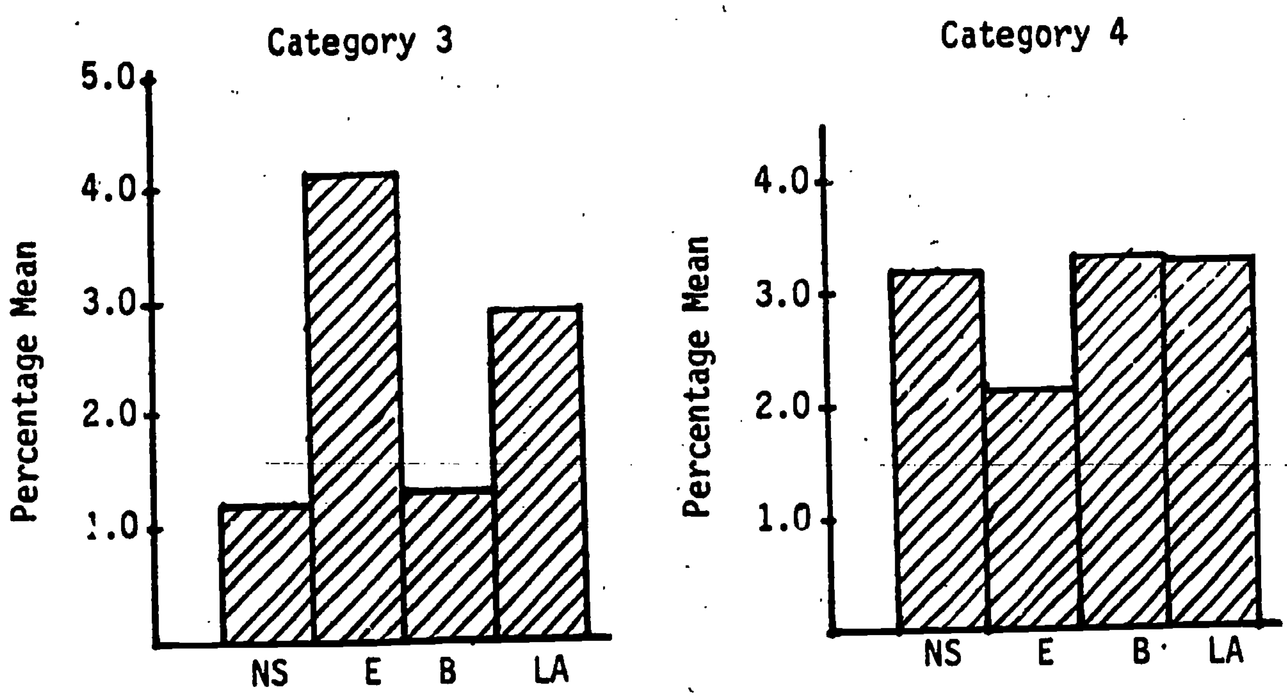
NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts



(c)

Figure 5.3 (d & e)

Mean percentages for each CIAS category by college



(d) (e)

Category 3 - Repeating a student's response; providing corrective feedback; building on a student's response

Category 4 - Questions asked by instructor

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

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Category 4 (Questions asked by instructor) is used with about the same frequency by all of the instructors who were observed (Figure 5.3(e)). The instructors in Engineering seem to ask fewer questions, but this may not be a very valid statement because the sample from this college is quite small. When the observers coded a Category 4, they also determined the specific type of question which was being asked. The subcategories for Category 4 and the percentage of each type question which was used in each college are given in Table 5.27. As indicated by the asterisks (*), the most frequently asked questions are those which deal with process/structure (4s) - i.e., "Do you need more time?" "Does everyone have a copy of the handout?" - or those which are rhetorical (4r). The instructors in the Natural Sciences and Engineering focused more on knowledge/comprehension (4c) level questions while those in Liberal Arts asked more higher level (4a - Analysis, 4y - Synthesis, 4j - Evaluation/Judgment) and probing (4p) questions. Students are called on individually to respond (4d) most frequently by the instructors in the College of Business. One somewhat surprising result is that the instructors in Business asked affective questions (4f) more frequently than the others. (Several examples of an affective question would be: "Do you like this example?" or "How do you feel about large classes?"). Overall, as we had hypothesized, most of the questions dealing directly with the content only required the students to respond at the knowledge/comprehension level.

The mean percentages for Category 8 are graphed next in Figure 5.3(f) so the student response rate can be compared with the questioning rate. Though the instructors all ask approximately the same number of

TABLE 5.27

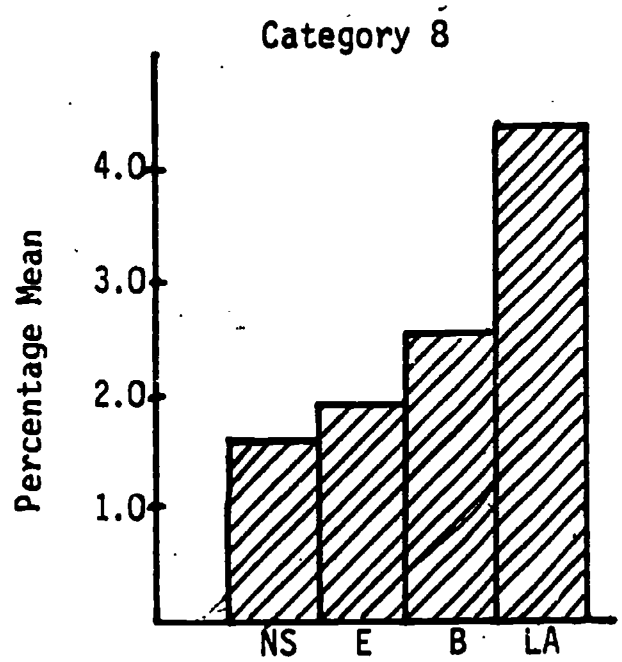
Percentage of Types of Questions Asked During Class by College

Question Code	NS	E	B	LA	AVG
4c	21.7	16.6	6.2	10.8	13.8
4e	8.3	2.6	2.8	2.8	4.1
4a	2.0	1.5	3.7	12.2	4.9
4y	0.0	0.0	0.0	1.1	0.3
4j	0.0	0.1	0.0	1.7	0.5
4f	0.0	0.0	2.6	0.9	0.7
4s	26.9	32.9*	28.4*	13.1	25.3
4r	37.9*	31.0	22.0	32.5*	30.9
4p	2.9	14.7	15.5	16.1	12.3
4d	0.4	0.7	18.8	8.3	7.1

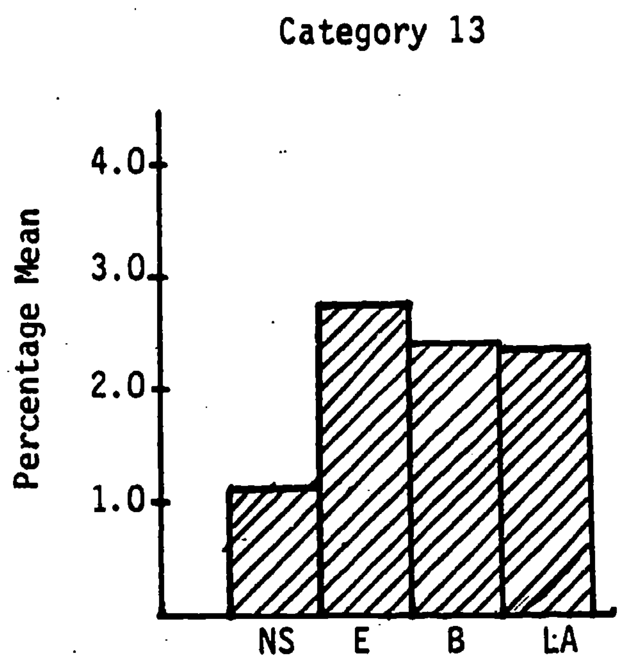
Underlined #s indicate highest percentage for that Category.
*Highest percentage for that College.
Question codes:
- 4c - Knowledge/Comprehension
- 4e - Application
- 4a - Analysis
- 4y - Synthesis
- 4j - Evaluation/Judgment
- 4f - Affective
- 4s - Process/Structure
- 4r - Rhetorical
- 4p - Probing
- 4d - Calling on student

Figure 5.3 (f & g)

Mean percentages for each CIAS category by college



(f)



(g)

Category 8 - Cognitive student talk   Category 13 - Student question

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

questions, the students in Liberal Arts seem to be given more opportunity to respond and/or to respond at length. This phenomenon can be explained by the data we saw in Table 5.27 which shows that the instructors in Liberal Arts asked more questions which required higher level thought processes (4a, 4y, 4j).

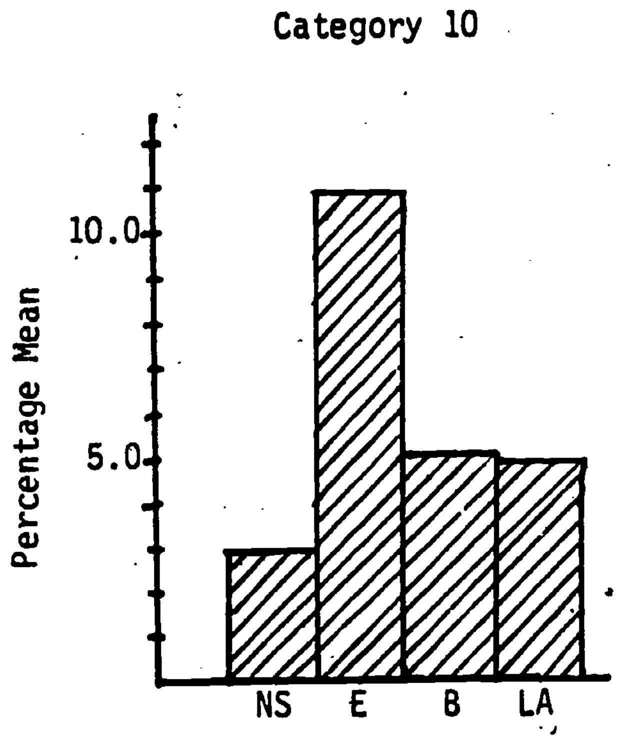
Student questions (Category 13) are graphed next in Figure 5.3(g). We see here that though the instructors in Engineering asked fewer questions than did those in the other colleges, they allowed students to ask questions more frequently. The students in the Natural Sciences either did not have many questions or were discouraged from asking them by their instructors.

Category 10 (Silence) percentages are shown next in Figure 5.3(h). The large amount of silence found in Engineering classes, when compared with the silence occurring in the other colleges, is accounted for by the fact that the Engineering instructors gave frequent, short in-class quizzes at the beginning of their classes while the others did not.

The instructors in the Natural Sciences write on the board/overhead without talking (Category 14) much more than the instructors in the other colleges (Figure 5.3(i)). The classes in the Natural Sciences which were observed consisted of two chemistry classes, one math class, one astronomy class, and one home economics class. Evidently, in these courses the instructors frequently present problems and/or formulas which

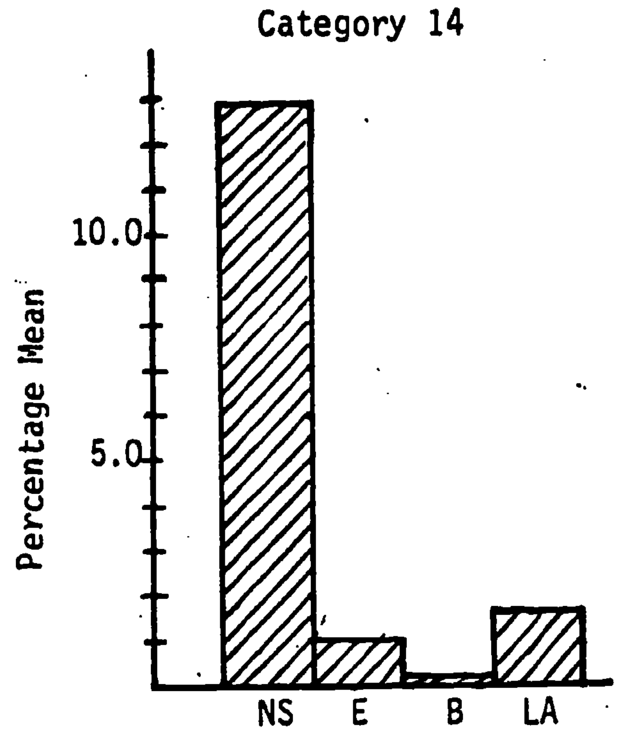
Figure 5.3 (h, i, j, & k)

Mean percentages for each CIAS category by college



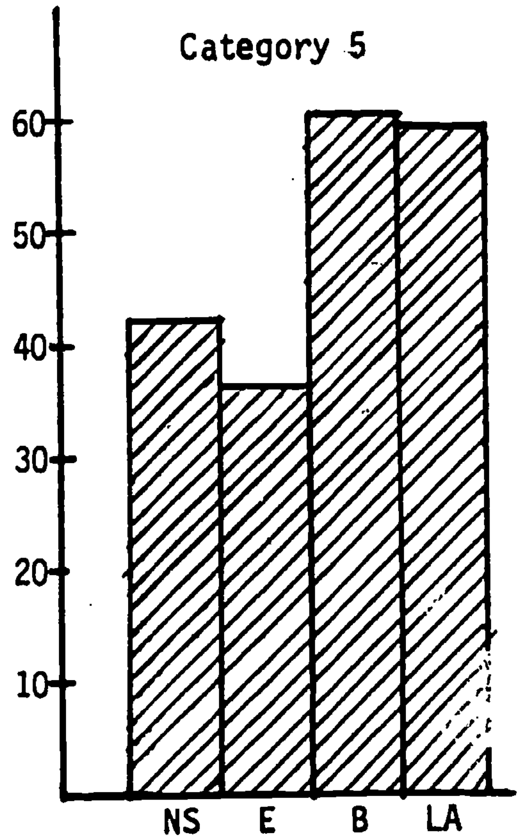
(h)

Category 10 - Silence; listening or watching



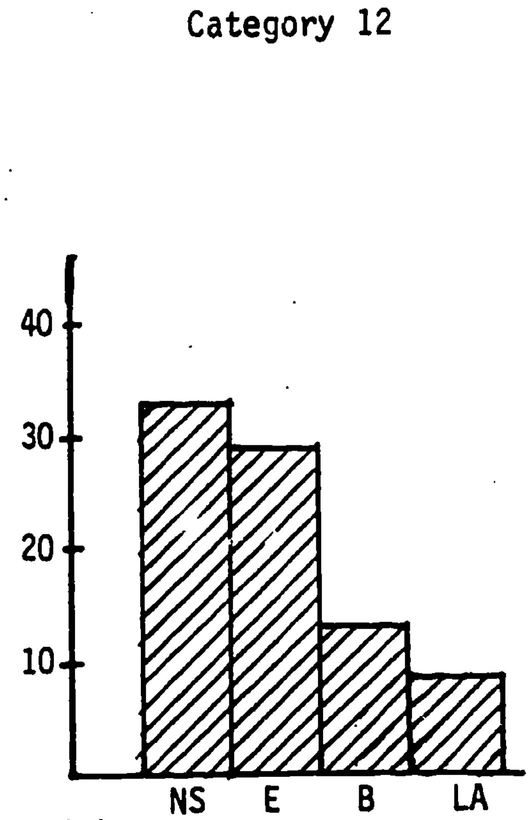
(i)

Category 14 - Writing on board without talking



(j)

Category 5 - Lecture



(k)

Category 12 - Simultaneous visual and verbal presentation

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

are written on the board/overhead for the students to copy into their notes.

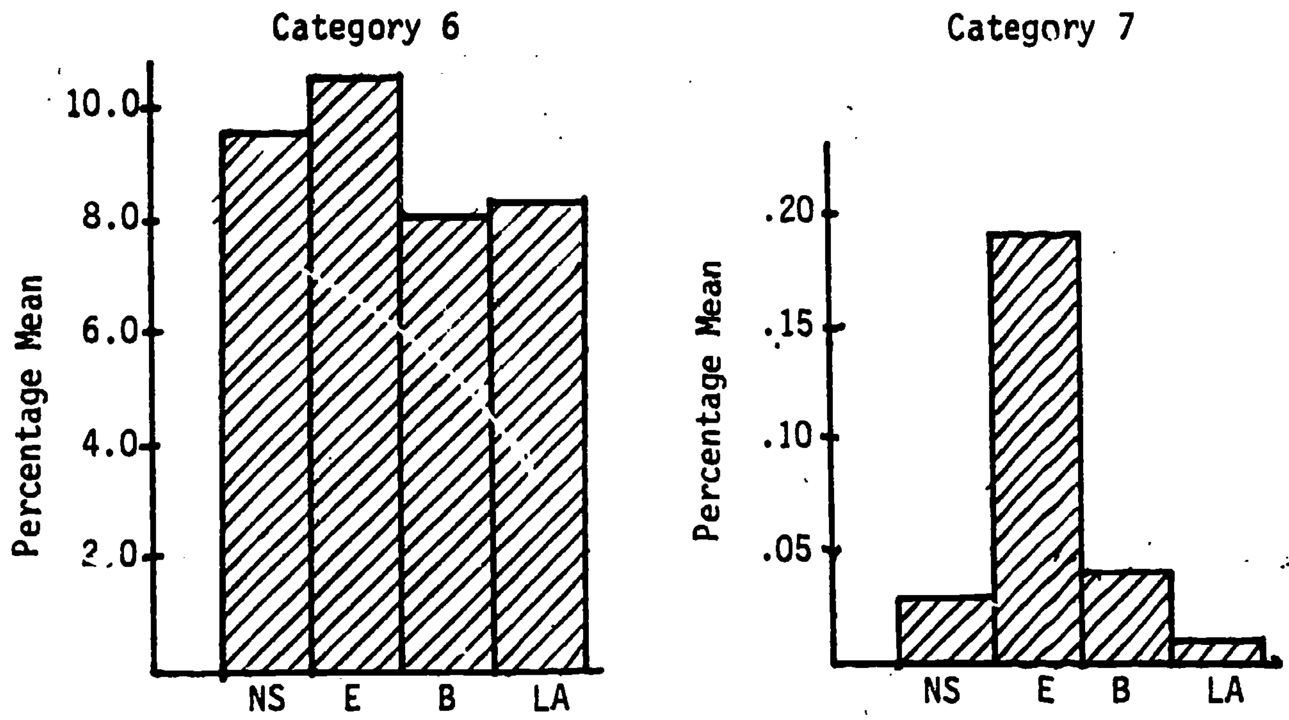
The reader should note that the scales on Category 5 (Lecture) and Category 12 (Lecture with visuals) are quite different from those for the previous categories (i.e., each segment represents a larger % change). (See Figures 5.3(j)(k).) The interactions represented by these two categories are the ones which appear to be used most often in large lecture courses. When mean percentages for these categories are compared by college we note that the instructors who lecture straight (i.e., without the aid of visuals) less (Category 5) tend to lecture with visuals more (Category 12). Thus, the total mean percentage of time spent lecturing for each college is as follows: NS - 75.51%, E - 65.28%, B - 73.47%, and LA - 68.51%.

Statements which are coded as Category 6 (Providing cues; focusing on main points; giving directions; assignments, process) were used with relative frequency by all of the instructors; though, those in Engineering and Natural Science used them more frequently than did the instructors in Business and Liberal Arts (Figure 5.3(l)). Statements which are coded into this category provide assistance to the students in their note-taking by pointing out important points and providing cues to new words or concepts.

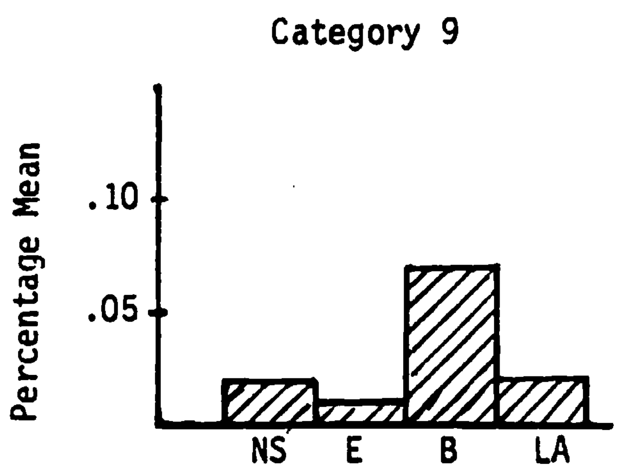
Though statements of criticism (Category 7) were used very infrequently (Figure 5.3(m)), the instructors in Engineering used them quite a bit more than the others. (Again, however, these results must be

Figure 5.3 (l, m, & n)

Mean Percentages for each CIAS category by college



(l) (m)



(n)

Category 6 - Providing cues; focusing on main points; giving directions, assignments, process

Category 7 - Criticism

Category 9 - Non-cognitive student talk

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

looked at with the small sample size for Engineering in mind. This may not be representative of the College as a whole.)

Finally, non-cognitive student talk (Category 9), occurred very infrequently. As is indicated in Figure 5.3(n) however, the students in Business engage in this type of talk more frequently than do the students in the other colleges. In comparing the graphs for Category 7 and Category 9, there seems to be little relationship between the amount of criticism used by an instructor and the amount of non-cognitive student talk recorded. The College of Engineering shows the least non-cognitive student talk and the most criticism while the College of Business shows the most non-cognitive student talk and the second-highest amount of criticism.

By instructor. The mean percentages for each CIAS category by instructor are shown in Table 5.28. The highest mean percentage for each category is underlined. These mean percentages are also graphed in Figure 5.4(a-p).

The average percentages of teacher talk (Category 1-7, 11 and 12) per instructor are shown first in Figure 5.4(a). Here, though it appears that there is not a great deal of difference among the instructors in the amount of time they spend talking, the range for their average percentages is from 79.3% for Instructor #13 to 98.0% for Instructor #20. In a 50-minute class this 18.7% difference would amount to 9.4 minute while in an 80-minute class it would be 15 minutes.

Table 5.28

Mean Percentages for CIAS Categories by Instructor

Instructor Code	NS					E		B					LA						
	11	12	15	18	19	13	29	14	17	21	22	26	16	20	23	24	25	27	28
Length of Class (min.)	50	80	50	50	50	80	50	80	80	80	80	50	80	50	80	50	50	80	80
Avg. % TT	96.1	95.4	85.1	96.9	91.3	79.3*	89.1	94.7	79.4	96.1	82.2	94.8	92.7	98.0	85.5	85.4	79.9	80.5	86.3
Avg. % ST	2.4	4.1	3.7	1.03*	2.1	5.1	3.5	5.0	9.2	2.1	5.7	4.4	3.2	1.3	11.6	5.5	10.4	7.7	8.5
# Students	140	200	130	300	300	140	250	120	140	200	350	110	130	300	120	200	220	90*	130
Categories																			
1	2.2	0.8	0.07	0.6	0.1	0.02*	0.2	1.0	0.1	1.9	0.1	2.2	0.1	4.2	0.9	0.2	0.1	0.1	0.1
2	2.5	1.4	0.9	0.3*	0.5	0.6	0.9	0.3*	3.0	1.8	1.1	0.8	1.1	0.4	0.7	1.5	0.9	0.9	2.4
3	1.4	2.4	0.7	0.3	1.4	5.9	1.7	2.4	0.1*	1.4	0.3	2.2	2.6	0.4	6.6	4.0	3.3	2.5	0.5
4	1.2*	4.4	3.5	1.2*	5.3	2.7	1.3	2.9	2.4	6.7	2.3	1.9	5.5	1.5	5.6	2.1	4.3	1.9	2.6
5	67.3	52.9	20.2*	33.3	46.1	44.7	24.8	67.0	51.7	57.1	60.1	63.7	62.9	80.2	34.2	63.2	53.6	54.1	70.1
6	10.2	11.5	10.7	8.5	8.3	8.6	13.2	5.4*	8.6	9.0	7.6	9.6	8.1	9.5	7.0	9.5	8.9	9.4	5.6
7	0.02	0.0	0.04	0.07	0.01	0.3	0.0	0.0	0.1	0.01	0.12	0.0	0.0	0.04	0.03	0.0	0.0	0.0	0.0
8	1.2	2.8	2.1	0.05*	1.8	2.6	1.04	2.5	3.3	1.5	1.1	3.2	2.8	0.5	9.0	4.3	5.4	4.1	5.1
9	0.0	0.0	0.01	0.0	0.01	0.02	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.01	0.0
10	1.4	0.2	6.2	0.1*	4.8	15.1	5.1	0.3	11.3	1.8	12.1	0.7	2.0	0.6	0.7	8.3	8.3	7.5	4.7
11	0.1	0.9	0.8	0.08*	0.7	0.6	0.3	0.9	1.1	0.6	2.5	1.2	0.2	1.7	0.1	0.3	1.3	0.4	1.6
12	10.3	21.8	48.2	52.5	28.9	15.6	46.8	14.9	12.3	19.0	8.1	13.2	12.2	0.1*	29.5	4.7	2.1	11.3	3.5
13	1.3	1.2	1.3	1.0	1.4	3.0	2.5	2.6	3.6	0.6	4.5	1.2	0.4*	0.9	2.6	1.2	4.4	3.6	3.4
14	0.03	0.3	5.3	1.9	1.8	0.1	2.3	0.0*	0.2	0.05	0.04	0.0*	2.1	0.04	2.3	0.9	1.3	4.3	0.5

Underlined percentage means indicate highest percent for that category.
*Lowest percent for that category.

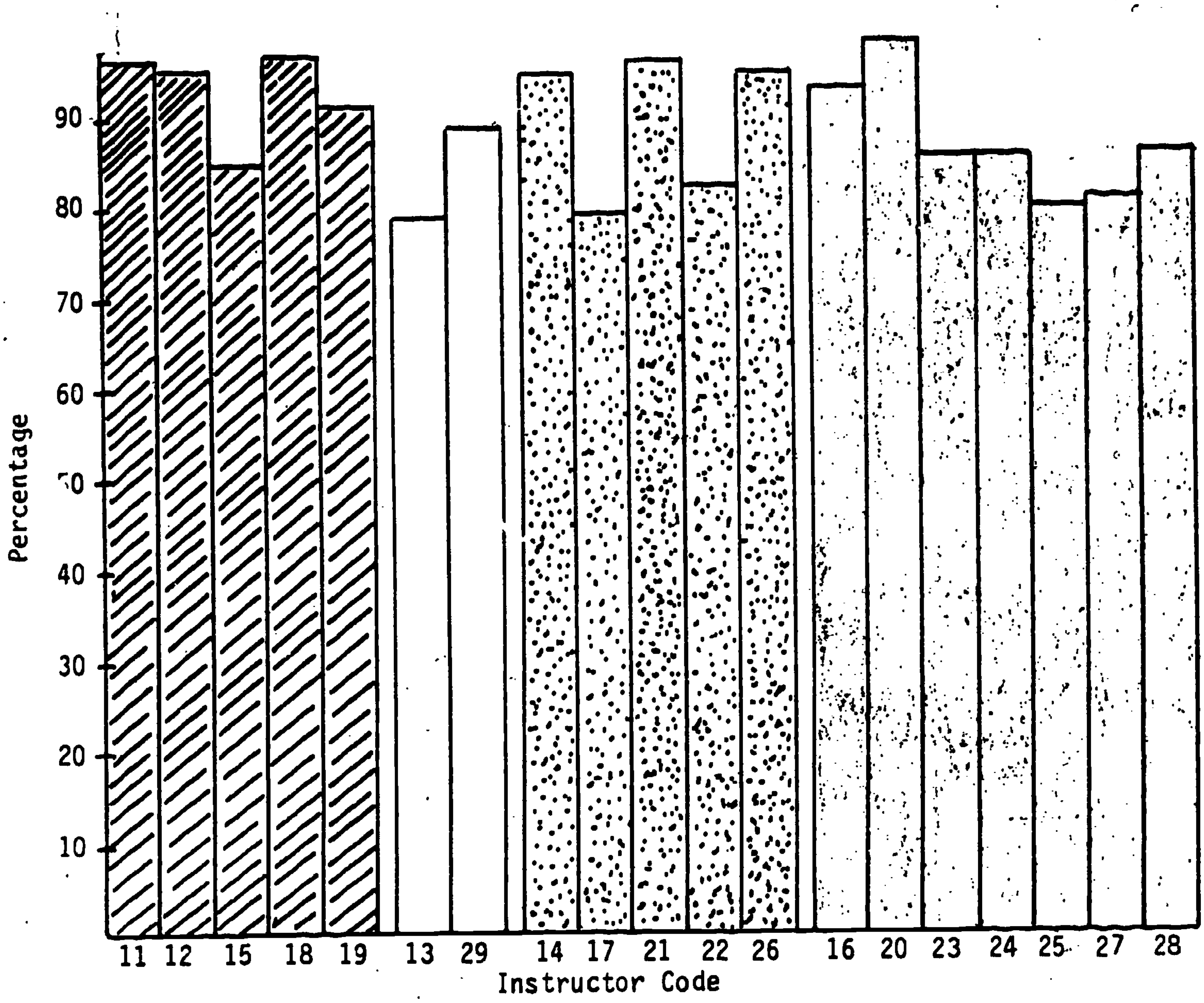


Figure 5.4(a). Average percentage of Teacher Talk per instructor.

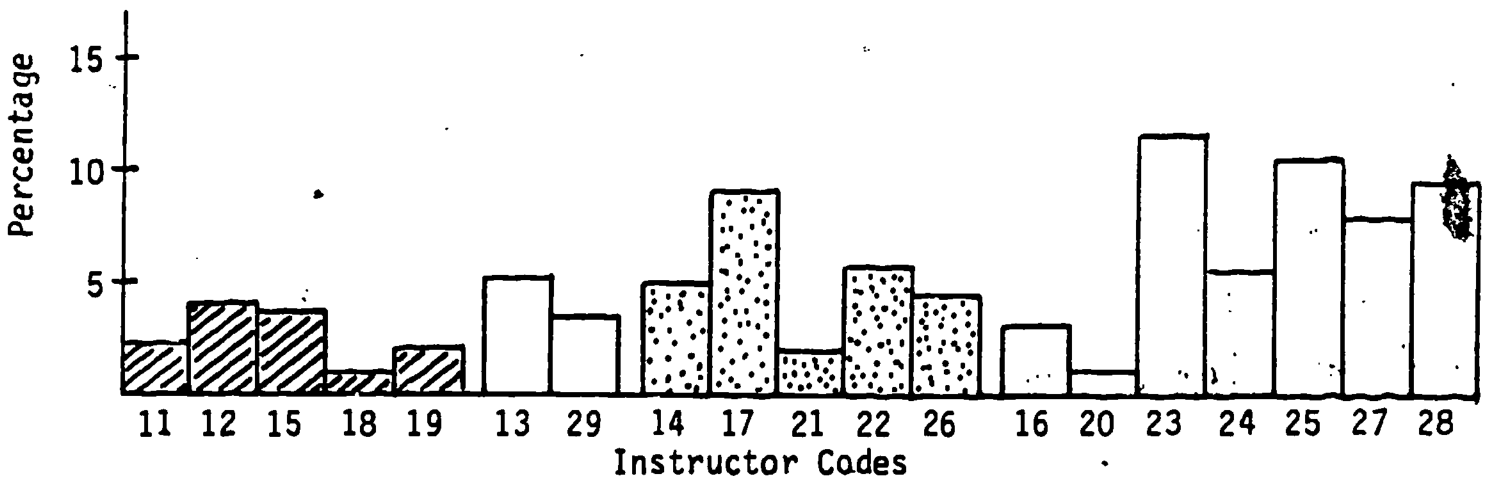


Figure 5.4(b). Average percentage of Student Talk per instructor.

Key
Natural Science Engineering Business Liberal Arts

The average percentages of student talk (Category 8 and 9) per instructor are graphed next (Figure 5.4(b)). This shows that the students in instructor #23's class participated an average of 11.6% of the time (Since this class met on Tuesday/Thursday, that means the students spent an average of 9.3 minutes verbally participating.) It is interesting to note (though not unreasonable to expect) that as the average class size decreases, the amount of student participation increases:

	NS	E	B	LA
Avg. Class Size	214	195	184	170
Avg. % Student Talk	2.7	4.3	5.3	6.9
Avg. # minutes in T/T class	2.2	3.4	4.2	5.5
Avg. # minutes in MWF class	1.4	2.2	2.7	3.5

This indicates that the goal of having a great deal of verbal student participation may not be readily attainable (or desirable?) in large classes.

The percentage means for each instructor on Category 1 (Accepting student attitudes) are given in Figure 5.4(c). Instructor #20 uses statements which are coded in this category more frequently (4.2%) than do the other instructors. Perhaps this indicates that it is difficult to make statements of this type when one does not know the students very well. It would be informative to compare the percentage of use of Category 1 statements in smaller classes to that observed in this study.

Each instructor's use of Category 2 (Positive reinforcement; affective instructor comments) is graphed in Figure 5.4(d). Instructors

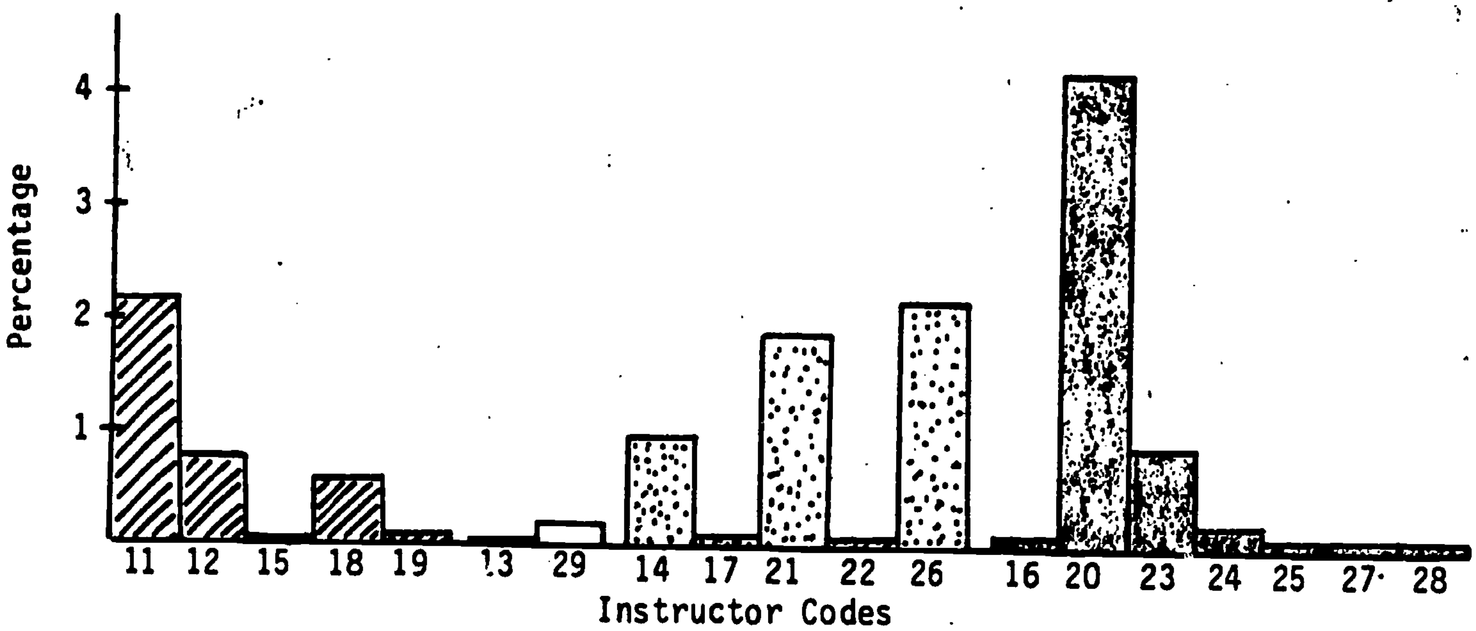


Figure 5.4(c). Percentage means for Category 1 (Accepting student attitudes) by instructor.

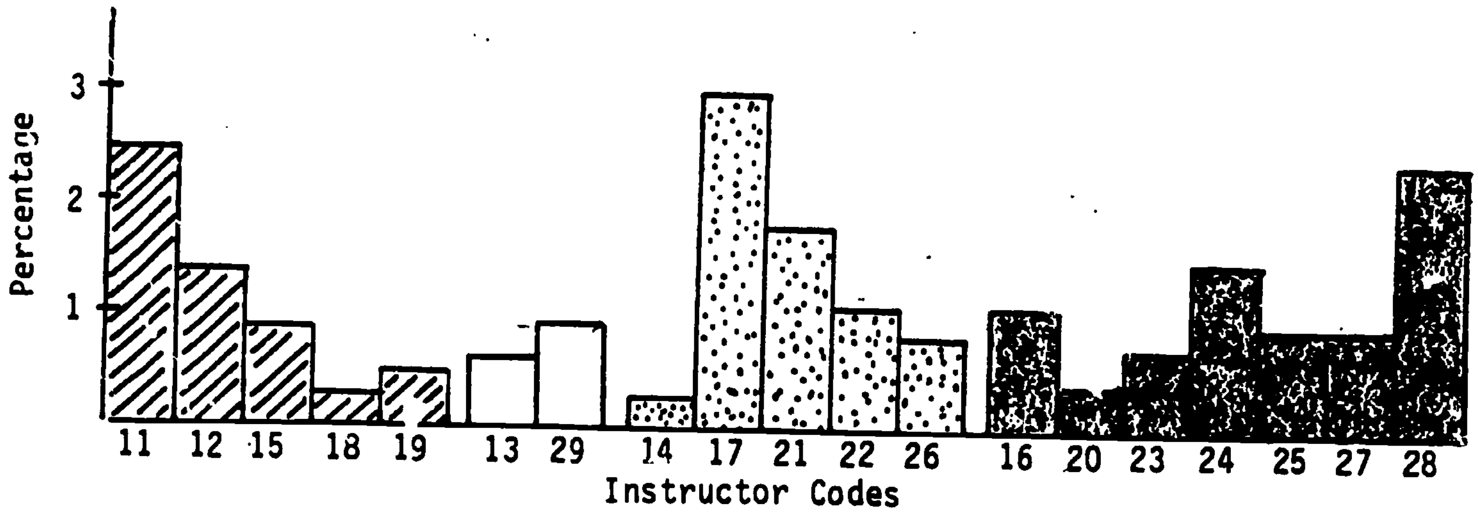


Figure 5.4(d). Percentage means for Category 2 (Positive reinforcement; affective instructor comments) by instructor.

Key

Natural Science Engineering Business Liberal Arts

#11, #17, and #28 use statements of this nature more frequently than do the other instructors. Even so, these instructors only use positive reinforcement 2.5%, 3.0%, and 2.4% of the time respectively. Of course, there usually must be student participation before an instructor can use reinforcing statements. And, since there is little student participation in these large classes, there are few opportunities to use direct reinforcement.

The mean percentages for Category 3 (Repeating a student response; providing corrective feedback; building on a student response) are graphed in Figure 5.4(e). Instructors #13 and #23 use statements of this nature quite frequently while instructor #17 uses them very rarely. For the most part, the statements which occur most often under this category consist of "instructor reptition of a student's response". Statements which provide corrective feedback and build on a student's response are not heard frequently in large classes.

The mean percentages for each instructor for Category 11 (Use of humor) are presented next (Figure 5.4(f)). As can be seen, humor is not used frequently in large classes. Even instructor #22, who uses humorous statements most frequently, only spends about 2.5% of the time making humorous statements. (This equals approximately two minutes each class period in a Tues./Thurs. class.)

A graph of the mean percentages for Category 4 (Questions asked by the instructor) is presented next in Figure 5.4(g). Here we see that Instructor #21 asked questions more freqently (6.7%) than the other

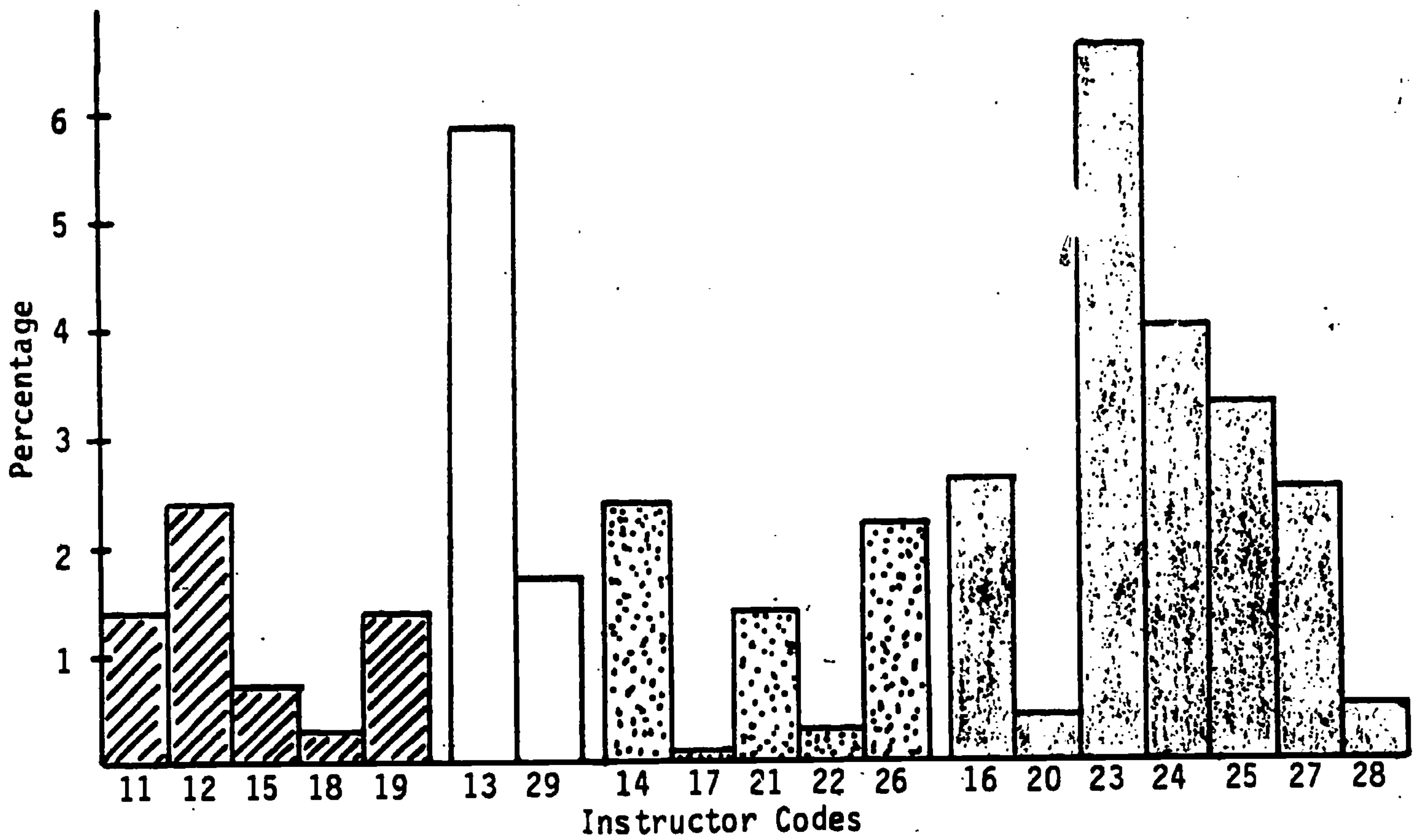


Figure 5.4(e). Percentage means for Category 3 (Repeating a student response; providing corrective feedback; building on a student response) by instructor.

Key

Natural Science Engineering Business Liberal Arts

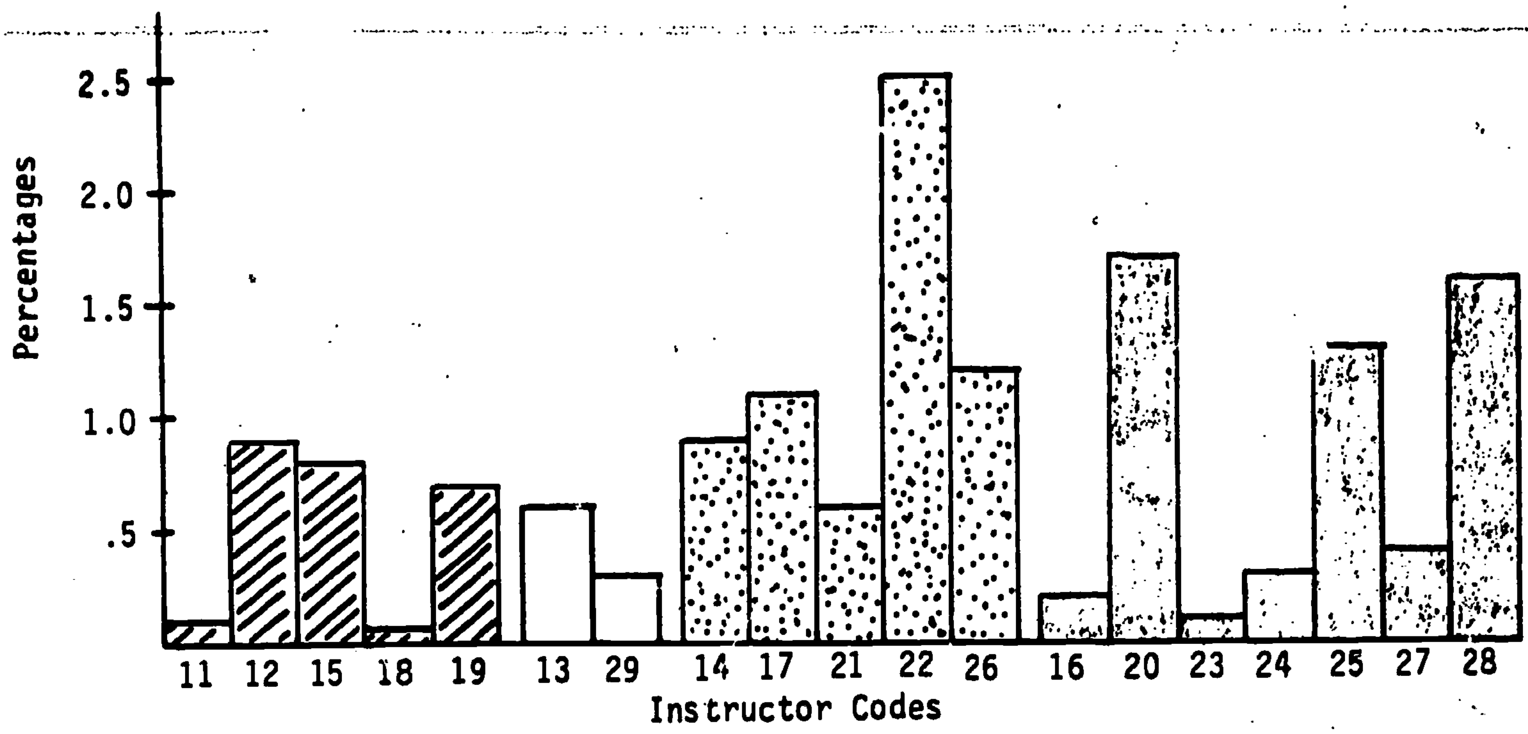


Figure 5.4(f). Percentage means for Category 11 (Use of humor) by instructor.

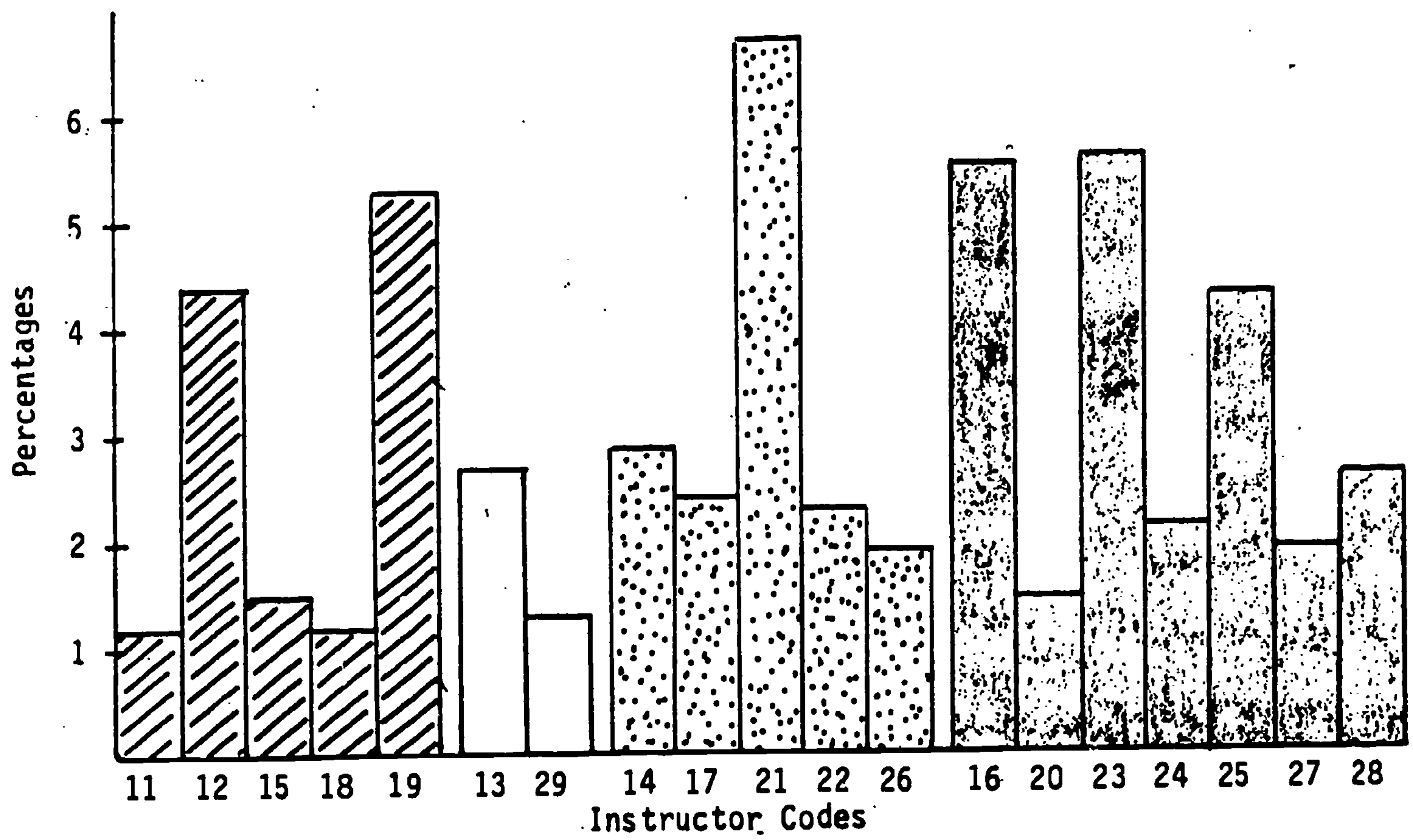


Figure 5.4(g). Percentage means for Category 4 (Questions asked by the instructor) by instructor.

Key Natural Science Engineering Business Liberal Arts instructors. This averages approximately 5.4 minutes per class period spent asking questions (in a Tues./Thurs. class).

If the mean percentage for Instructor #21 for Category 4 is compared with that of Category 8 (Cognitive student response - Figure 5.4(h)), one can assume that most of the questions which were asked were of a rhetorical nature. This assumption can be made because though a number of questions were asked, very little time was recorded (1.5%) as being spent in student responses. On the other hand, Instructor #23 spent an average of 5.6% (or 4.5 minutes) of the time asking questions and student responses encompassed an average of 9.0% (or 7.2 minutes) of the time. This indicates that some of the questions which were being asked required higher level thinking and, consequently, longer student responses. We can also note from Figure 5.4(h) that most of the instructors in Liberal Arts allowed relatively more frequent student participation than did the instructors in the other colleges.

Category 13 (Student questions) provides us with additional information concerning the participation level of the students. Figure 5.4(i) shows the mean percentages for this category. Here we find that Instructors #22 and #25 allow student questions more frequently (4.5% and 4.4% respectively) than do the other instructors, while Instructors #21 and #16 allow student questions least frequently (0.6% and 0.4% respectively). The level of student questions was relatively equal in all of the classes in Natural Science while there was quite a bit of variation in the classes in Business and Liberal Arts. This may indicate

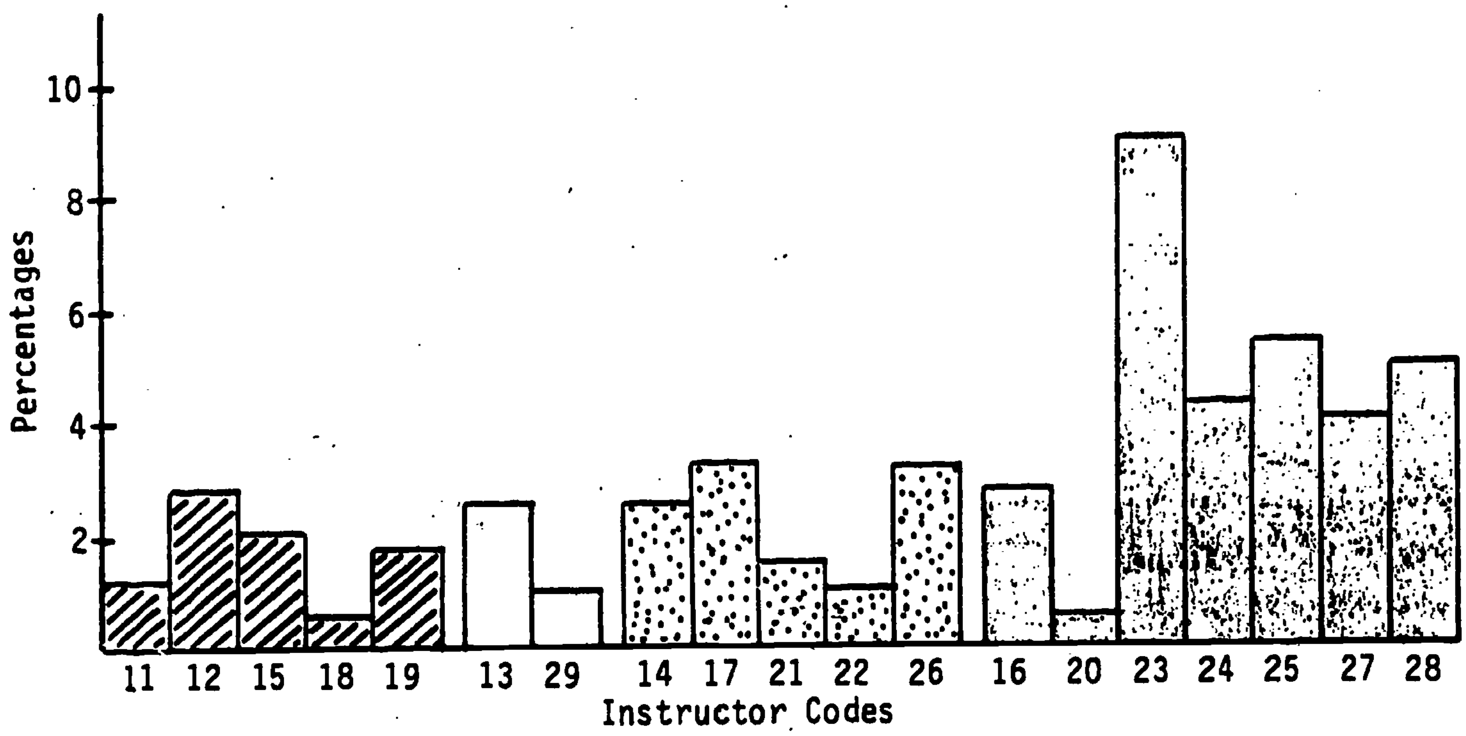


Figure 5.4(h). Percentage means for <u>Category 8</u> (Cognitive student response) by instructor.

<u>Key</u>
Natural Science Engineering Business Liberal Arts

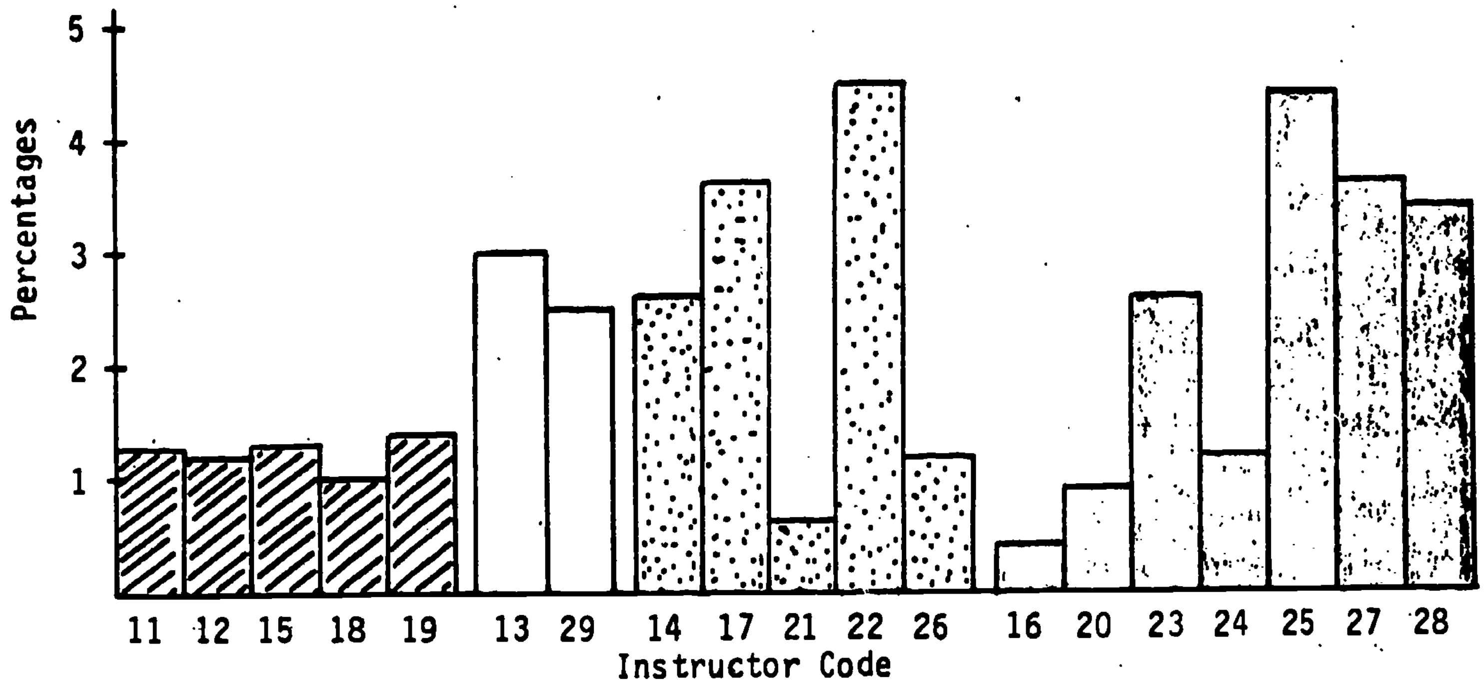


Figure 5.4(i). Percentage means for Category 13 (Student questions) by instructor.

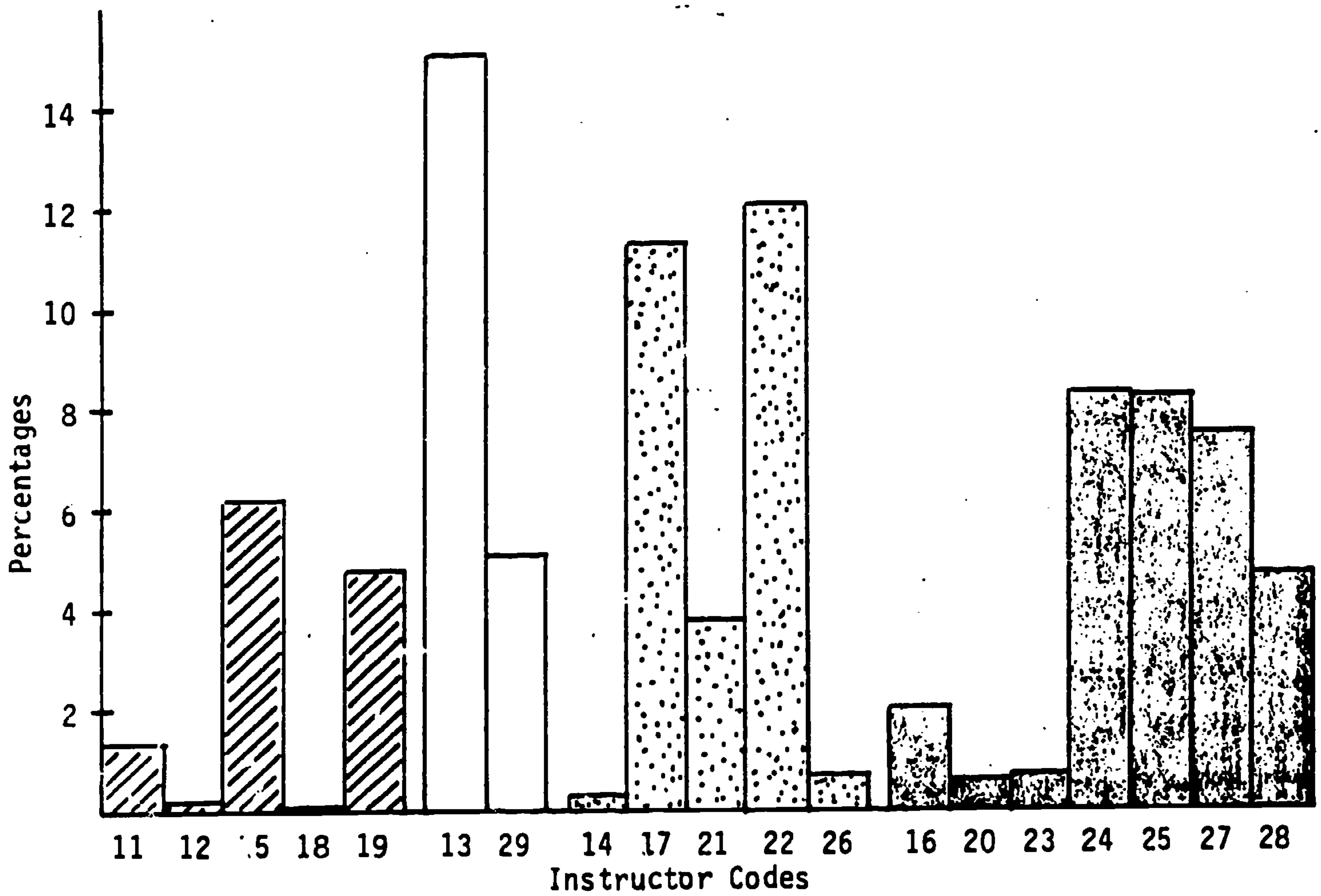


Figure 5.4(j). Percentage means for Category 10 (Silence) by instructor.

Key: Natural Science, Engineering, Business, Liberal Arts

the use of very similar teaching styles by the instructors in Natural Science.

Figure 5.4(j) shows the mean percentages for Category 10 (Silence). Instructor #13 gave frequent in-class quizzes which probably accounts for the relatively high amount of silence (15.1% or about 12 min.) found in this class. On the other hand, there was virtually no silence (0.1% or about .5 min.) in Instructor #18's classroom. Often the only time complete silence occurs in large university classrooms is when the students are working on a quiz or problem at their seats or after the instructor has asked a question and is giving them time to develop a good answer before calling on someone to respond. Otherwise, silence occurs fairly infrequently.

Another category of silence which was added to the basic 10 categories consists of time when the instructor is writing information on the board or overhead transparency but is not talking at the same time. This activity is represented by Category 14 (Figure 5.4(k)). The phenomenon of writing on an overhead or blackboard without talking seems to be foreign to the instructors in Business. Many of them use slides as information disseminators rather than overhead transparencies or the blackboard so this category would not be a useful descriptor of their teaching techniques. We can see that Instructor #15 spends more time in this teaching mode (5.3% or about 2.7 min.) than do the other instructors. Overall, however, this method is not used very frequently in the large classes observed in this study.

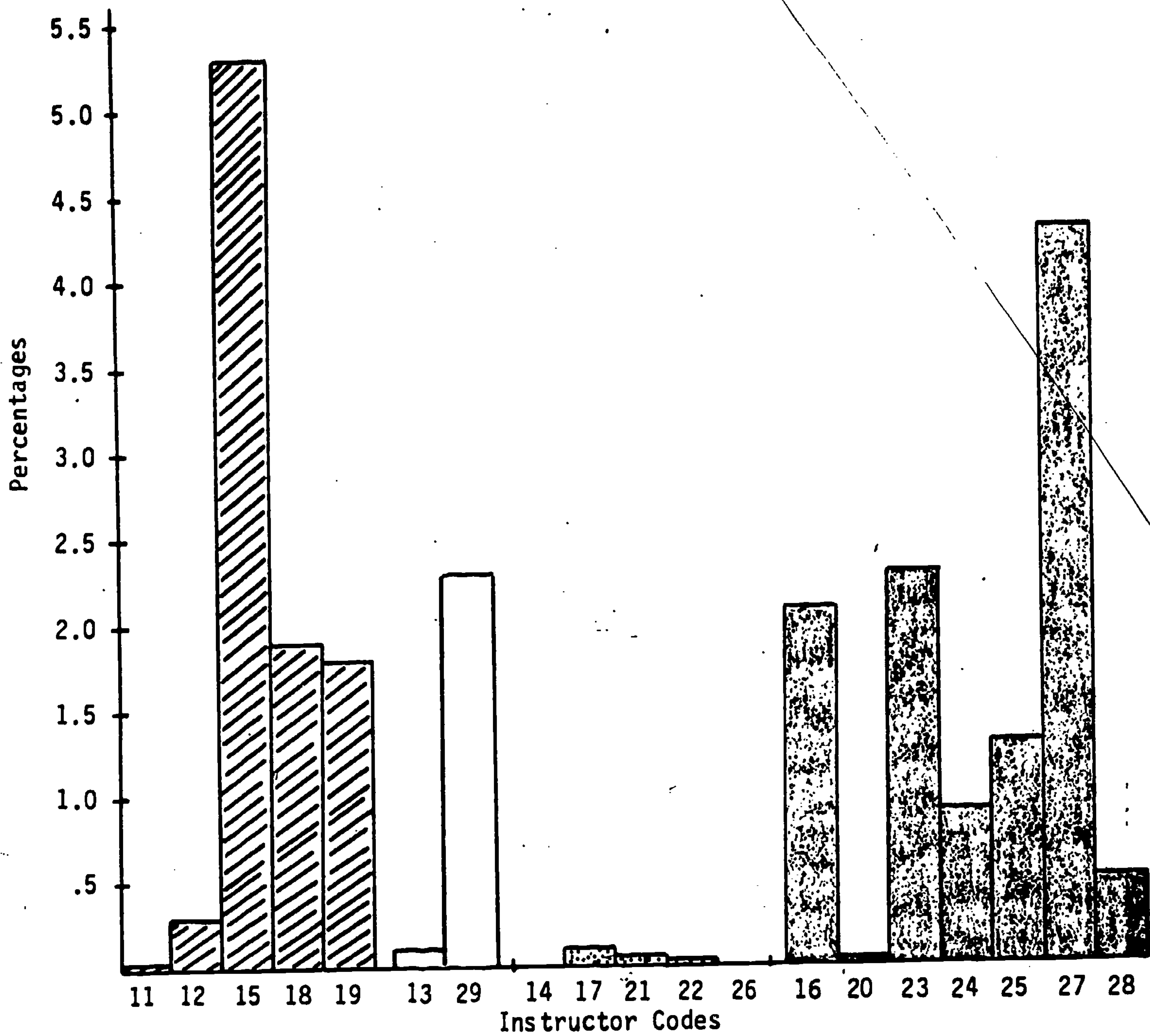


Figure 5.4(k). Percentage means for Category 14 (Writing on board or transparency without talking) by instructor.

Key
Natural Science Engineering Business Liberal Arts

The most frequently used verbal activity in large classes is represented by Category 5 (Lecture). As we can see in Figure 5.4(1) the amount of time spent in just giving out information varies from a low of 20.2% or 10 min. in Instructor #15's class to a high of 80.2% or 40 min. in Instructor #20's class. (These are both MWF classes of 50 min. each.) On the average, however, these instructors spent from 40% to 60% of the class time lecturing; that is 20-30 minutes in a MWF class and 32-48 minutes in a TTh class.

Category 12 (Lecturing with visuals) is also information dissemination, but the instructor focuses the students' attention on a visual while continuing to lecture (see Figure 5.4(m)). If we look at the mean percentage for Instructor #15 in this category (52.5% or 26 min.), we can readily see why the mean percentage in this class for Category #5 was quite low. If we add these two means together we find that Instructor #15 lectured with and without visuals a total of 72.7% or 36.4 minutes. On the other hand, Instructor #20's percentage mean for Category 12 is only 0.1% but when this is added to his mean percentage for Category 5 (80.2%) we find that this instructor lectured an average of 80.3% of the time or 40.2 minutes.

The verbal statements represented by Category 6 (Providing cues; focusing on main points; giving directions, assignments, process) provide the students with guidelines for their note-taking and assessment of the relevancy of what is being said by the instructor. Yet, in many of the classes which were observed for this study statements such as these are

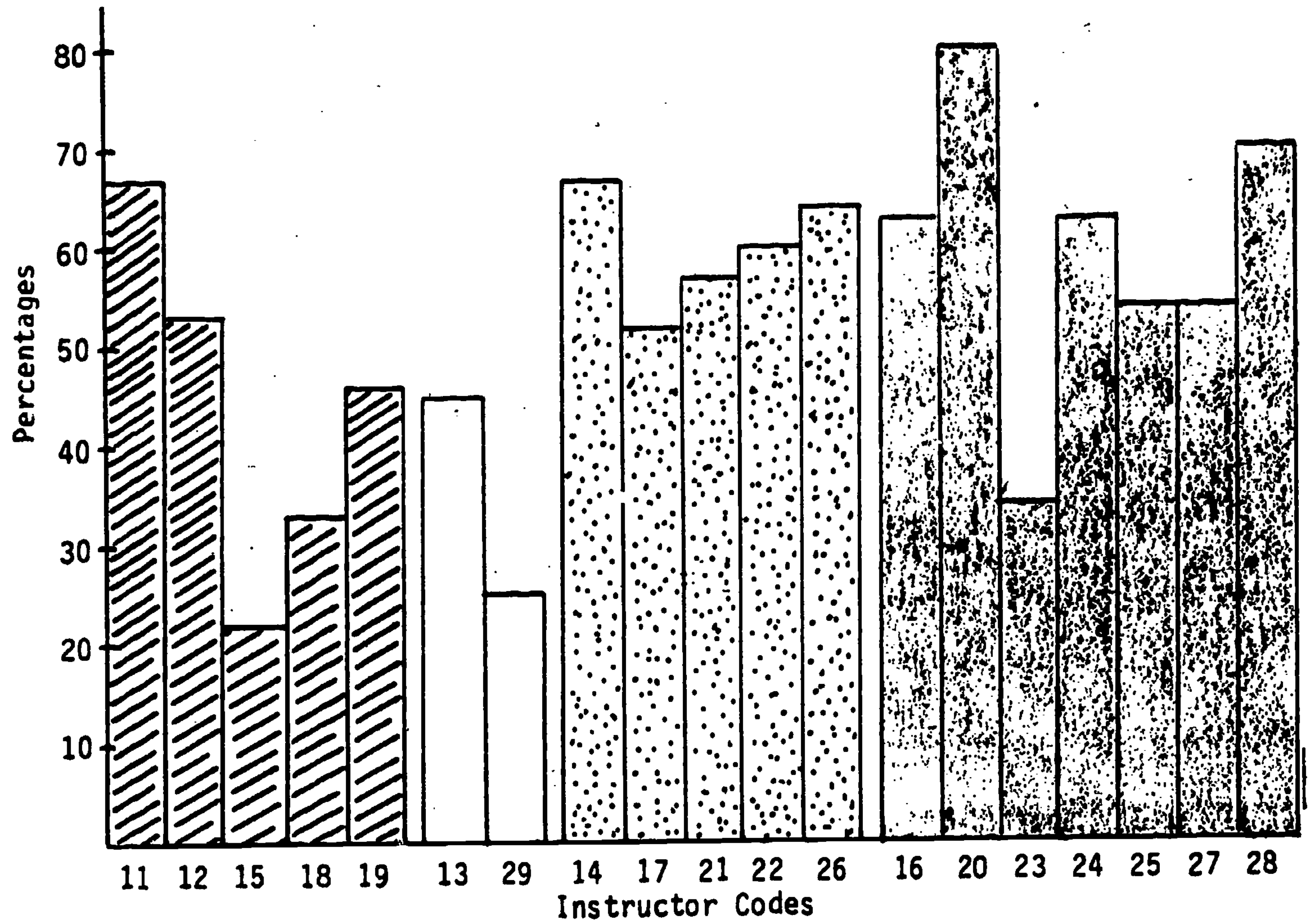


Figure 5.4(1). Percentage means for Category 5 (Lecture) by instructor.

Key

Natural Science Engineering Business Liberal Arts

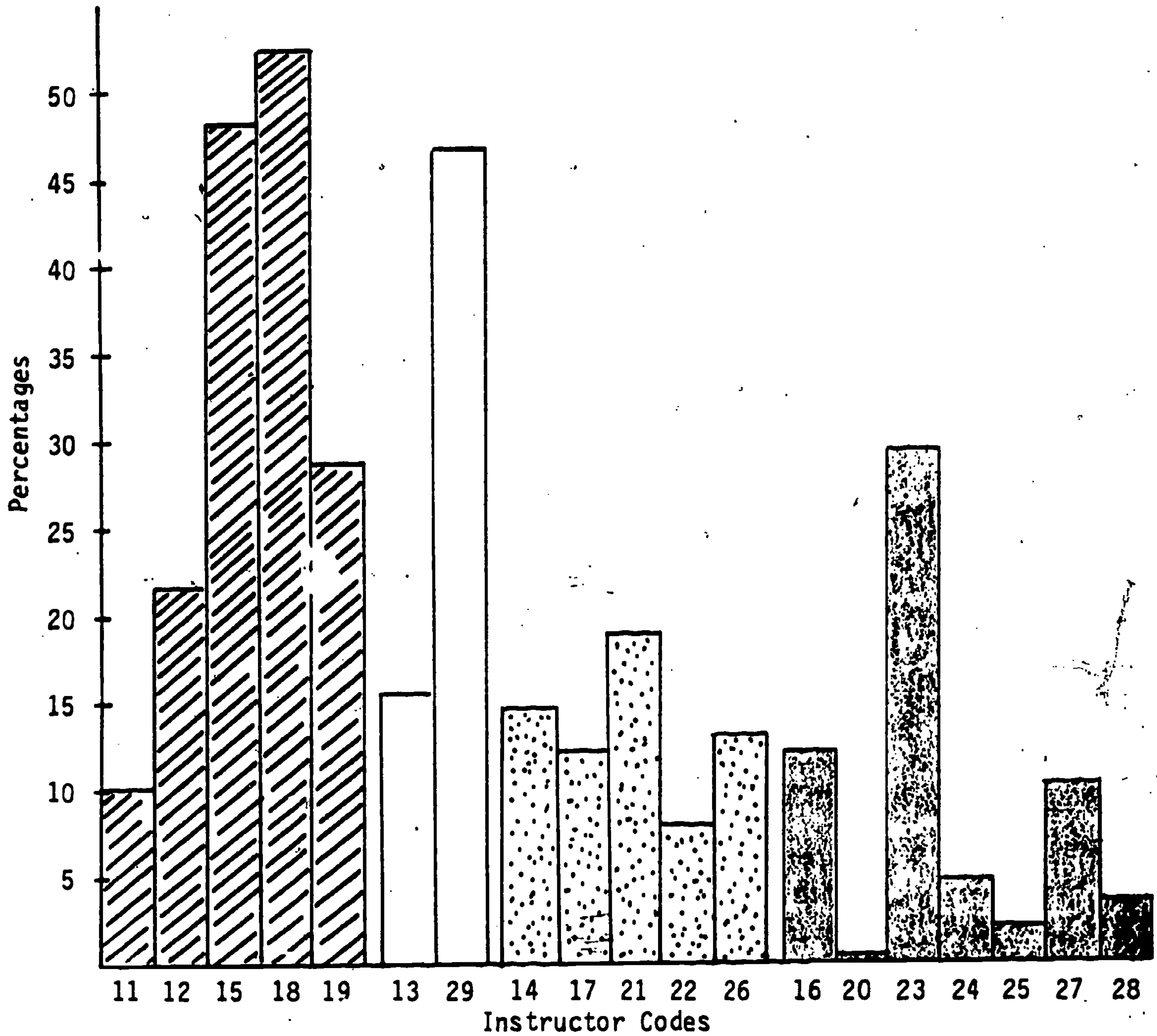


Figure 5.4(m). Percentage means for Category 12 (Lecturing with visuals) by instructor.

Key

Natural Science Engineering Business Liberal Arts

not used very frequently (see Figure 5.4(n)). The average use of these statements ranges from a low of 5.4% of the time or 4.3 minutes in Instructor #14's class to a high of 13.2% of the time or 6.6 minutes in Instructor #29's class. It is interesting to note that more of the instructors in Natural Science and Engineering use these types of statements than do those in Business or Liberal Arts. Perhaps this is due to the technical nature of the subjects taught in the two former colleges, which require more cues and directions for student acquisition of the material.

In looking at Figure 5.4(o) we see that Criticism (Category 7) is used very infrequently in large university classes. Even though it appears that Instructor #13 uses criticism frequently, the actual mean percentage of time spent criticizing is only 0.3% or about .2 minutes. It is frequently assumed that the larger the class the more the instructor has to discipline. However, the data gathered in this study show no relationship between the class size and the amount of criticism used by the instructor. For example, Instructor #13 uses the most criticism but this class only had 140 students. On the other hand, Instructor #22 had the largest class (350 students) but used criticism 0.12% of the time or about .1 minute per class session. There seems to be more of a tendency for instructors in Natural Science to use criticism in their classes than for those in Liberal Arts. This may be because instructors who are in the sciences are typically more authoritarian than those who are in Liberal Arts or it may be due to the different types of course content which are being presented. Of course, these are only speculations and cannot be "proven" without additional study.

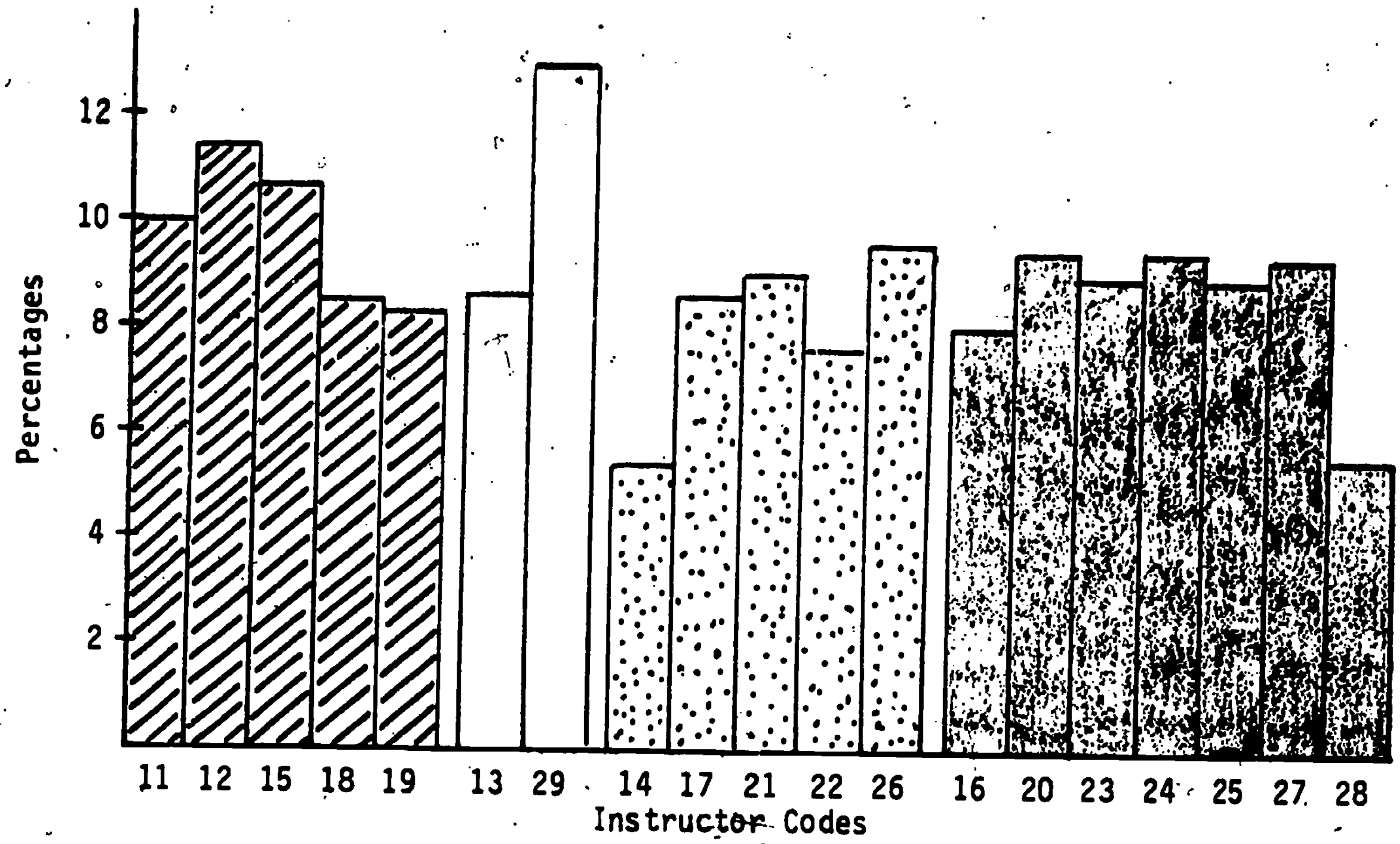


Figure 5.4(n). Percentage means for Category 6 (Providing cues; focusing on main points; giving directions; assignments, process) by instructor.

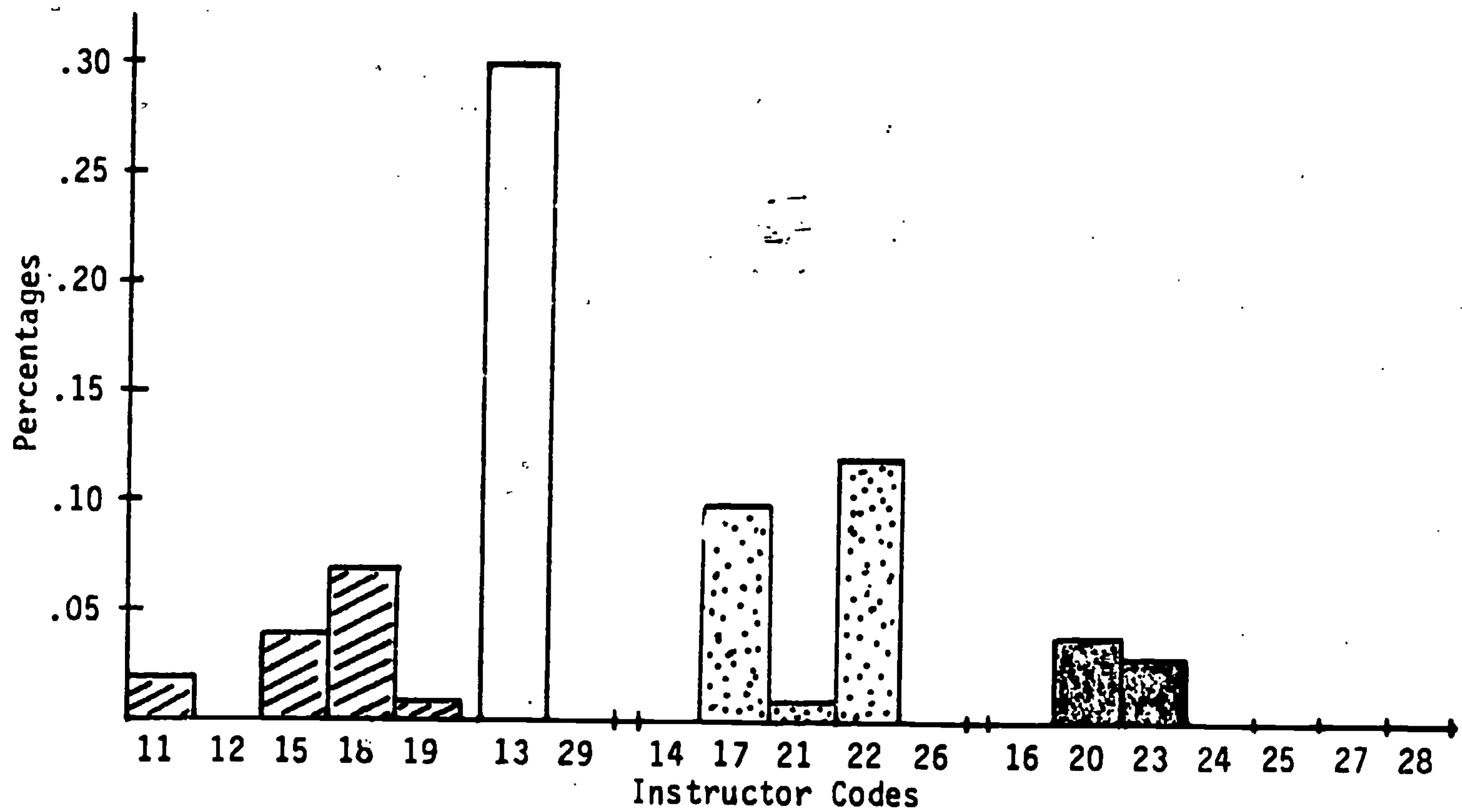


Figure 5.4(o). Percentage means for Category 7 (Criticism) by instructor.

Key: Natural Science, Engineering, Business, Liberal Arts

The final category which is graphed in Figure 5.4(p) is Category 9 (Non-cognitive student talk). Statements which are coded into this category consist of statements made by students which have nothing to do with the content (e.g., "Can we have a break?", "What time is it?", "Do we have to hear this again?"). As one would expect, there is really very little non-cognitive student talk which occurs in university classes; even in the large ones. Figure 5.4(p) indicates that Instructors #17 and #22 have the most non-cognitive student talk occurring in their classes (0.2% or .16 minutes). This may be why they use more criticism (Fig. 4.4(o) - Category 7) than most of the other instructors. For most of the instructors, however, Category 9 is not recorded at all.

<u>By instructor - first half vs. last half of semester</u>. One of the goals of this study was to discover whether the verbal interactions of the instructors changed over time. To do this, we compared the CIAS category mean percentages from the first half of the semester with those of the last half. The mean percentages for this are presented in Table 5.29 and graphed in Figure 5.5(a-n).

As we can see in Figure 5.5(a) most of the instructors increased their use of Category 1 (Accepting Student attitudes) from the first half of the semester to the last half. Instructor #20 used statements of this nature more than twice as frequently during the last half of the semester (2.6% - 1st half; 5.6% - 2nd half). Overall, however, statements which are coded into this category seem to be used quite infrequently in large classes.

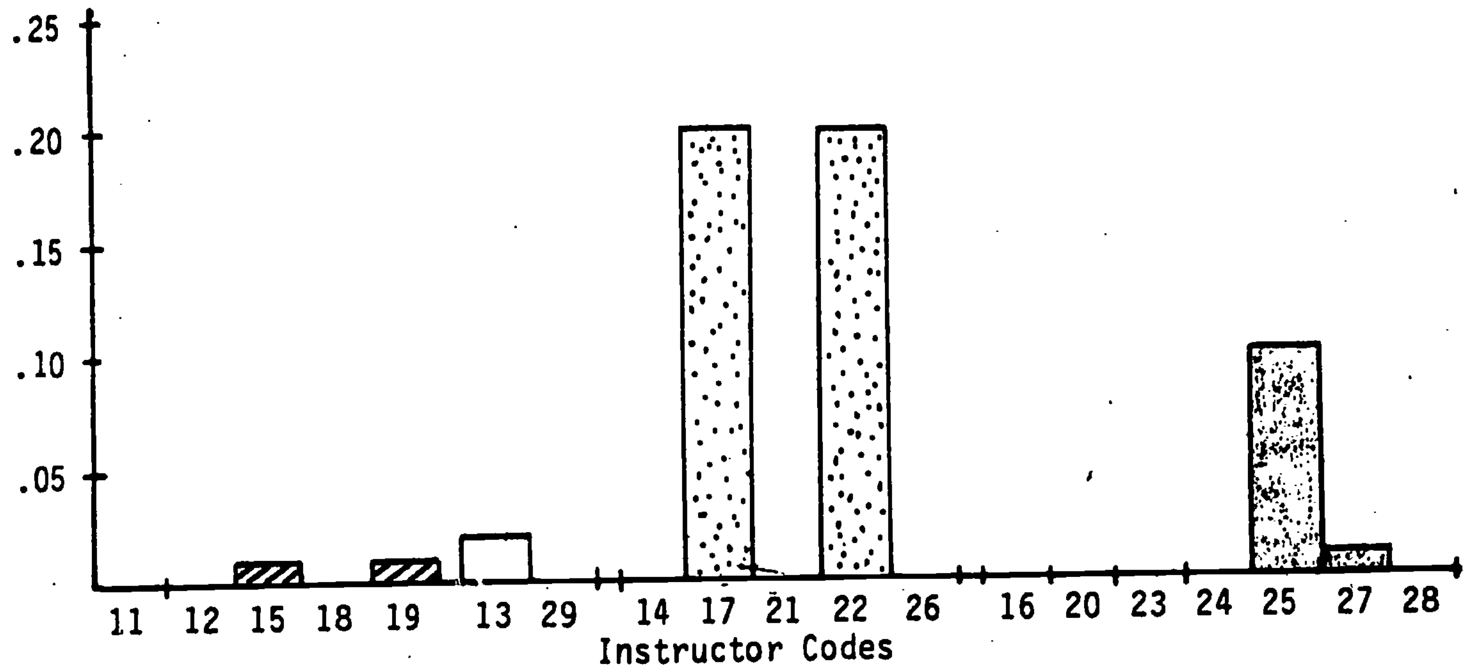


Figure 5.4(p). Percentage means for Category 9 (Non-cognitive student talk) by instructor.

Key: Natural Science, Engineering, Business, Liberal Arts

TABLE 5.29

Mean Percentages for CLAS Categories by Instructor
1st half of semester vs. 2nd half of semester

	NS										E			
	11		12		15		18		19		13		29	
Category	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1	2.6	1.8	.88	.75	.06	.08	.56	.62	0.0	.23	.02	.01	.20	.20
2	2.3	2.6	.88	.53	.44	1.14	.48	.14	.40	.55	.62	.51	.56	1.14
3	2.4	.52	2.9	1.8	.58	.81	.46	.22	2.3	.90	2.8	7.9	2.1	1.3
4	1.0	1.3	4.6	4.0	2.8	3.9	1.6	.78	6.2	4.7	3.8	2.0	1.2	1.4
5	62.8	71.7	50.1	56.5	20.0	20.3	30.4	36.2	53.3	41.6	47.1	43.2	24.1	25.5
6	13.4	7.1	12.2	10.6	10.6	10.7	11.6	5.4	7.1	9.0	7.3	9.5	14.1	12.2
7	.02	.02	0.0	0.0	0.0	0.06	.14	0.0	.02	0.0	.08	.49	0.0	0.0
8	1.5	.90	3.7	1.8	1.6	2.3	.10	0.0	2.2	1.6	3.2	2.2	1.3	.76
9	0.0	0.0	0.0	0.0	0.0	.11	0.0	0.0	0.0	.01	0.0	.04	0.0	0.0
10	0.0	2.8	.12	.38	5.0	6.9	.02	.24	4.8	4.8	13.2	16.3	4.6	5.7
11	1.4	.56	1.1	.58	.82	.82	.08	.08	.90	.61	.52	.73	.32	.28
12	11.4	7.1	22.0	21.6	51.8	46.2	51.8	53.3	21.4	33.6	18.9	13.6	46.7	46.9
13	.92	1.6	1.2	1.2	.88	1.5	1.5	.48	.14	.45	2.3	3.4	3.2	1.8
14	.06	0.0	.32	.25	5.4	5.2	1.3	2.5	1.4	2.0	.14	.09	1.7	2.8

Underlined values indicate a fairly significant change between the 1st half and the 2nd half of the semester in the mean values.

NS - Natural Science

E - Engineering

Table 5.29 (con't)

	B									
	14		17		21		22		26	
Category	a	b	a	b	a	b	a	b	a	b
1	1.1	.77	.04	.10	1.3	2.5	0.0	.24	2.4	2.1
2	.28	.27	3.3	2.5	.14	.30	.90	1.3	.76	.82
3	3.1	1.2	.20	0.0	1.9	1.0	.28	.36	2.5	1.9
4	3.3	2.2	1.8	3.8	6.2	7.3	2.1	2.5	1.9	1.9
5	62.3	74.7	52.4	50.1	57.1	57.1	67.5	52.7	60.0	67.4
6	6.8	3.0	8.1	9.9	9.3	8.7	7.8	7.4	11.9	7.3
7	0.0	0.0	.04	.15	.02	0.0	.10	.14	0.0	0.0
8	3.2	1.2	4.4	7.7	1.7	1.3	1.1	1.1	3.3	3.1
9	0.0	0.0	.14	.45	0.0	0.0	0.0	.32	0.0	0.0
10	.28	.23	13.8	4.9	1.8	1.9	6.1	18.1	.90	.52
11	1.2	.40	1.4	.35	.60	.60	3.4	1.6	.98	1.4
12	15.1	11.2	11.6	14.2	19.4	18.5	7.2	8.9	14.2	12.1
13	3.2	1.5	2.9	5.5	.48	.70	3.4	5.5	1.0	1.4
14	0.0	0.0	0.0	.55	.08	.02	.06	.02	0.0	0.0

Underlined values indicate a fairly significant change between the 1st half and the 2nd half of the semester in the mean values.

B - Business

Table 5.29 (con't)

	LA													
	16		20		23		24		25		27		28	
Category	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1	.18	0.0	2.6	5.6	.54	1.24	.02	.29	.08	.10	.12	.08	.10	.12
2	.92	1.3	.10	.57	.64	.68	1.5	1.5	1.3	.52	.90	.88	1.9	2.8
3	2.2	3.2	.62	.27	6.8	6.3	1.2	5.7	2.6	4.0	1.3	3.5	.60	.43
4	4.1	7.3	1.5	1.6	6.2	5.1	2.0	2.1	6.6	2.4	2.1	1.7	2.6	2.6
5	64.6	60.8	83.7	77.2	40.1	28.4	65.5	61.8	56.0	61.6	57.6	51.2	64.4	73.3
6	9.6	6.3	7.8	11.0	8.2	5.8	7.6	10.7	8.6	9.0	9.9	8.9	6.7	4.6
7	0.0	0.0	0.0	.07	.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2.5	3.1	.56	.37	9.0	8.9	2.2	5.7	6.1	4.9	4.2	4.0	4.3	5.7
9	0.0	0.0	0.0	.03	0.0	0.0	0.0	0.0	.14	.03	.02	0.0	0.0	0.0
10	1.9	2.3	.52	.63	.52	.62	14.0	4.7	7.5	9.0	6.2	8.6	9.8	.52
11	.30	.13	1.6	1.7	.72	1.2	.16	.44	1.8	.97	.20	.53	1.8	1.4
12	12.1	12.3	.10	.10	22.3	36.7	4.7	4.7	2.9	1.4	8.7	13.4	4.0	3.0
13	.30	.48	.82	.90	2.7	2.5	.66	1.5	4.9	4.9	4.4	2.9	3.3	3.4
14	1.5	2.9	0.0	.07	2.2	2.3	.44	1.1	1.5	1.2	4.4	4.3	.48	.48

Underlined values indicate a fairly significant change between the 1st half and the 2nd half of the semester in the mean values.

LA - Liberal Arts

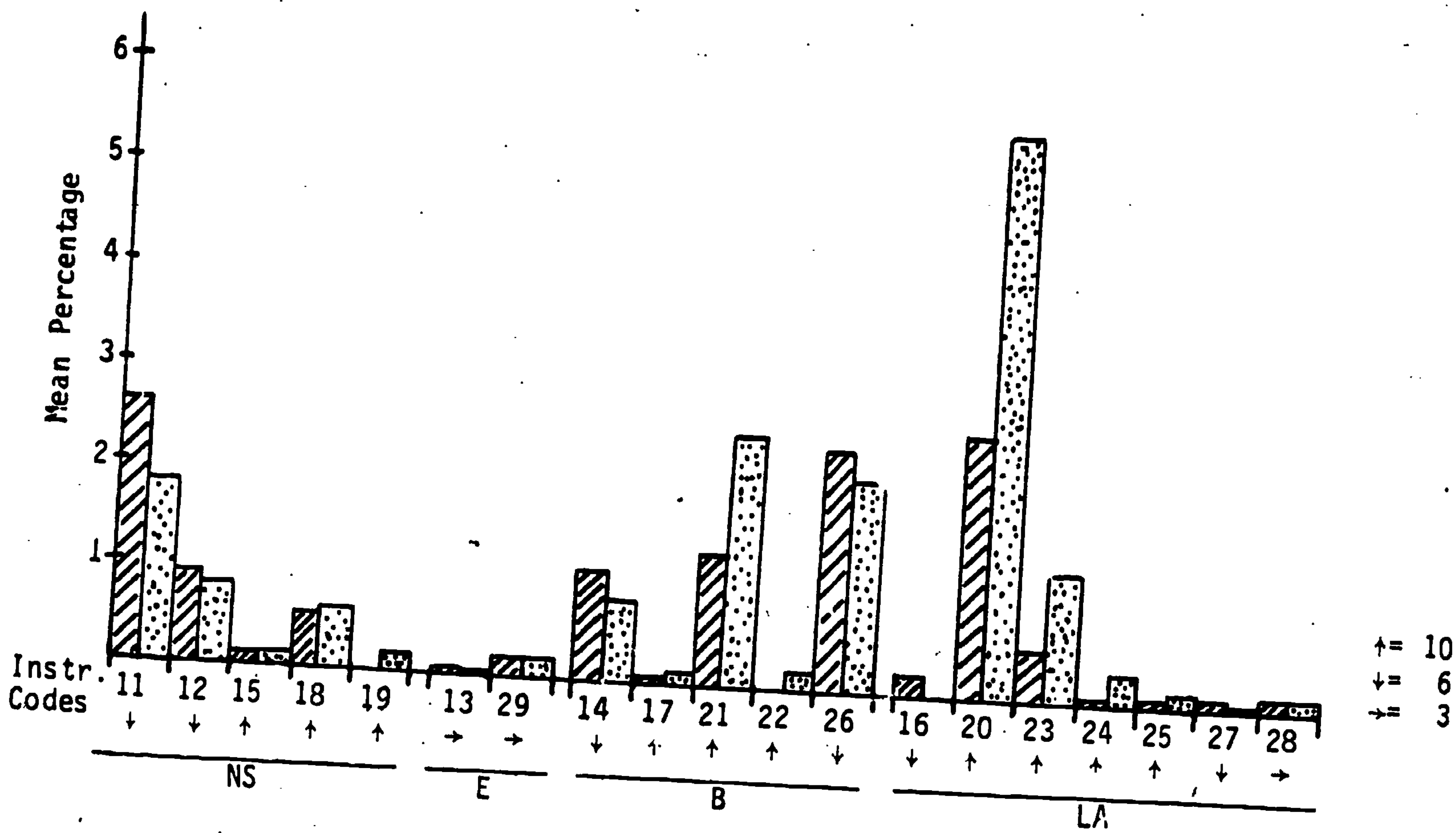


Figure 5.5(a). CIAS Category 1 (Accepting student feelings) mean percentages for first and second half of semester.

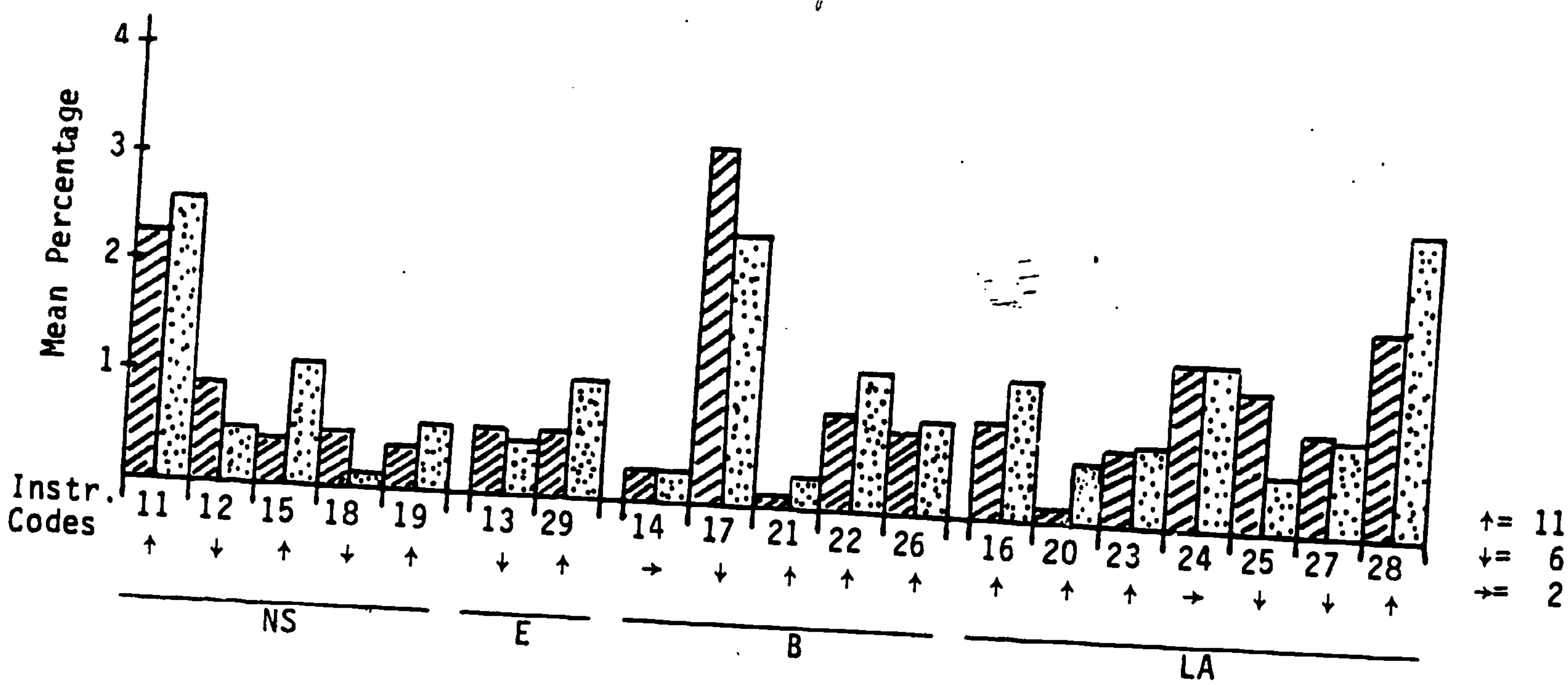


Figure 5.5(b). CIAS Category 2 (Positive reinforcement; affective instructor comments) mean percentages for first and second half of semester.

Key
- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

Figure 5.5(b) shows that all of the instructors used Category 2 statements (Positive reinforcement; affective instructor comments) at one time or another during the semester. Eleven of the instructors increased their use of these types of statements between the first and second half of the semester while only six decreased their use. This may be a result of feeling more comfortable with the class after some time has passed. Instructor #28 increased the use of statements of praise most over the semester (from 1.9% to 2.8%). On the other hand, Instructor #17 decreased the use of statements of praise most over the semester (from 3.3% to 2.5%). The use of praise ranged from a high of 3.3% of the time (Instructor #17), or 2.64 minutes/TTh class, to a low of 10% (Instructor #20), or .05 minutes/MWF class. It would be very interesting to see if this pattern (increasing use of praise) is also prevalent in smaller university classes.

The percentage means for Category 3 (Repeating a student response; providing corrective feedback; building on a student response) are graphed in Figure 5.5(c). The use of statements which fall into this category decreases in 12 of the classes while it rises in only seven of them. Instructors #13 and #24 dramatically increase their use of statements which are coded into Category 3 over the course of the semester; from 2.8% to 7.9% for Instructor #13 and from 1.2% to 5.7% for Instructor #24. For the most part, these instructors' Category 3 statements consist of repeating the answers of their students rather than building on their answers or providing corrective feedback.

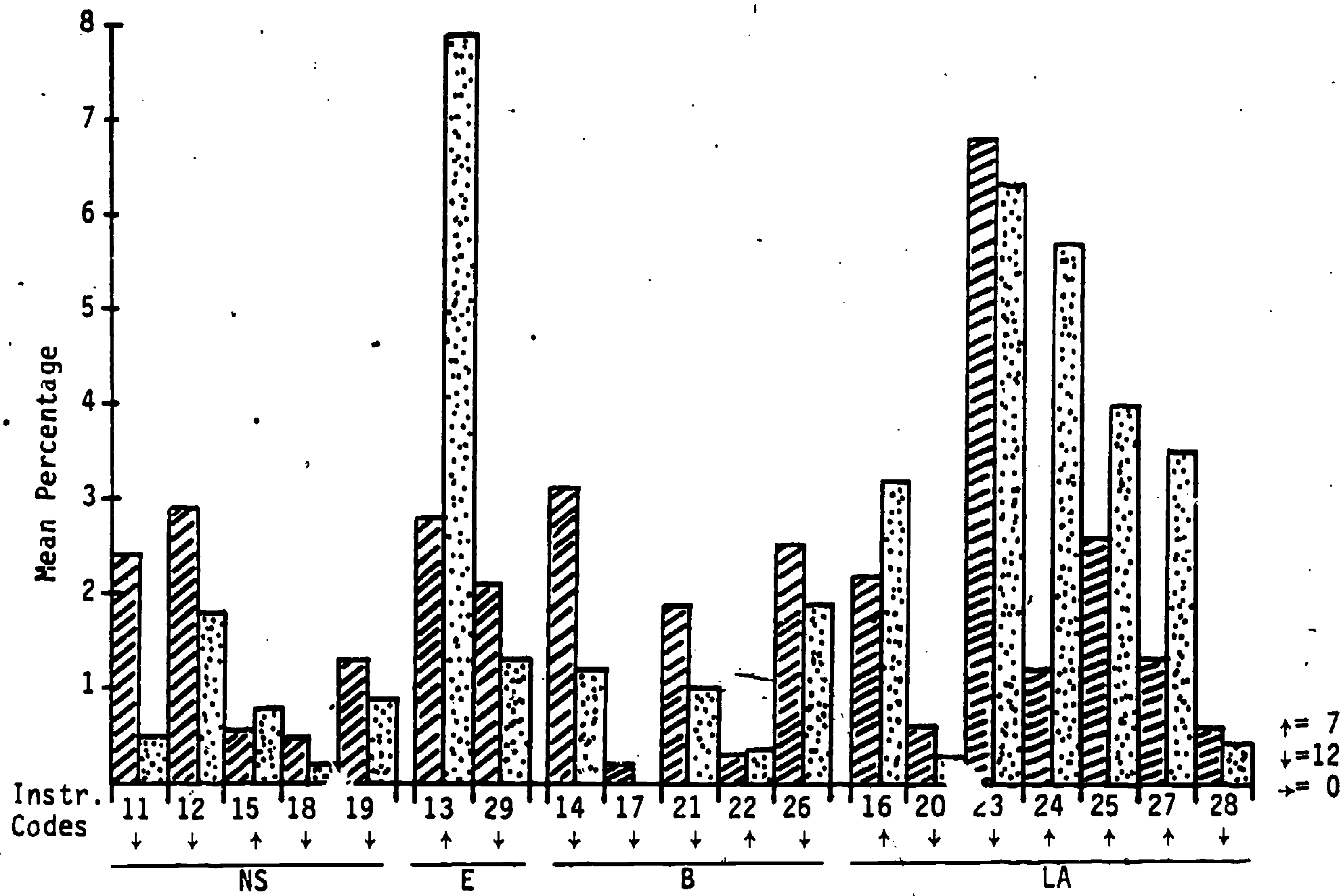


Figure 5.5(c). CIAS Category 3 (Repeating a student response; providing corrective feedback; building on a student response) mean percentages for first and second half of semester.

Key

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

The use of Humor (Category 11) by the instructors is graphed in Figure 5.5(d). It is interesting to note that 10 of the 19 instructors decreased their use of humor in the second half of the semester. Perhaps the humor is used initially to make the students feel welcome in the large class and its use is then decreased after the instructor feels the period of adjustment has passed. Instructor #22 used humor most frequently (3.4% or 2.7 min./TTh class) during the first half of the semester but its use dropped quite dramatically during the second half of the semester (1.6% or 1.3 min./TTh class). On the other hand, Instructor #18 used humor least (0.8% or .04 min/MWF class) but was consistent over the course of the semester.

The use of questions (Category 4 - Figure 5.5(e)) increased in 9 of the classes, decreased in 8 of the classes, and remained constant in 2 of the classes. These changes are divided fairly evenly throughout the colleges with one exception: a greater percentage of the instructors in Business increased their use of questions during the second half of the semester. The instructor whose use of questions increased the most over the semester is #16 (from 4.1% or 3.3 min./TTh class to 7.3% or 5.8 min./TTh class). The instructor with the greatest decrease in questions asked is #25 (from 6.6% or 3.3 min/MWF class to 2.4% or 1.2 min/MWF class).

Since asking questions (Category 4) is usually a prerequisite for acquiring student participation (Category 8) a comparison of the graphs for these categories provides some interesting information (Figure 5.5(f)). For example, though Instructor #16's use of questions increased

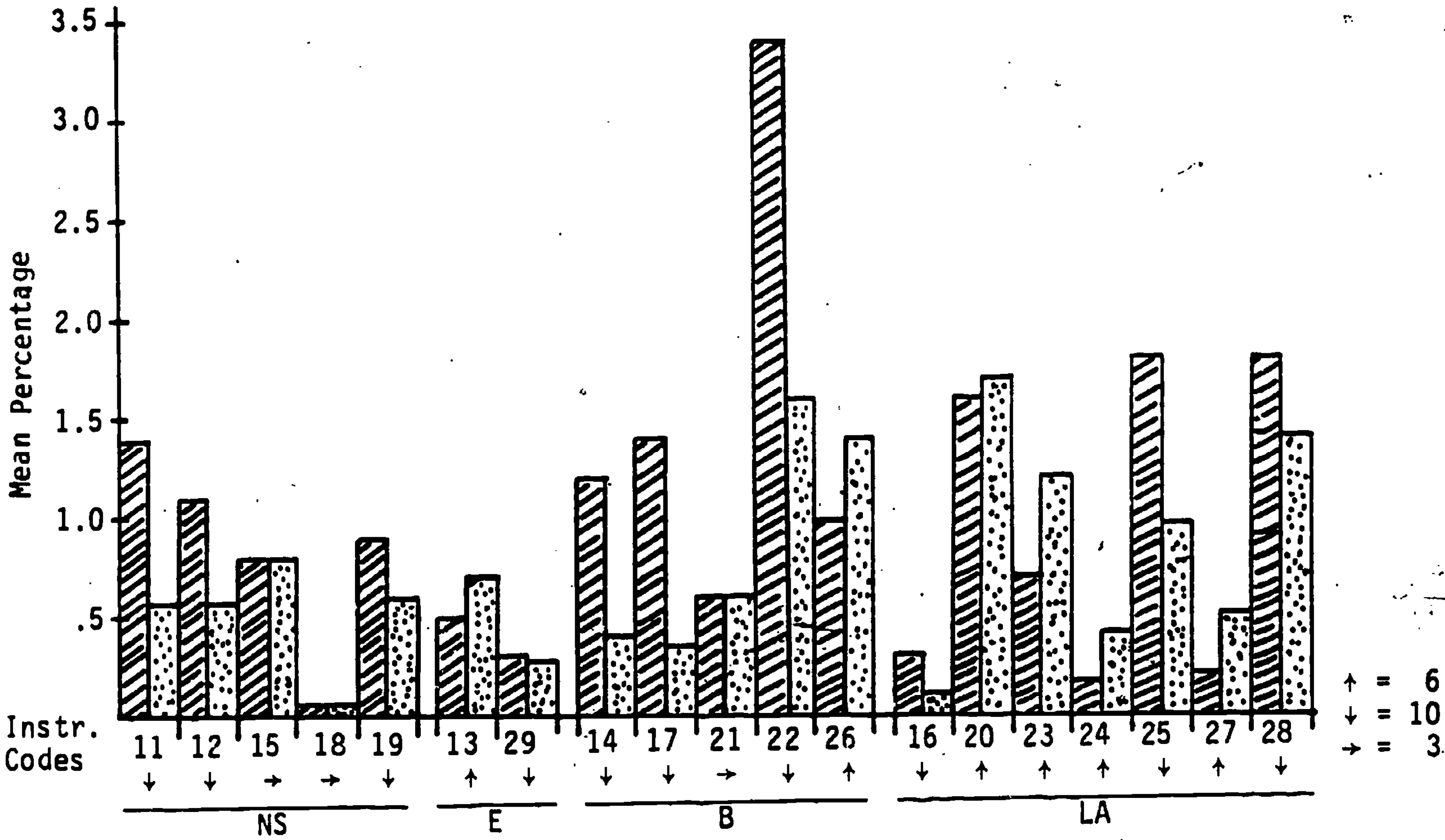


Figure 5.5(d). CIAS Category 11 (Humor) mean percentages for first and second half of semester.

Key

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

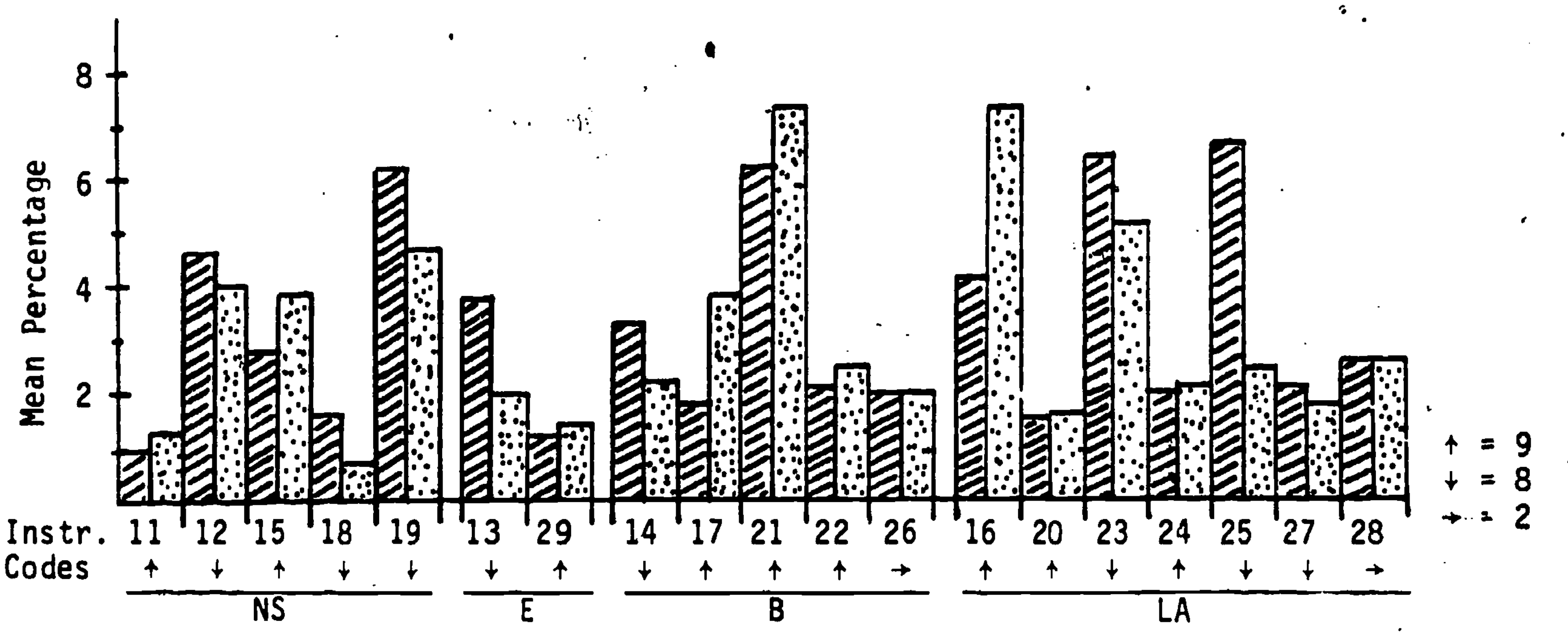


Figure 5.5(e). CIAS Category 4 (Instructor asked questions) mean percentages for first and second half of semester.

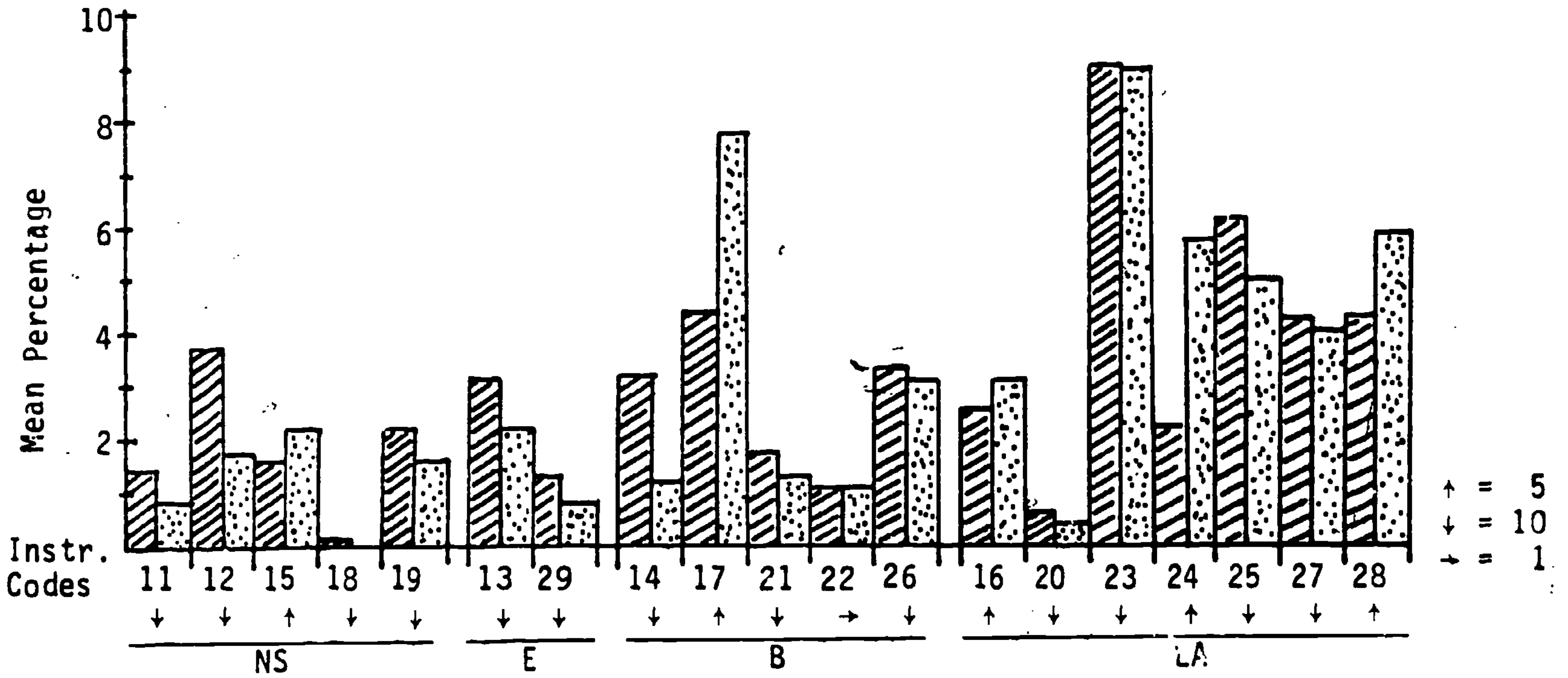


Figure 5.5(f). CIAS Category 8 (Cognitive student talk) mean percentages for first and second half of semester.

Key

- 1st half of semester (hatched)
- 2nd half of semester (dotted)

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remains constan

from 4.1% to 7.3%, the cognitive student talk in this class only increased from 2.5% to 3.1%. This probably indicates that most of the questions which were being asked during the second half of the semester were rhetorical in nature. On the other hand, though, Instructor #25's use of questions decreased from 6.6% - 2.4%, the cognitive student talk only decreased from 6.1% - 4.9%. This indicates that a number of the questions which were being asked during the second half of the semester were higher level questions which required extended student answers. This is also true in Instructor #28's class (i.e., the same percentage of questions are asked throughout the semester but the percentage of student response time increas from 4.3% to 5.7%). Overall, however, the amount of student talk which took place in these classes went down in 13 classes, increased in 5 classes, and remained constant in 1 class. Thus, it appears that students get to participate in class less frequently as the semester progresses.

The mean percentages of time spent in Category 13 (Student asked questions) are graphed in Figure 5.5(g). Here we see that the amount of time spent in this category increased in 12 classes, decreased in 5 classes, and remained constant in 2 classes. The students in classes #17 and #22 increased the percentage of time they spent asking questions more than the students in the other classes. Those in class #14 decreased the amount of time they spent asking questions more than the students in the other classes. It is impossible to determine from these data exactly why the students in some classes ask more questions during the second half of the semester, but it may be that the instructors encourage more questions after they feel comfortable with the class, or that the

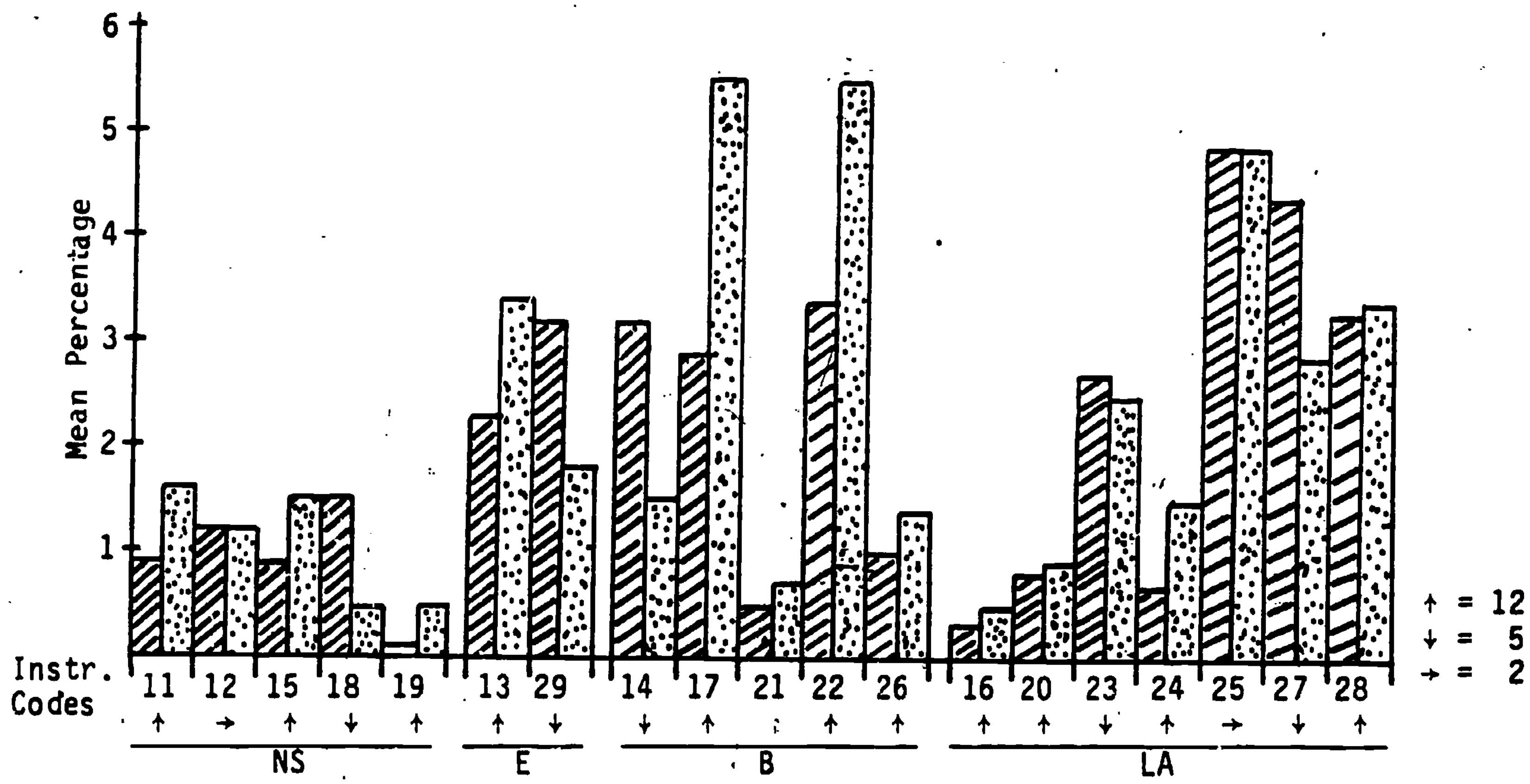


Figure 5.5(g). CIAS Category 13 (Student questions) mean percentages for first and second half of semester.

Key

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

students feel less inhibited after being in the class awhile. There also seems to be some connection between the increases or decreases in Categories 4 and 8 and those in Category 13. In classes #15, #17, #16, and #24 all three categories show an increase in the mean percentages and in classes #18, #14, #23, and #27 all three categories show a decrease. We were aware that "Instructor questions" (Category 4) were related to "Cognitive student responses" (Category 8), but were not aware that "Student questions" (Category 13) would, in many cases, also be related.

At times when no verbal activity is taking place the observer codes a Category 10 (or zero). The mean percentages for this category are graphed in Figure 5.5(h). Here we see that there was an increase in the amount of silence observed in 13 of the classes, a decrease in five (5) of the classes, and no change in one (1) class. The amount of silence observed in class #22 triples between the first and second half of the semester; from 6.1% or 4.9 min/TTh class to 18.1% or 14.5 min./TTh class. The largest decrease in the amount of silence observed takes place in class #24; from 14.0% or 7 min./MWF class to 4.7% or 2.4 min./MWF class. There is also a substantial decrease in the amount of silence observed in the class of Instructor #17 (from 13.8% or 11.0 min./TTh class to 4.9% or 3.92 min./TTh class). Instructor #13's use of silence remains quite high for both halves of the semester; from 13.2% or 10.6 min./TTh class to 16.3% or 13.0 min./TTh class. For the most part, the amount of silence which is observed in the other classes remains relatively constant over the semester. Most of the silence which was observed in these classes consisted of times when the students were doing an assignment at their seats, taking a quiz, or looking at a visual aid. The purposeful use of

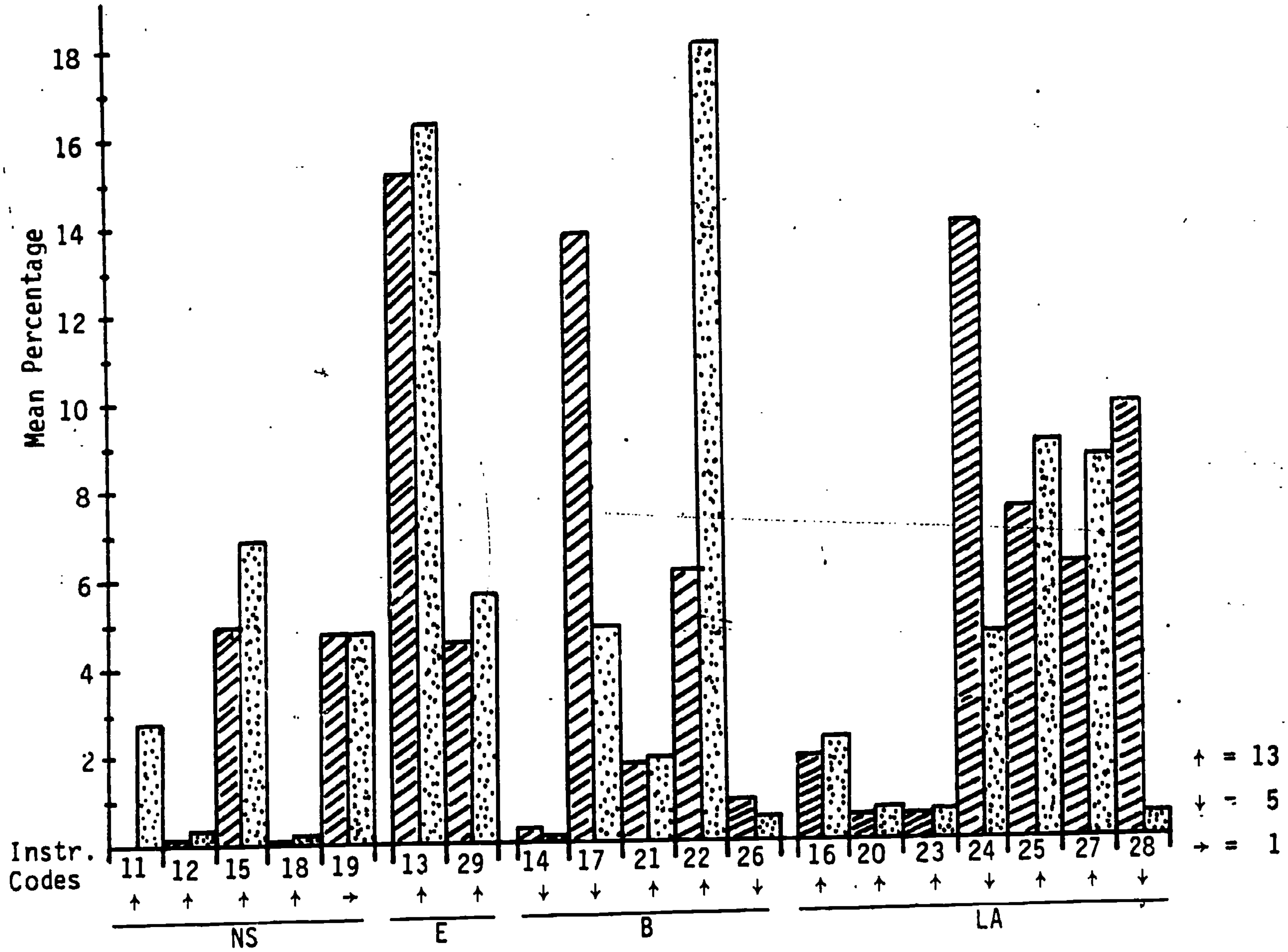


Figure 5.5(h). CIAS Category 10 (Silence) mean percentages for first and second half of semester.

Key

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

silence as "wait time" after instructor posed questions was not observed very frequently.

Category 14 is coded when the instructor is writing on board or overhead without talking. The mean percentages for this category for the first and last half of the semester are graphed in Figure 5.5(i). As can be seen, all of the instructors in Natural Science, Engineering and Liberal Arts use this technique at one time or another. However, there are two instructors in Business who did not use this technique. This is probably because these instructors used slides as visual aids to their lectures as opposed to overhead transparencies or the blackboard. Instructors #15 in NS and #27 in LA used this technique most frequently; 5.4% and 5.2% for #15 (or about 2.7 min.) and 4.4% and 4.3% (or about 3.5 min.) for #27. The findings for this category show that instructors seldom just write information on the board or overhead without talking about what was written. Because of this fact, many instructors tend to "talk to the board" while they write, often making it difficult for the students to hear what is being said.

The first and second half mean percentages for Category 5 (Lecture) are graphed in Figure 5.5(j). As was noted earlier, this is the category which is recorded most frequently in large university lecture classes. It is interesti to note that the percent of time spent lecturing went up\for eight (8) of the instructors, went down for nine (9) of the instructors and remained constant for two (2) of the instructors. For the most part, however, the amount of time spent lecturing remains fairly constant over the course of the semester (i.e., the increases and

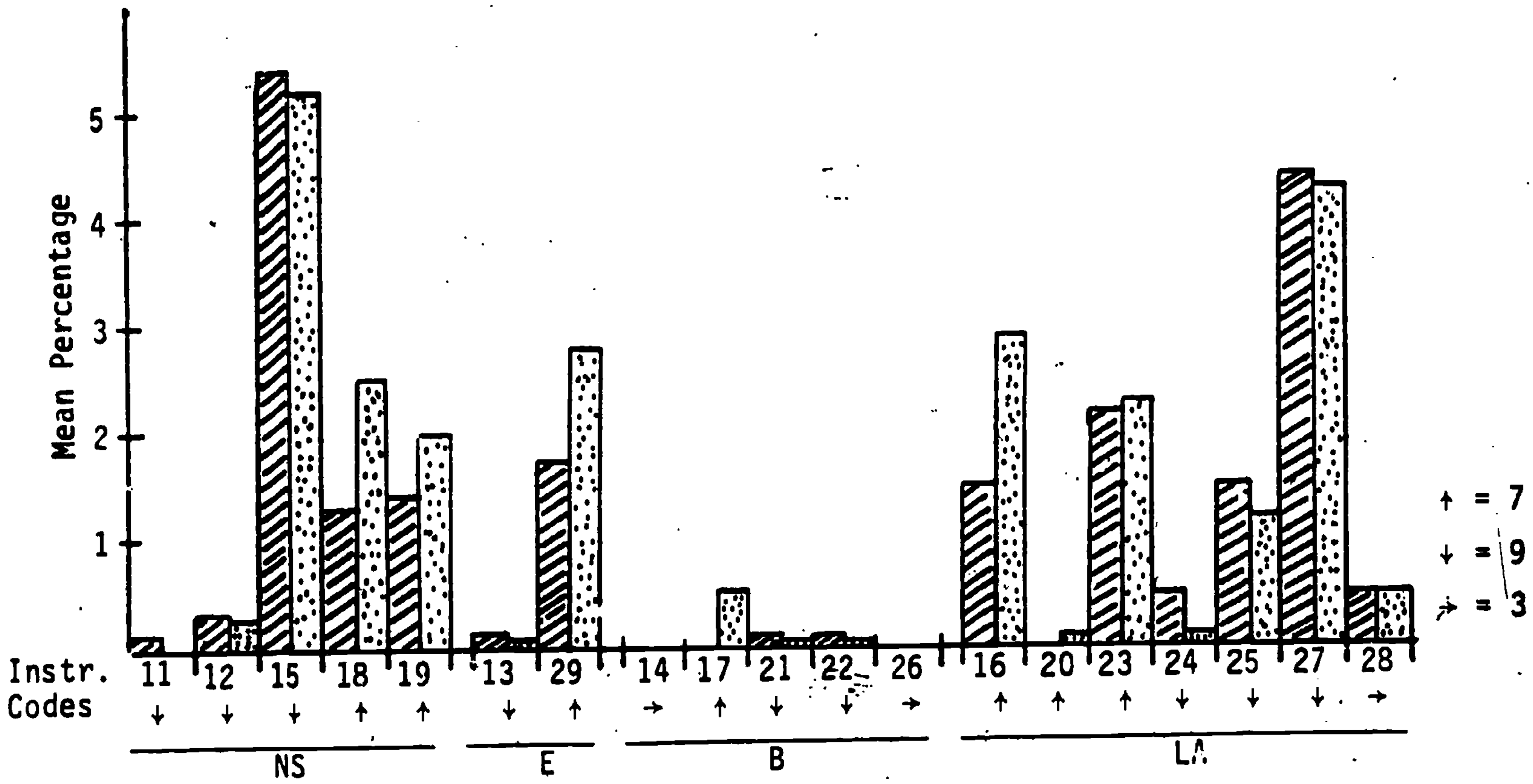


Figure 5.5(i). CIAS <u>Category 14</u> (Writing on board or overhead without talking) mean percentages for first and second half of semester.

<u>Key</u>

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remains constant

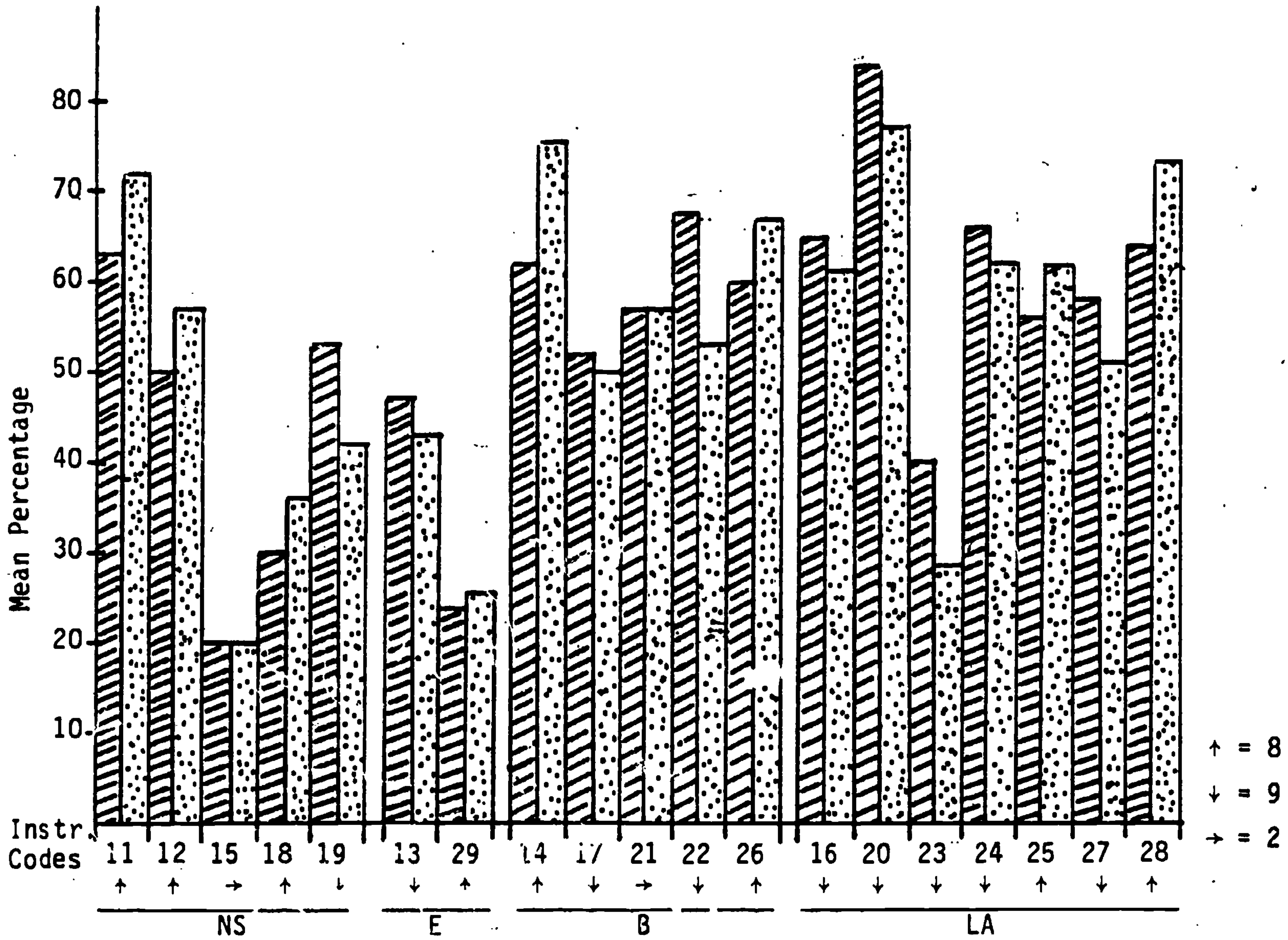


Figure 5.5(j). CIAS Category 5 (Lecture) mean percentages for first and second half of semester.

Key

- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remains constant

decreases are quite small). The largest increase in time spent lecturing is found in the class of Instructor #14 (12.4% increase - or 9.9 min/TTh class). The largest decrease is found in the class of Instructor #22 (14.8% decrease or 11.8 min./TTh class). The amount of straight lecturing which is done by the instructors decreases in 71.4% of the classes in Liberal Arts and increases in 60.0% of the classes in Natural Science.

Some interesting observations can be made by comparing the data for Category 5 (Figure 5.5(j)) and Category 12 (Figure 5.5(k)). First, we note that there are the same number of instructors who increase, decrease, or remain constant in their use of both categories (↑=8, ↓=9, → =2). In 13 of the 19 classes (or 68%) an increase in Category 5 results in a decrease in Category 12 and vice versa. Also, the instructors who have low mean percentages in one of these categories tend to have higher mean percentages in the other category. Thus, if the total mean percentages for both categories were combined, we would find that all of the observed instructors lectured (with or without visuals) approximately the same amount of time (80% - 85%).

The first and second half mean percentages for Category 6 (Providing cues; giving directions; focusing on main points) are graphed in Figure 5.5(l). Here we note that there was a decrease in the use of these types of statements in 12 of the classes and an increase in their use in 7 of the classes. This is probably due to the fact that instructors find that it becomes less necessary to give as many specific directions as the course progresses. Most of the changes in the use of statements of this

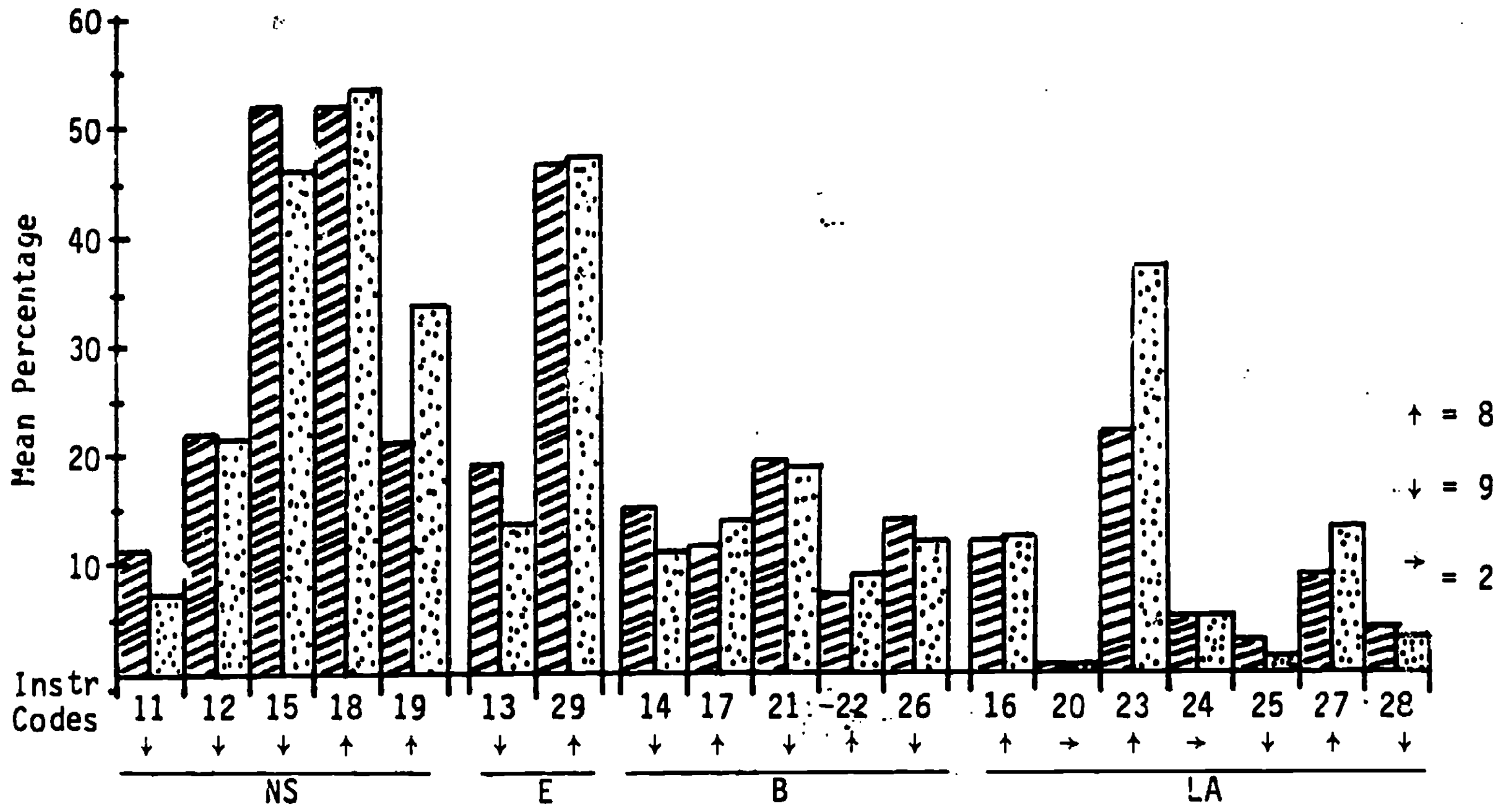


Figure 5.5(k). CIAS Category 12 (Simultaneous lecture with visuals) mean percentages for first and second half of semester.

Key

1st half of semester
2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

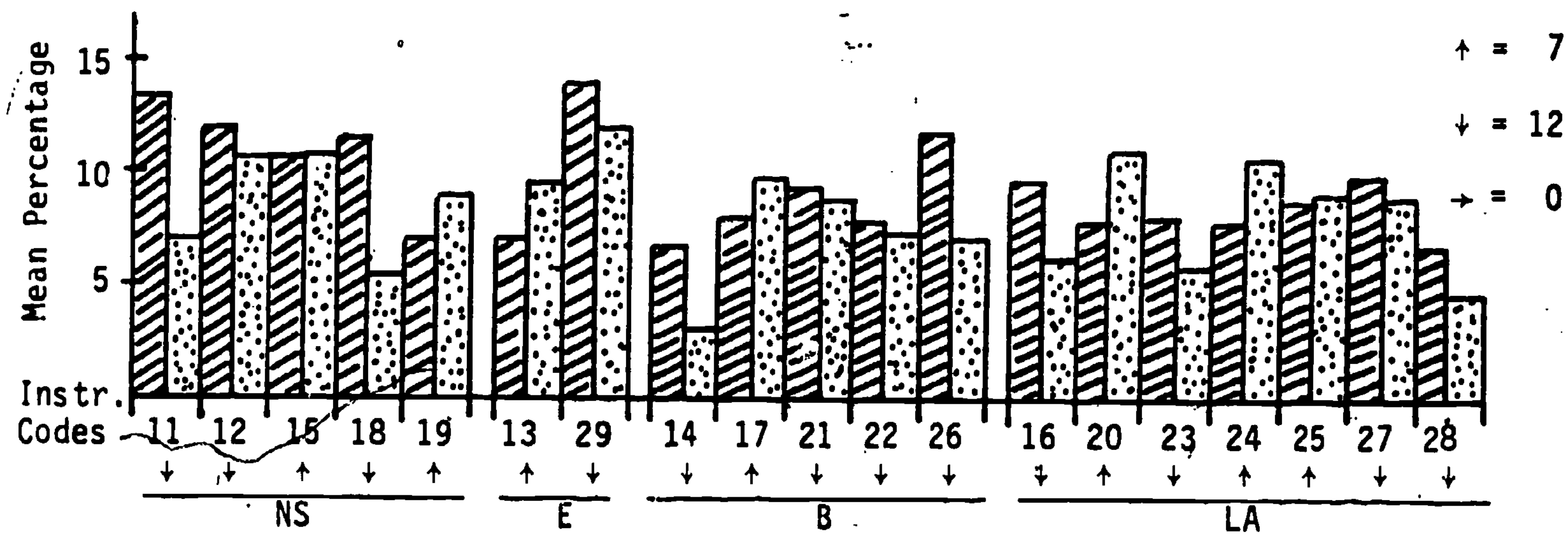


Figure 5.5(1). CIAS Category 6 (Providing cues; giving directions; focusing on main points) mean percentages for first and second half of semester.

Key

- 1st half of semester (hatched)
- 2nd half of semester (dotted)

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remained constant

type are quite small. The instructor whose use of Category 6 statements decreases the most is #11 (from 13.4% to 7.1% or from 6.7 min./MWF class to 3.6 min./MWF class). The instructor whose use increases the most is #20 (from 7.8% to 11% or from 3.9 min./MWF class to 5.5 min./MWF class). The average mean percentage for all of the instructors on this Category is about 9% (4.5 min./MWF class or 7.2 min./TTh class). This is really quite high and results in a large number of these statements per class when one considers that each cue or focusing statement only takes several seconds to say. (There could be as many as 90 such statements made in a MWF class or as many as 144 statements made in a TTh class.) This is encouraging because statements of this type guide the students in focusing on the main ideas of the lecture and also act as an organizing mechanism in their notetaking.

Figure 5.5(m) shows the mean percentages for the first and second half of the semester for Category 7 (Criticism). As can be seen, only 4 of the instructors used statements of criticism throughout the semester. Instructors #18, #19, #21, and #23 only used such statements at the beginning of the semester; probably to establish control in these large classes. (The size of these classes were 300, 300, 200 and 120 respectively.) Instructors #15 and #20, on the other hand, only used statements of criticism toward the end of the semester. (Their classes had 130 and 300 students respectively.) As can be seen, Instructor #13 used statements of criticism most frequently (.49%), during the second half of the semester. This averages out to approximately .4 minute/TTh class (or ∿24 seconds). Thus, though it looks like a great deal of

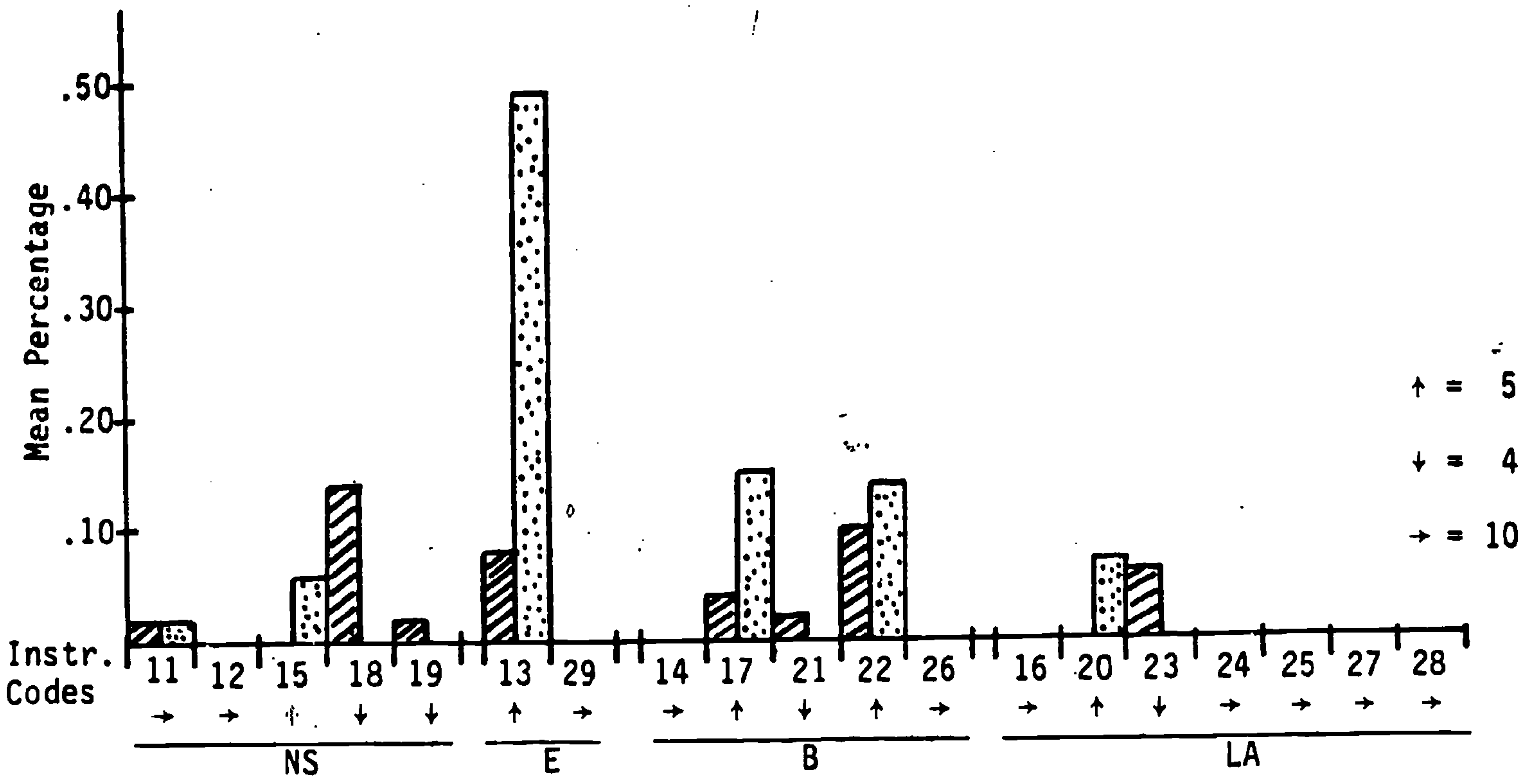


Figure 5.5(m). CIAS Category 7 (Criticism) mean percentages for first and second half of semester.

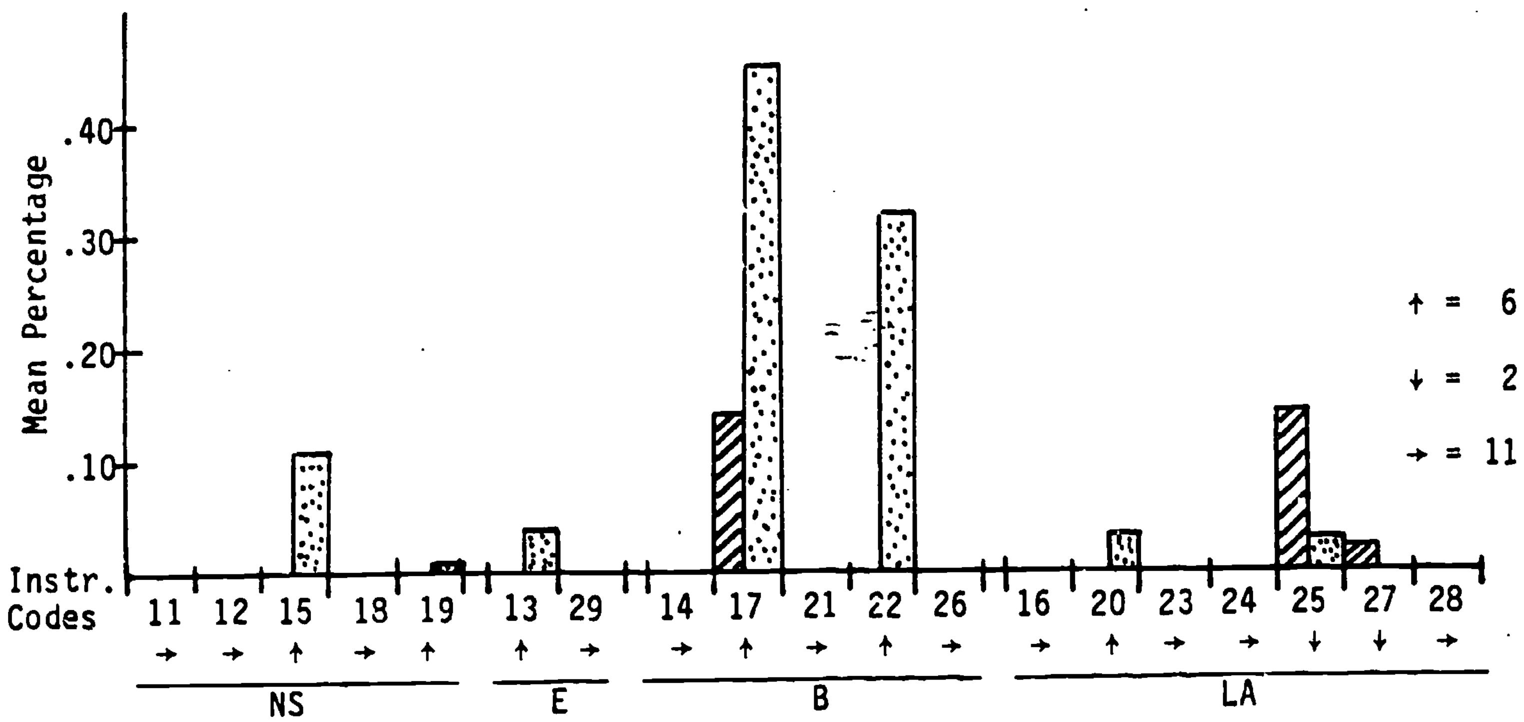


Figure 5.5(n). CIAS Category 9 (Non-cognitive student talk) mean percentages for first and second half of semester.

Key
- 1st half of semester
- 2nd half of semester

NS - Natural Science
E - Engineering
B - Business
LA - Liberal Arts

↑ - increase in use of these statements
↓ - decrease in use of these statements
→ - amount of use of these statements remains constant

criticism on the graph, it is really very little in terms of the time spent making these statements.

The final graph in Figure 5.5 is graph (n) for the first and second half mean percentages for Category 9 (non-cognitive student talk). As can be seen, most of the non-cognitive student talk occurred during the last half of the semester. The mean percentages for this category increased in 6 of the classes, decreased in 2 classes, and remained constant in 11 of the classes. In comparing Figure 5.5(m) and 5.5(n) we find that there is a relationship between the increasing non-cognitive student talk and the increased use of criticism (e.g., Classes #15, #13, #17, #22, and #20). Again, however, though there appears to be a great deal of non-cognitive student talk in the class of Instructor #17, it only encompasses .45% of the time (or .4 min./TTh class). For the most part, there is much less non-cognitive student talk in these large classes than one might expect.

By course level. The courses which were observed directly by an observer were categorized as to the relative level-- lower-division (containing primarily freshmen and sophomores) and upper-division (containing primarily juniors and seniors). (There were eight (8) lower-division and eleven (11) upper-division courses which were observed in this study.) The CIAS mean frequencies for each category were then calculated for each group and a one-way ANOVA was run on the data. The results are given in Table 5.30.

TABLE 5.30

One-way ANOVA of Mean Frequency of Use for Each CIAS Category by Course Level

Category	Lower-Division	Upper-Division	Fvalue	p
1	.8355	.6867	.494	.48
Δ2	.8673	1.1444	3.699	.0559
*3	2.6309	1.6356	4.255	.04
*4	3.5100	2.6467	6.315	.01
*5	48.1845	57.9789	13.286	.0003
*6	9.5527	8.1967	5.904	.02
7	.0527	.0278	.8979	.34
8	2.8536	3.0289	.152	.70
9	.0227	.0367	.476	.49
10	4.8611	5.2289	.076	.78
11	.8627	.9400	.356	.55
*12	22.1845	14.9478	8.833	.003
13	1.8345	2.3411	2.747	.10
*14	1.6382	.9456	5.9739	.02

*Significant difference at p ≤ .05

ΔApproaching significance.

As can be seen in this table, there are significant differences at the .05 level between the class levels in the instructor's use of certain types of statements. For example:

1. Lower-division instructors repeat student answers and provide corrective feedback (Category 3) significantly more ($p = .04$) than do Upper-division instructors.

2. Lower-division instructors ask significantly more ($p = .01$) questions (Category 4) than do Upper-division instructors.

3. Upper-division instructors lecture (Category 5) significantly more ($p = .0003$) than do Lower-division instructors.

4. Lower-division instructors provide significantly more ($p = .02$) cues (Category 6) than do Upper-division instructors.

5. Lower-division instructors use significantly more ($p = .003$) visuals (Category 12) along with their lectures.

6. Lower-division instructors write on the board or overhead <u>without</u> talking (Category 14) significantly more ($p = .02$) than do Upper-division instructors.

The results for Category 2 are approaching significance ($p = .0559$) and indicate that Upper-division instructors use positive reinforcement more than do Lower-division instructors. This is somewhat surprising given that the other categories which show a significant difference (in which the Lower-division instructors use them more frequently) indicate that Lower-division instructors seem to be aware of their students' inexperience and thus use more questions, repeat students answers more frequently, provide more cues, and utilize more visual aids along with their lectures. Perhaps Lower-division instructors use less positive reinforcement because their students respond somewhat less or they feel it is not worthwhile to reinforce student answers which are at the lower cognitive levels (which most are).

The only category of statements which is used significantly more by Upper-division instructors is Category 5 (Lecture). This probably would be expected because Upper-division instructors assume that their students have mastered the art of notetaking and assimilation of information.

<u>Summary: Direct Observation Data</u>. This aspect of the study provided a great deal of specific information concerning the verbal interactions which occur in large classes. We found that the bulk of the class time (about 70%) was spent lecturing (with or without the aid of visuals) and that, on the average, the instructors talked approximately 85% - 90% of the time during each class period. (This equals about 43 - 45 minutes/MWF class period or about 68 - 72 minutes/TTh class period.) On the average, student participation included about 5% of the time during each class period (about 2.5 minutes/MWF class period or 4 minutes/TTh class period).

Figure 5.6 shows the CIAS means for each college (these are also recorded in Table 5.26). As is indicated here, most of the instructors spend about the same amount of time in Categories 1 (Accepting student feelings), 2 (Positive reinforcement), 4 (Questioning), 6 (Providing cues and directions), 7 (Criticism), 9 (Non-cognitive student talk), 11 (Humor) and 13 (Student questions). There is some variation in Category 3 (Repeating student response, providing corrective feedback), with the Engineering instructors shown as using statements which are coded into

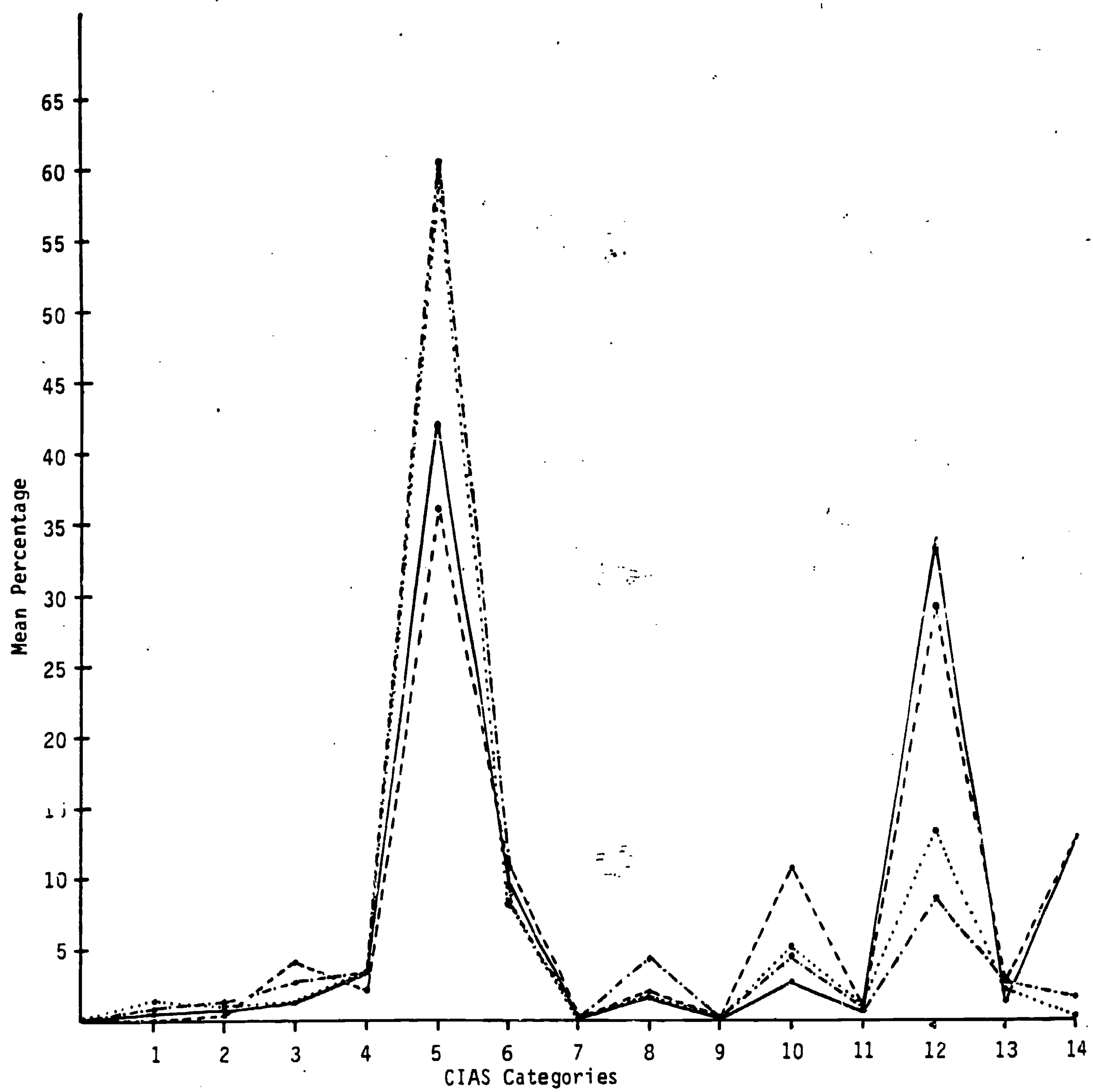


Figure 5.6. CIAS Category means for each College.

Key

—— Natural Science - - - Engineering .... Business -.-.- Liberal Arts this category most frequently. Category 5 (Lecture) shows quite a bit of variation with Business and Liberal Arts instructors lecturing most. There is a little variation on Category 8 (Cognitive student talk), with the students in Liberal Arts classes participating more frequently than the others. Category 10 (Silence) is the next one which shows a difference among the colleges. Here we see that silence occurs more frequently in the College of Engineering classes. There is quite a bit of variation among the colleges in the amount of time spent in Category 12 (Lecture with visuals), with the instructors in Natural Science using this technique most frequently. Finally, there seems to be a real distinction between the technical vs. non-technical instructors in their use of Category 14 (Writing on board without talking); i.e., the Natural Science and Engineering instructors use this technique more than do those in Business or Liberal Arts. Overall, however, there is a great deal of similarity in the verbal interactions which occur in each of the four colleges in which classes were observed.

Several trends can be noted when a comparison of the mean percentage of use of each category for each instructor during the first half of the semester is compared with the use during the second half of the semester.

1. Category 1 (Accepting student attitudes) - Most instructors increased their use of this type of statement.

2. Category 2 (Positive reinforcement) - Most instructors increased their use of this type of statement.

3. Category 3 (Repeating a student response, providing corrective feedback) - Most instructors decreased their use of this type of statement.

4. Category 11 (Humor) - Most of the instructors decreased their use of this type of statement.

5. Category 4 (Questions) - About an equal number of instructors increased and decreased their use of questions.

6. Category 8 (Cognitive student response) - The amount of student response participation decreased in most of the classes during the second half of the semester.

7. Category 13 (Student asked questions) - The amount of time spent in student asked questions increased in most of the classes.

8. Category 10 (Silence) - Most of the instructors increased the amount of time spent in silence.

9. Category 14 (Writing on board or overhead without talking) - About an equal number of instructors increased and decreased their use of this technique. Two of the instructors never used it.

10. Category 5 (Lecture) - The amount of time spent lecturing remains nearly constant for most of the instructors.

11. Category 12 (Simultaneous use of visual and verbal presentation) - The amount of time spent lecturing with visuals remains nearly constant for most of the instructors.

12. Category 6 (Providing cues, giving directions) - Most of the instructors decreased their use of this type statement.

13. Category 7 (Criticism) - Of the nine (9) instructors who used these types of statements, five (5) increased their use and four (4) decreased their use.

14. Category 9 (Non-cognitive student talk) - Of the eight (8) classes in which this category was recorded, six (6) showed an increase while two (2) showed a decrease.

When comparing the verbal interactions in Lower-division vs. Upper-division courses, it was found that Lower-division instructors seem to be more student-oriented in that they use the following types of statements significantly more than do Upper-division instructors:

Category 3 (Repeating student response; providing corrective feedback; building on a student response)

Category 4 (Asking questions)

Category 6 (Providing cues; focusing on main points; giving directions; assignments, process)

Category 12 (Simultaneous visual and verbal presentation)

Category 14 (Writing on board without talking)

Cognitive Levels of Instructors' Evaluative Instruments

Each instructor who participated in LCAP was asked to provide a sample of his/her quizzes, exams, homework assignments, and written assignments (e.g., term paper assignments) to be analyzed. Each evluative instrument was first examined according to Bloom's Taxonomy of the Cognitive Domain to see what percentage of each cognitive level was being required of the students. For example, a two-item exam in which Item 1 requires analysis level thinking and Item 2 requires synthesis level thinking would be analyzed as being composed of 50% analysis and 50% synthesis. If an instructor supplied more than one quiz, exam, homework assignment, or written assignment, an overall average of the percentages for each cognitive level was computed for that particular type of instrument.

Before presenting the results, a warning about the reliability of classifying each item of an evaluation instrument is needed. In most cases, items were easily classified into one of Bloom's six cognitive levels. In other cases, some items were very difficult to classify because they appeared to fall between two adjacent levels. In this situation, the ambiguous items were classified into the lower level. Thus, the results are a rather conservative estimate.

Below are several sample questions from each of the cognitive levels of Bloom's Taxonomy. These are provided to give the reader a better idea of the type of thinking which was required for each level. (For additional examples please see Bloom, 1972.)

1. Knowledge

   a. From the following list, remembering your typeface handout, select the most casual (informal) typeface.

      a. Americana
      b. Melior
      c. Goudy
      d. Helvetica
      e. Cooper

   b. According to Fasteau, the end result of male socialization to sex stereotypes is competence in interpersonal relationships.

      a. True
      b. False

2. Comprehension

a. Among the following ions, the one least li ely to form coordination comp''unds is

(1) Fe^{+2} (3) Mg^{+2} (5) Mn^{+3}
(2) Rb^{+} (4) Zn^{+2}

b. Assuming a drawdown pressure of 100 psi, determine the downhole rate of production for a well in the field.

3. Application

a. On the surface of the Earth two different objects have two different weights. Compare their masses. Explain fully.

b. How many grams of $SrCl_2$ are in 200 ml of 0.30 M solution?

(1) 7.4 (3) 13.1 (5) 9510
(2) 9.5 (4) 31.7

4. Analysis

a. Compare and contrast the plight of free blacks and slaves in the South during the years 1800-1860. Make sure that you thoroughly discuss their social, economic, and legal conditions.

b. In what ways is Texas politics in particular like American politics in general? In what ways is the politics of Texas unlike politics in the country as a whole? Consider: patterns of participation, legislature, executive, administration.

5. Synthesis

a. What is "knowable" is negotiated. Such terms as controlled folly, nonordinary modes of knowing, the pit and midworld have been used to describe the negotiation. Discuss the terms (controlled folly, etc.) and texts and the degree to which you have revised your notion of "knowability".

b. Think of a plot based upon an obstacle that could occur between the following two sentences, and then develop a short story using these sentences and your plot.

   It was an event to be honored with a party, preferably a surprise party... "It was a surprise, all right--a surprise all the way around!"

6. Evaluation

   a. Analyze the statement below. Feel free to agree or disagree with the statement, but cite specific examples from the course material to support your argument. Address the statement from any angle you choose (i.e., work, law, sexuality, family, stereotypes, feminist and anti-feminist ideology, etc.).

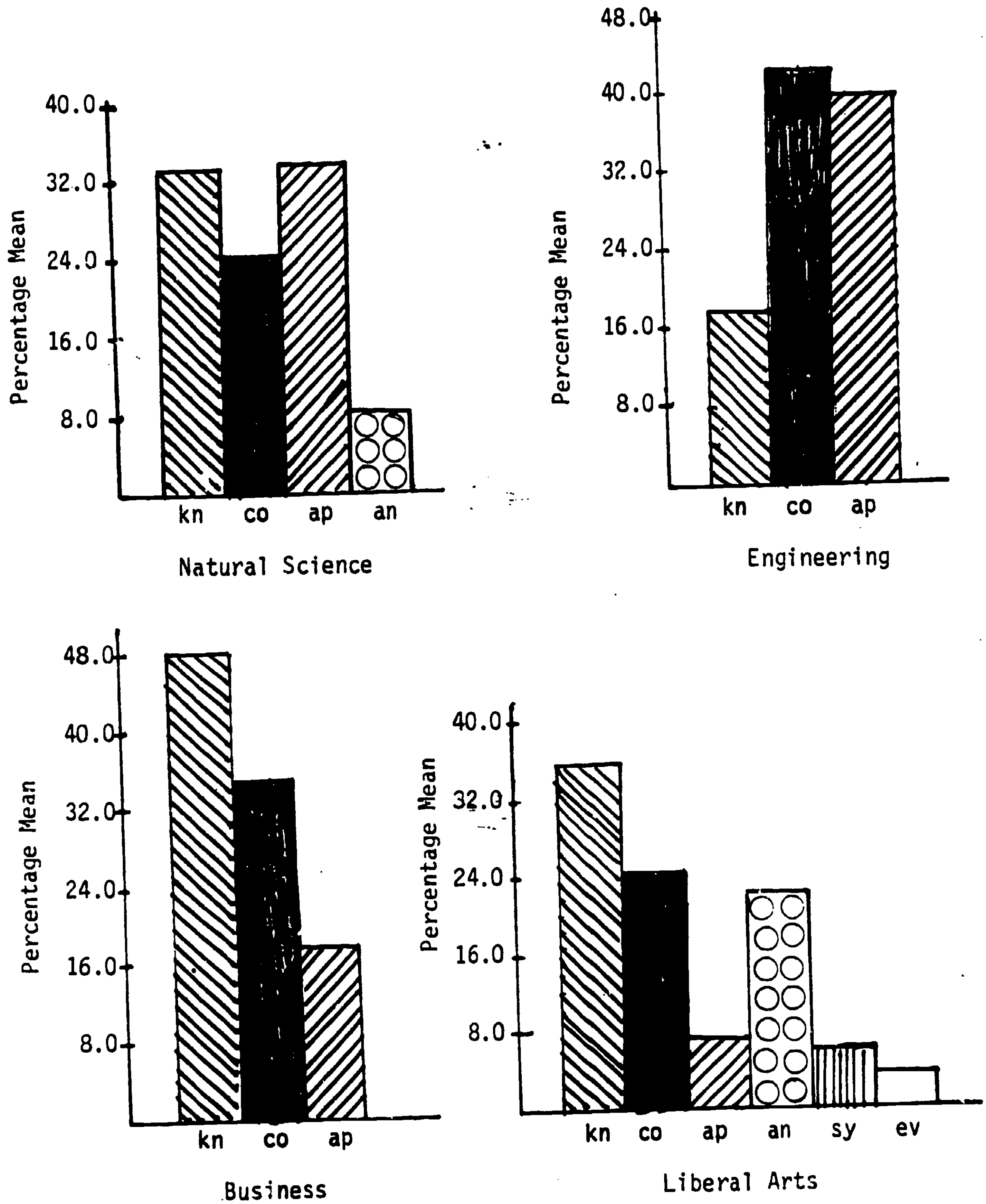
      "I'm for equal pay for equal work, but I think women should be treated like ladies, put up on the pedestal. After all, women are the wives and mothers of our society."

   b. Describe the major beliefs and values of Classical Liberalism. Describe the major beliefs and values of Democratic Theory. Do you think that these two systems of thought are successfully integrated, in theory and practice, in the United States? Why or wh not?

By college. The widest range of cognitive levels was found in the College of Liberal Arts - which covered all levels (see Figure 5.7). The lowest range of cognitive levels was found in the Colleges of Business and Engineering, which covered from knowledge/comprehension to application. Since the College of Engineering is represented by only two instructors, both of whom taught introductory courses, this range of cognitive levels is expected. Business, however, is represented by five instructors, all of whom teach upper division courses. Having 16

Figure 5.7

Cognitive levels of instructor's evaluative instruments by college



kn - knowledge
co - comprehension
ap - application
an - analysis
sy - synthesis
ev - evaluation/judgement

business exams which have application as the highest cognitive level is unexpected.

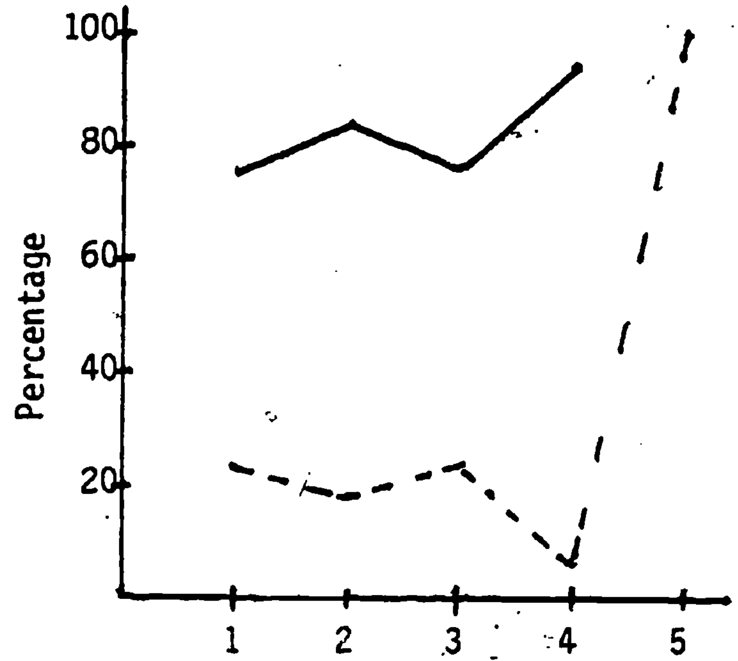
By instructor. The percentage of each cognitive level on each exam, written work, quizzes, and homework, by instructor is graphed in Figures 5.8(a) - 5.21(a). The overall percentages for all exams by instructor are graphed in Figures 5.8(b) - 5.21(b). The instructors have been grouped by college to provide a more convenient means for comparison.

In the College of Natural Scinces there were five instructors who participated in LCAP. Instructor #11 gave three quizzes, a final exam and a written project. As can be seen in Figure 5.8(a) most of the questions on all of the exams were at the knowledge level; all of these questions were multiple-choice type questions. The written paper required a little more advanced cognitive thought (comprehension). Overall, the exams in this class consisted of 82% of the questions at the knowledge level and 18% of the questions at the comprehension level (see Figure 5.8(b)).

Instructor #12 gave two exams and a make-up exam. The cognitive levels for these exams are graphed in Figure 5.9(a). Though this was a lower-division course, these exams tested the students up to the analysis level and consisted of short-answer type questions. It is interesting to note that the greatest percentage of analysis level questions occurred on the make-up exam. The first exam also contained a good amount (50%) of analysis-level questions. However, the final exam concentrated primarily on comprehension-level questions. Looking at the overall percentages

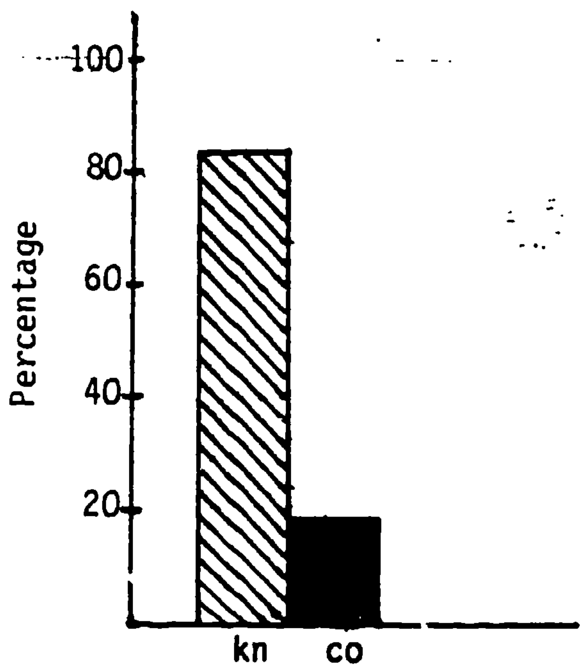
Figure 5.8 (a & b)

(a) - Percentage of cognitive levels required on exams for Instructor 11



1 - Quiz #1
2 - Quiz #2
3 - Quiz #3
4 - Final Exam
5 - Written Exam

———— = knowledge
- - - - = comprehension



(b) - Average percentage of cognitive levels required across three quizzes and the final exam for Instructor 11

kn - knowledge
co - comprehension.

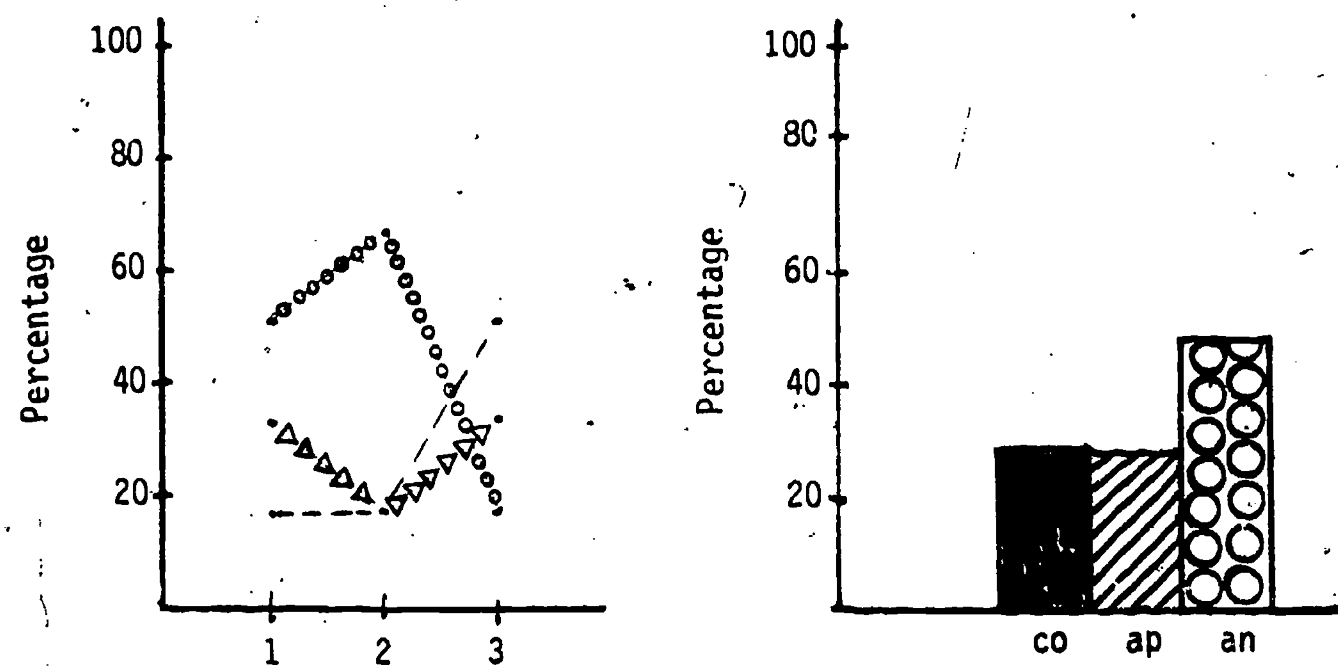
across the three exams given in this class (see Figure 5.9(b)) we find 28% of the questions at the comprehension level, 27.7% at the application level, and 44.3% at the analysis level.

Instructor #15 gave the students three major exams and a final exam. All of the questions on these exams consisted of problems to be worked. According to our analysis of the questions on these exams they were <u>all</u> at the application level.

Instructor #18 did not supply copies of the exams given in this course for item security reasons. However, in the interview with this instructor it was indicated that the questions asked on exams were at the application and analysis levels.

The final instructor in Natural Science was Instructor #19. For this class a number of homework assignments were given in addition to three major exams and a final exam. The cognitive levels for the homework assignments are graphed in Figure 5.10(a_1). The questions on these homework assignments consisted of short answer and fill-in-the-blank type questions. As can be seen, the homework began with questions which were primarily at the comprehension level and ended up with most of the questions being at the application level. The cognitive levels for the exams are graphed in Figure 5.10(a_2). The questions at the knowledge and comprehension levels predominate, with those at the application level increasing somewhat on the final exam. (All of the exam questions were in a multiple-choice format.) Because this was a lower division class, this range of cognitive levels is

Figure 5.9 (a & b)



(a) (b)

(a) - Percentage of cognitive levels required on exams for Instructor 12

1 - Exam #1
2 - Make-up exam
3 - Exam #3

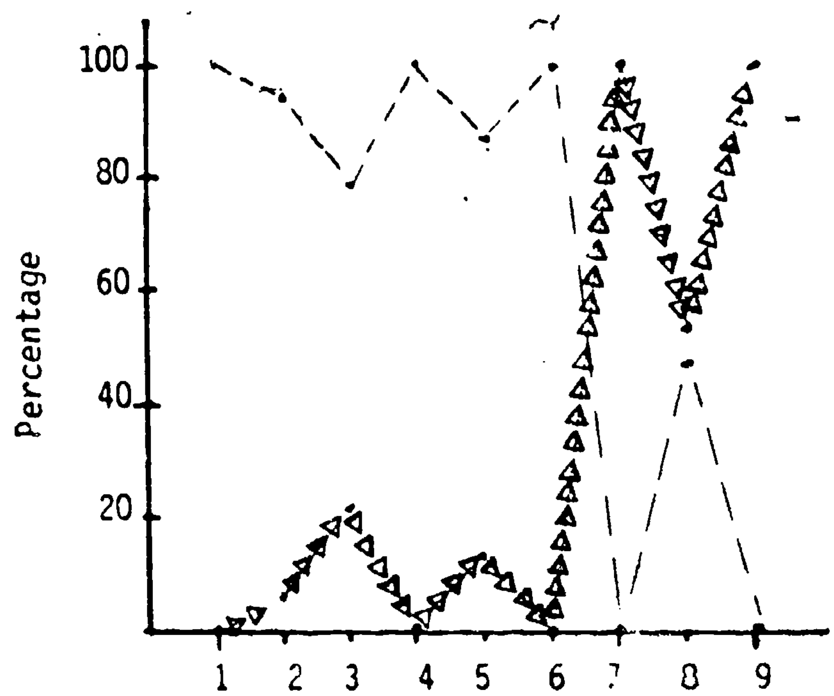
- - - - - - = comprehension
▷▷▷▷▷▷▷ = application
oooooooo = analysis

(b) - Average percentage of cognitive levels required across three exams for Instructor 12

co - comprehension
ap - application
an - analysis

Figure .10 (a_1)

Percentage of cognitive levels required on homework for Instructor 19

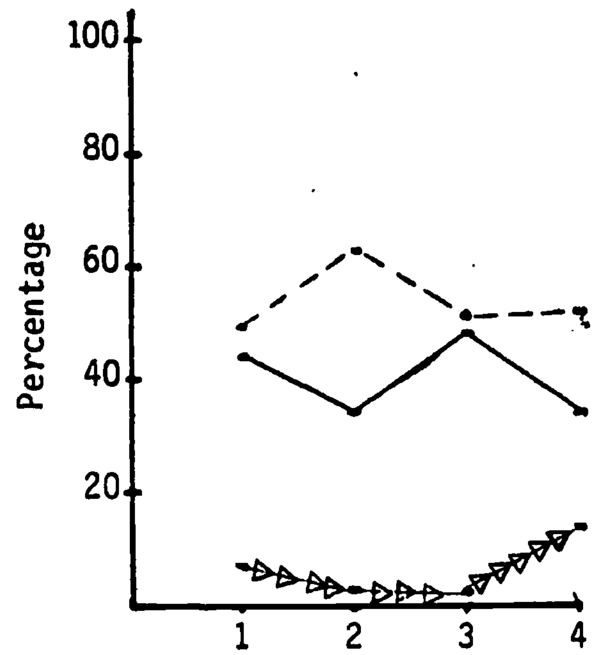


1 - Homework problems
2 - Homework set I
3 - Homework set II
4 - Homework set III
5 - Homework set IV
6 - Homework set V
7 - Homework set VI
8 - Homework set VII
9 - Supplemental homework

- - - = comprehension
▷▷▷ = application

(a_1)

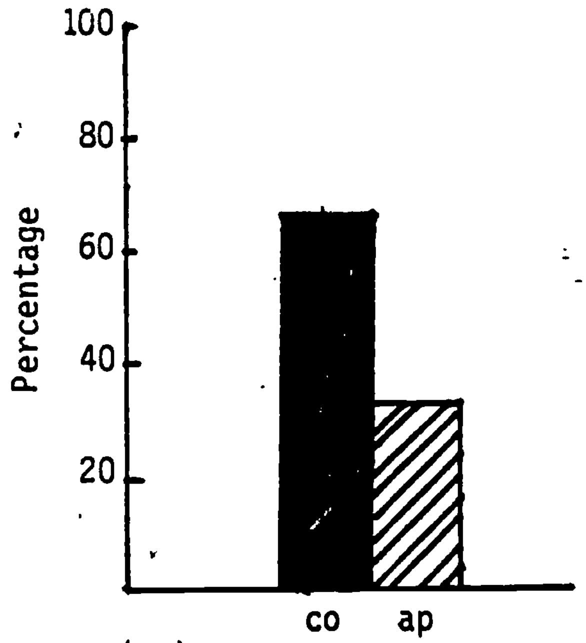
Figure 5.10 (a_2, b_1, & b_2)



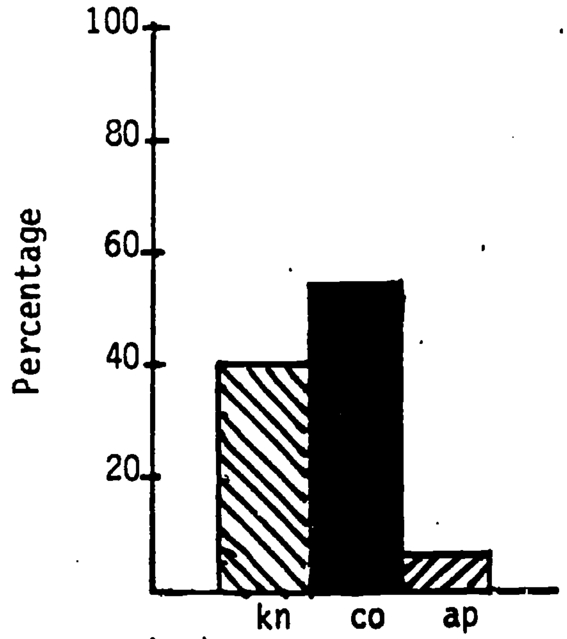
(a_2) - Percentage of cognitive levels required on exams for Instructor 19

1 - Exam I
2 - Exam II
3 - Exam III
4 - Final exam

———— = knowledge
- - - - - = comprehension
▷▷▷▷▷▷— = application



(b_1)



(b_2)

(b_1) - Average percentage of cognitive levels required across nine homework assignments for Instructor 19

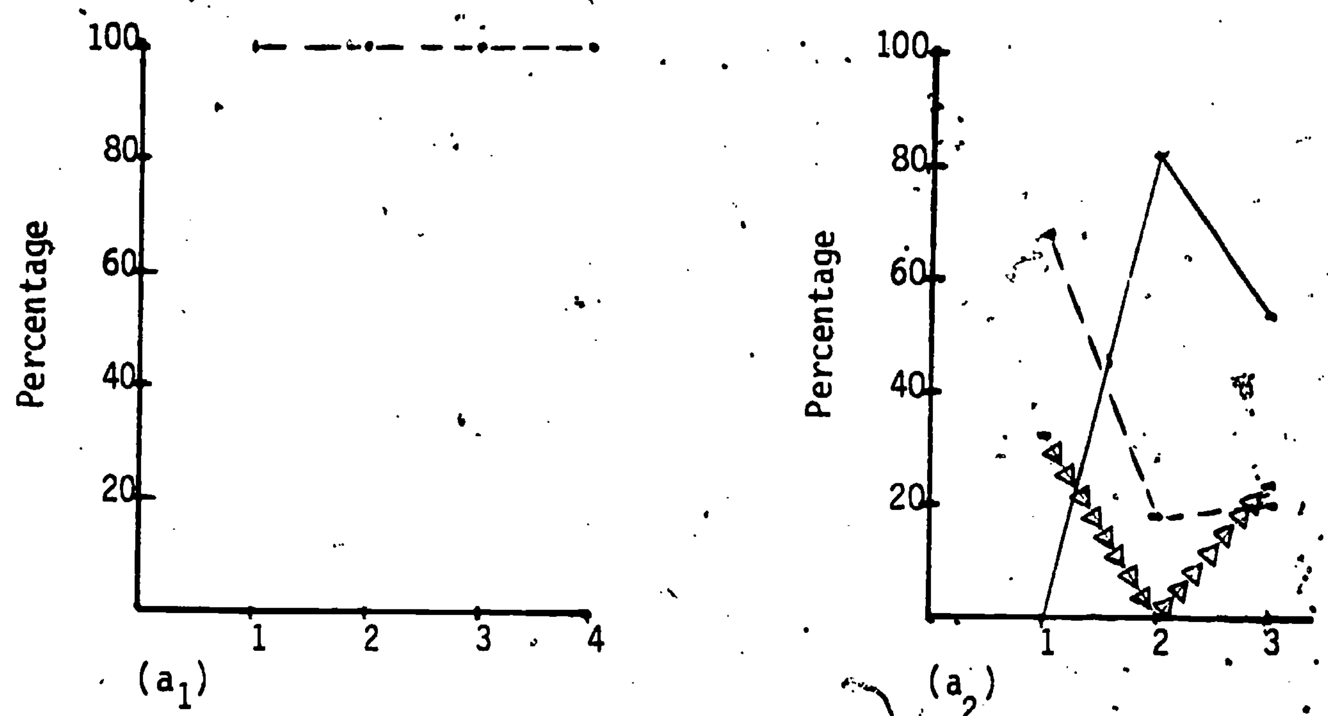
(b_2) - Average percentage of cognitive levels required across four exams for Instructor 19
kn - knowledge
co - comprehension
ap - application

expected. In Figure 5.10(b_1) we find an averge of 67.4% of the homework questions were at the comprehension level while 33.6% were at the application level. Figure 5.10(b_2) shows that on the exams 40% of the questions were at the knowledge level, 54% were at the comprehension level, and 6.3% were at the application level.

The evaluation instruments of instructors in the College of Engineering are analyzed next. Instructor #13 used written assignments and exams to evaluate the students' learning in this course. As can be seen in Figure 5.11(a_1) all of the written assignments required the students to think at the comprehension level. These papers ranged from one of 25-50 words in length to one of 400-700 words in length. The cognitive levels for the exams in this course are graphed in Figure 5.11(a_2). The questions for these exams were either fill-in-the-blank or short answer. It is interesting to note that knowledge level questions were not present on the first exam, increased to 80%+ on the second exam, and fell to ∿55% on the final exam. Just judging by the cognitive levels required on each exam, the first exam was most difficult and the second exam was least difficult with the final exam being of moderate difficulty. Figure 5.11(b) shows the average percentage for each cognitive level across the three exams: 46.3% at the knowledge level, 34.7% at the comprehension level, and 19% at the application level.

The other Engineering instructor is #29. This instructor used frequent quizzes plus a mid-term and final exams. The cognitive levels for each of the eight quizzes given in this class are graphed in Figure 5.12(a_1). As can be seen, the first quiz required the students to think

Figure 5.11 (a_1, a_2, & b)



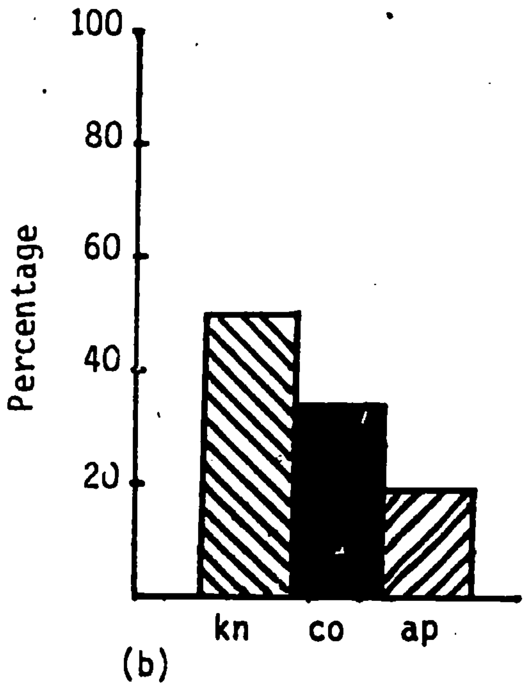
(a_1) - Percentage of cognitive levels required on writing assignments for Instructor 13

1 - Writing assignment #1
2 - Writing assignment #2
3 - Writing assignment #3
4 - Research paper

(a_2) - Percentage of cognitive levels required on exams for Instructor 13

1 - Exam #1
2 - Exam #2
3 - Final exam

——— = knowledge
- - - = comprehension
▷▷▷▷ = application

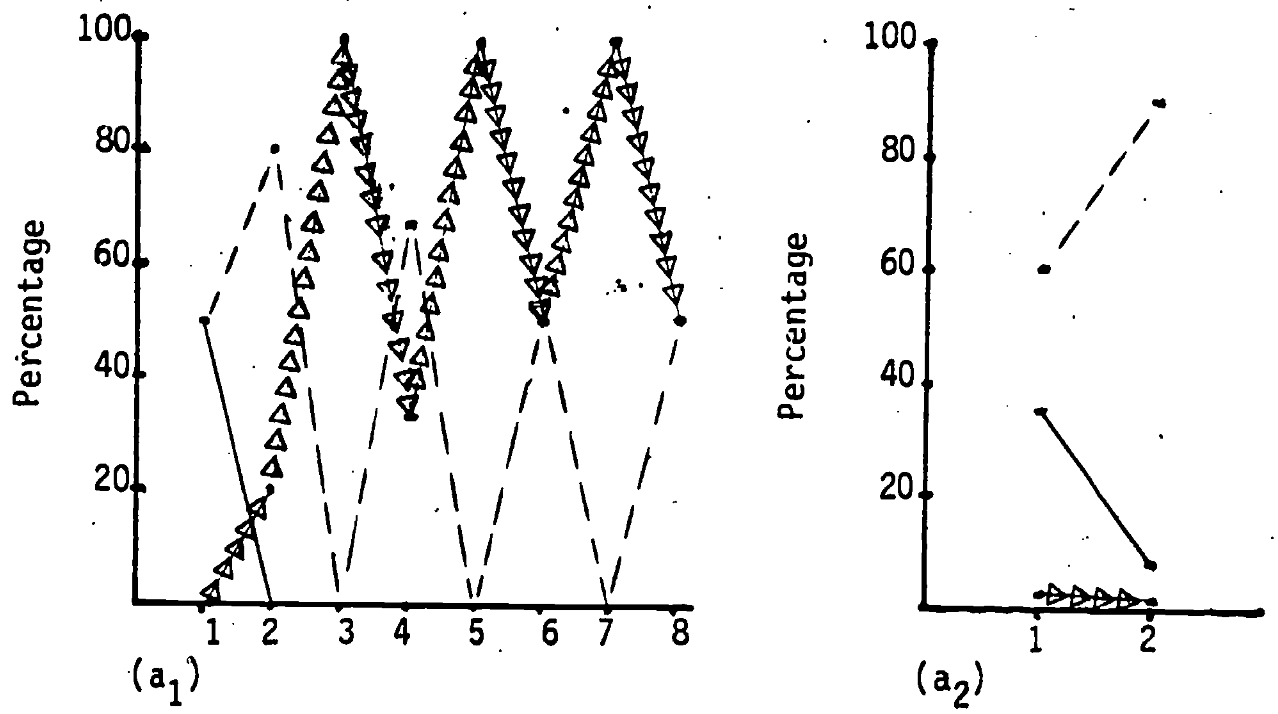


kn - knowledge
co - comprehension
ap - application

(b) - Average percentage of cognitive levels required across two exams and a final for Instructor 13 at only the knowledge and comprehension levels (50% of each). The second and succeeding quizzes required varying amounts of comprehension and application level thinking. Quizzes 3, 5 and 7 required only application level thought processes while quizzes 4, 6 and 8 required about 50% each of the comprehension and application levels. The questions on these quizzes were primarily short answer with some fill-in-the-blank and multiple-choice on quizzes #1 and #3. The cognitive levels for the exams given in this course are graphed in Figure 5.12(a_2). In all three of the exams the students are required to respond most frequently at the comprehension level. Though there are application level questions on the exams, there are relatively few. The questions on the two exams were all multiple-choice type. The average percentages of the cognitive levels required in the quizzes are graphed in Figure 5.12(b_1). Here we see that 6.25% of the questions were at the knowledge level, 37.1% were at the comprehension level, and 56.7% were at the application level. The average percentages of the cognitive levels required in the exams are graphed in Figure 5.12(b_2): 21.5% at knowledge level, 75% at comprehension level, and 3.5% at application level.

In the College of Business there were five instructors who participated in LCAP. Instructor #14 used seven homework assignments to evaluate the students in this class. As can be seen in Figure 5.13(a) these assignments tested the students up to the application level and can be classified as consisting of fill-in-the-blank and short answer questions. Assignments #1 and #3 tested only the comprehension level, assignments #2, # 4 and #7 tested only the application level, assignment #5 tested the knowledge, comprehension and application levels, and

Figure 5.12 (a_1, a_2, b_1, & b_2)

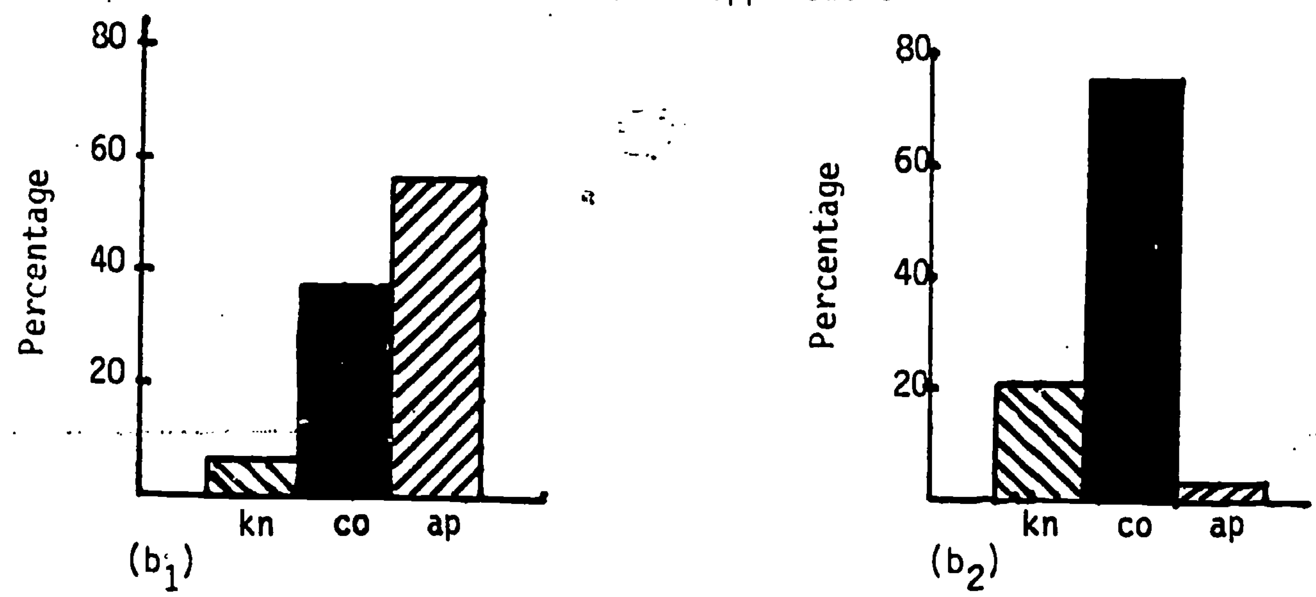


(a_1) - Percentage of cognitive levels required on quizzes of Instructor 29

1 - Quiz #1	5 - Quiz #5
2 - Quiz #2	6 - Quiz #7
3 - Quiz #3	7 - Quiz #8
4 - Quiz #4	8 - Quiz #9

(a_2) - Percentage of cognitive levels required on exams of Instructor 29

1 - Midterm exam	——— = knowledge
2 - Final exam	- - - = comprehension
	▷▷▷▷ = application



(b_1) - Average percentage of cognitive levels required across eight quizzes for Instructor 29

(b_2) - Average percentage of cognitive levels required across two exams for Instructor 29

kn - knowledge
co - comprehension
ap - application

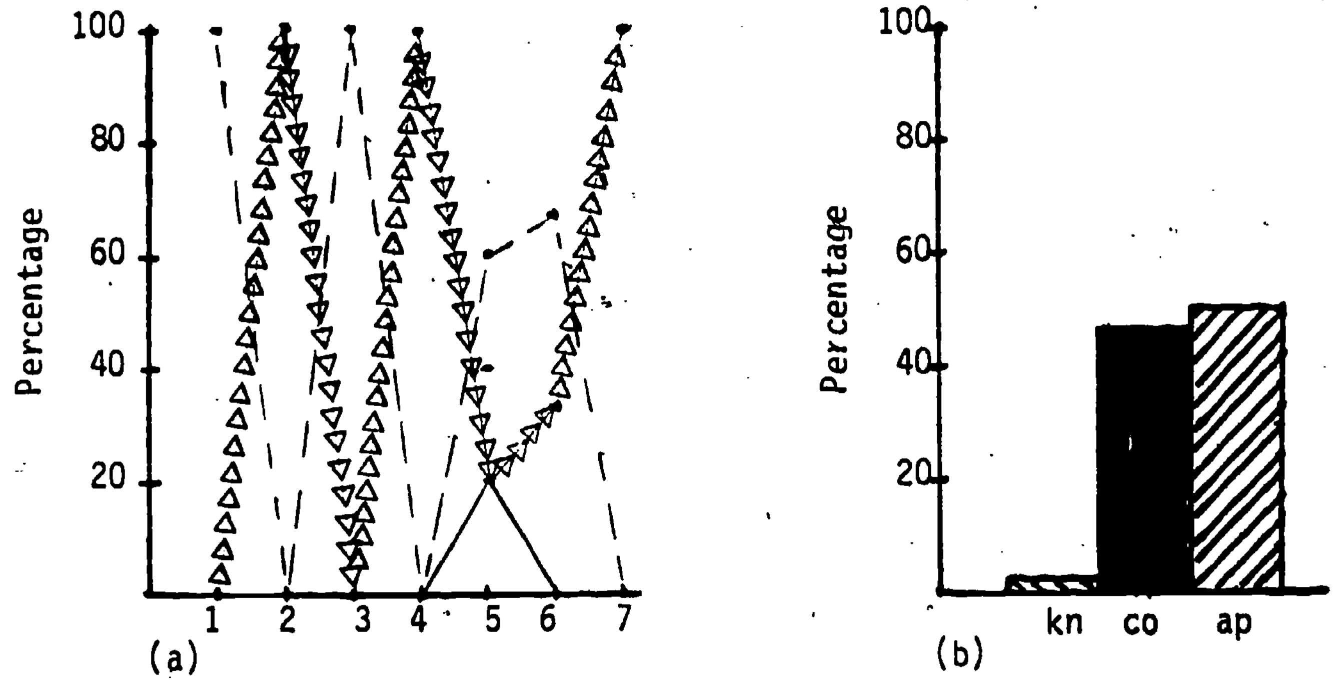
assignment #6 tested the comprehension and application levels. Figure 5.13(b) shows that the evaluation instruments in this class focused primarily on the application level (50.4%) with the comprehension level comprising 46.7% of the questions and questions at the knowledge level only making up 2.9% of the total.

The cognitive levels of the four exams given by Instructor #17 are graphed in Figure 5.14(a). These exams concentrated on questions at the knowledge and comprehension levels and consisted entirely of multiple-choice questions. Figure 5.14(b) shows that, overall, 67% of the questions on the exams were at the knowledge level and 33% were at the comprehension level.

Instructor #21 gave three exams and a final during the semester. In Figure 5.15(a) we see that all of the questions on these exams were either at the comprehension or application levels and consisted of true/false and multiple choice types of questions. It is interesting that the exams are more heavily weighted toward application-level questions until the final which is weighted toward comprehension-level questions. This indicates, to some extent, that the final may have been somewhat less difficult than the other three exams. Overall, 50.4% of the questions on this Instructor's evaluation instruments were at the application level (Figure 5.15(b)) and 49.6% were at the comprehension level.

Instructor #22 used three quizzes, three major exams and a final exam to evaluate the students' progress in the course. The three

Figure 5.13 (a & b)



(a) - Percentage of cognitive levels required on homework problems for Instructor 14

1 - Homework #1
2 - Homework #2
3 - Homework #3
4 - Homework #4
5 - Homework #5
6 - Homework #6
7 - Homework #7

——— = knowledge
- - - = comprehension
ᐅᐅᐅᐅ = application

(b) - Average percentage of cognitive levels required across seven homework assignments for Instructor 14

kn - knowledge
co - comprehension
ap - application

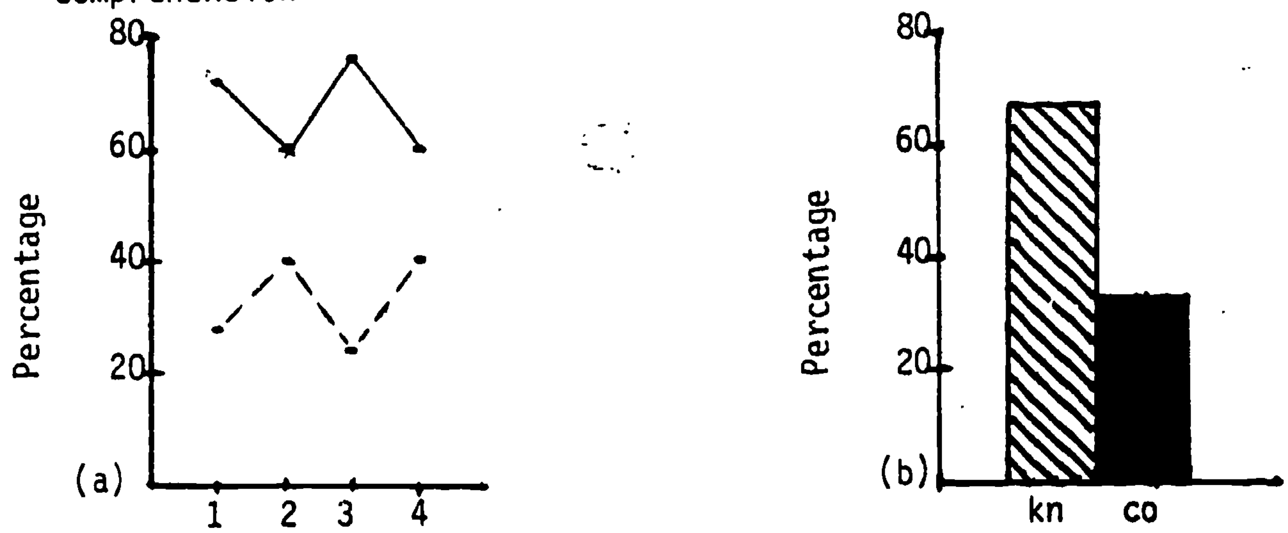


Figure 5.14 (a & b)

(a) - Percentage of cognitive levels required on exams for Instructor 17

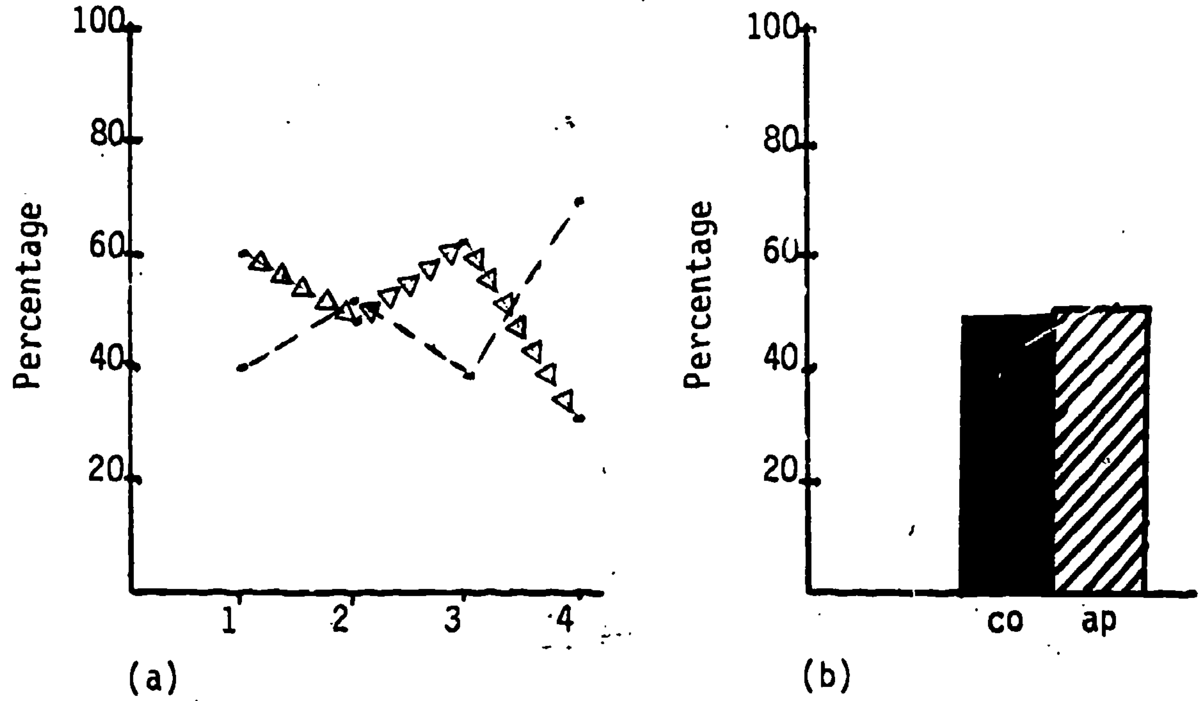
1 - Exam #1
2 - Exam #2
3 - Exam #3
4 - Final exam

——— = knowledge
- - - = comprehension

(b) - Average percentage of cognitive levels required across three exams and the final exam for Instructor 17

kn - knowledge
co - comprehension

Figure 5.15 (a & b)



(a) - Percentage of cognitive levels required on exams for Instructor 21

1 - Intra-session exam #1
2 - Intra-session exam #2
3 - Intra-session exam #3
4 - Final exam

- - - = comprehension

▷▷▷▷ = application

(b) - Average percentage of cognitive levels required across four exams for Instructor 21

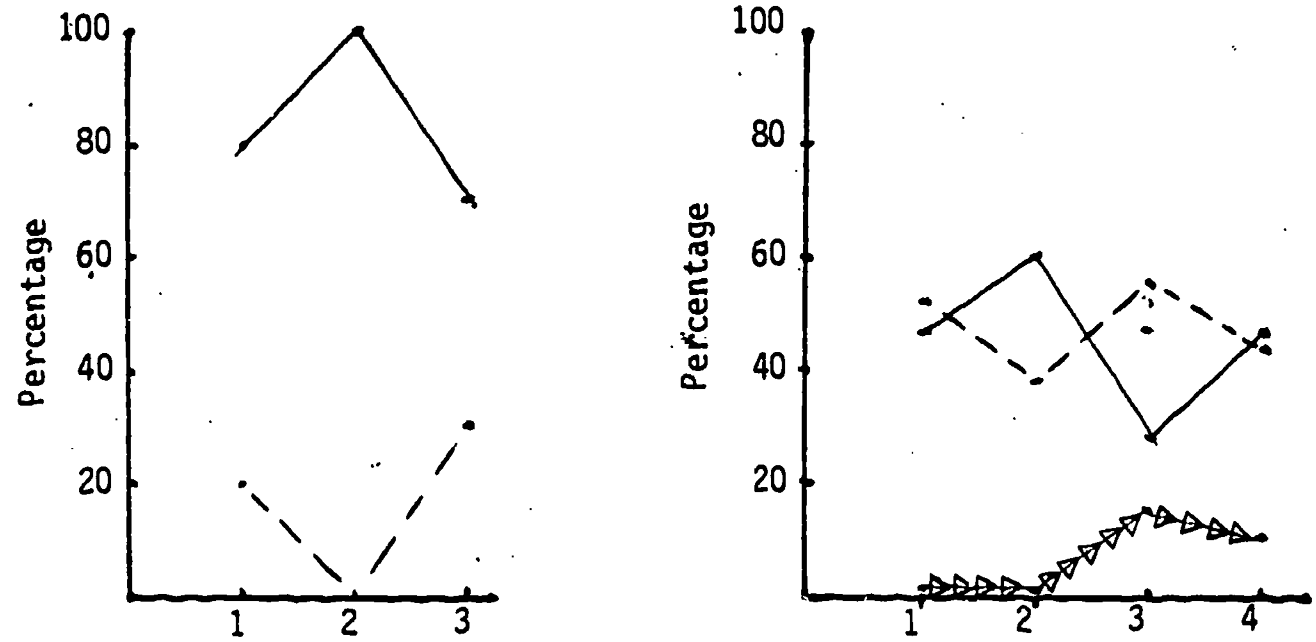
co - comprehension
ap - application

quizzes, graphed in Figure 5.16(a_1), consisted of true/false questions which tested the students primarily at the knowledge level. While the three major exams and final exam included questions at the application level, Figure 5.16(a_2) shows that a very small percentage of the questions were at this level. All of the exams were comprised totally of multiple-choice type questions. Figure 5.16(b_1) shows that 83% of the questions on the three quizzes were at the knowledge level and 17% were at the comprehension level. Figure 5.16(b_2) indicates that, across the four exams, 45% of the questions were at the knowledge level, 45.5% were at the comprehension level, and 7.5% were at the application level.

We were provided with a copy of one homework set (#4) and the final exam for the class of Instructor #26. All of the twelve questions on the homework set were at the application level and consisted of fill-in-the-blank and short-answer types of questions. (See Figure 5.17(a)). The final exam was comprised of 60 multiple choice questions: 70% at the knowledge level, 17% at the comprehension level and 13% at the application level (Figure 5.17(b)).

The cognitive levels required in the evaluation instruments of the instructors in the College of Liberal Arts will be discussed next. As can be seen in Figure 5.18(a) Instructor #16 used frequent short quizzes and three major exams to evaluate the students' progress. The third quiz contained a very high percentage of questions at the application level but, overall, the primary emphasis seems to be on questions which require thinking only at the knowledge and comprehension levels. The questions on quizzes #1, #2, and #4 were short-answer, those on quiz #3 were a

Figure 5.16 (a_1, a_2, b_1, & b_2)



(a_1) (a_2)

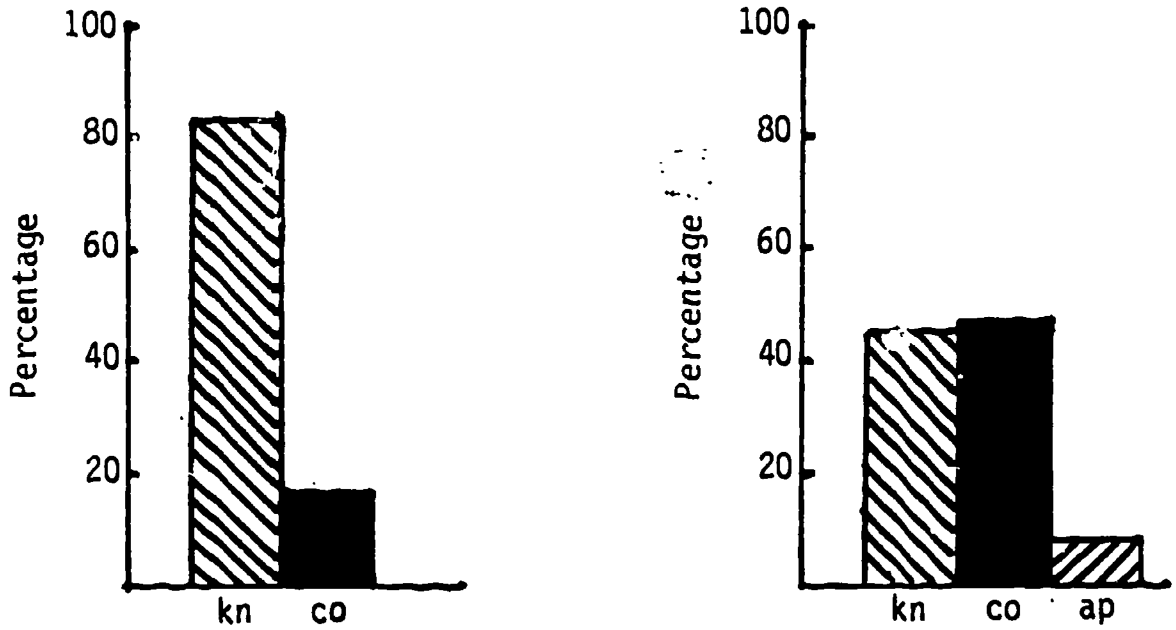
(a_1) - Percentage of cognitive levels required on quizzes for Instructor 22

1 - Quiz #1
2 - Quiz #2
3 - Quiz #3

(a_2) - Percentage of cognitive levels required on exams for Instructor 22

1 - Exam #1
2 - Exam #2
3 - Exam #3
4 - Final exam

——— = knowledge
\- - - = comprehension
▷▷▷▷ = application



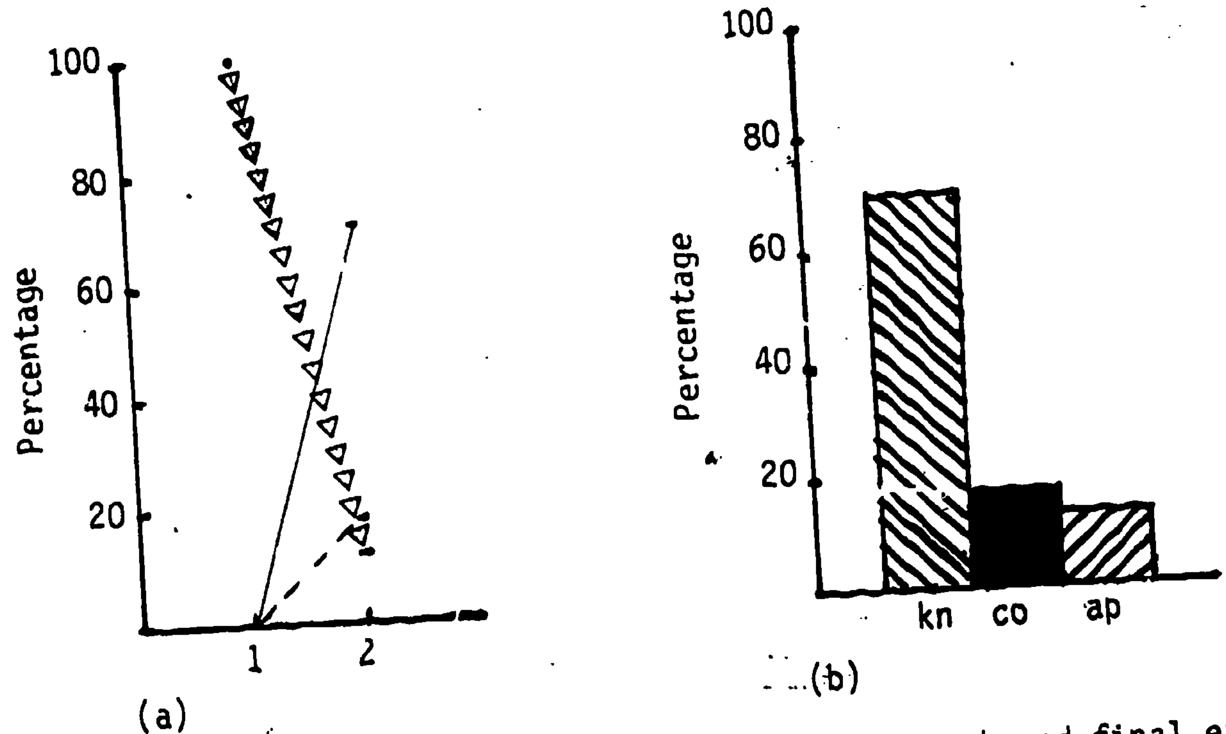
(b_1) (b_2)

(b_1) - Average percentage of cognitive levels required across three quizzes for Instructor 22

(b_2) - Average percentage of cognitive levels required across four exams for Instructor 22

kn - knowledge
co - comprehension
ap - application

Figure 5.17 (a & b)



(a) - Percentage of cognitive levels required on homework and final exam for Instructor 26

1 - Homework set IV
2 - Final exam

_____ = knowledge
\- - - = comprehension
ᐅᐅᐅᐅ = application

(b) - Average percentage of cognitive levels required on final exam for Instructor 26

kn - knowledge
co - comprehension
ap - application

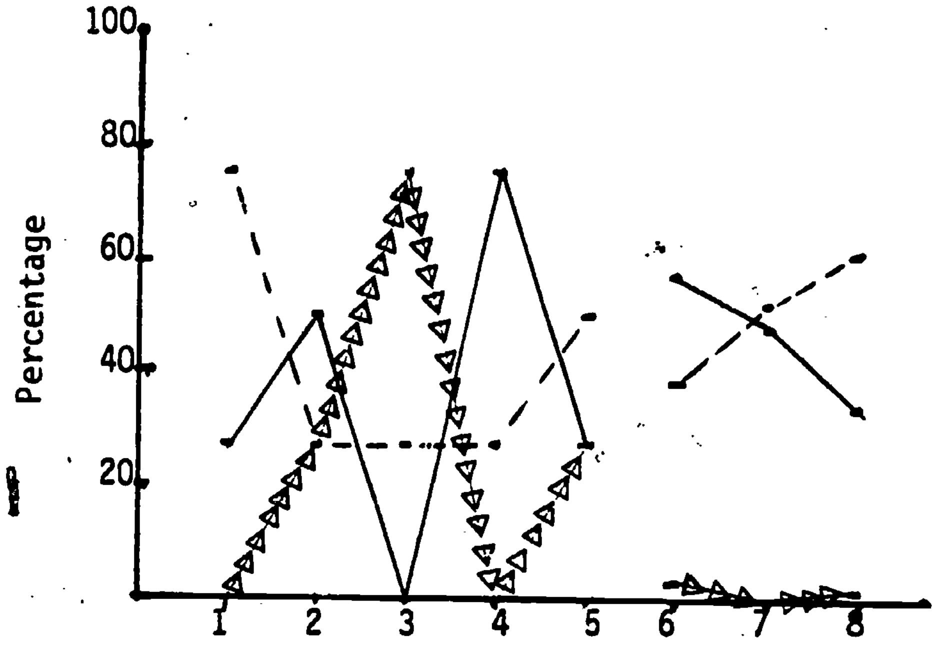
mixture of short-answer and multiple-choice, and those on quiz #6 were all multiple-choice. The average percentages of each cognitive level tested on the quizzes are graphed in Figure 5.18(b_1) - 35% knowledge, 40% comprehension, 25% application - and the levels tested on the exams are graphed in Figure 5.18(b_1) - 47% knowledge, 51% comprehension, 2% application. The questions on all of the exams were in the multiple-choice format.

Instructor #20 tested the students via essay exams and required them to respond at the upper three cognitive levels (analysis, synthesis, evaluation). Because there were 300 students in this class and it was a lower-division introductory course this mode of testing is not what one would expect. Figure 5.19(a) shows the percentage of each of the three exams which were at each cognitive level. Here we see that analysis level questions predominated, but evaluation level questions comprised 25%-30% of the last two exams and synthesis level questions occurred on 25% of the Final Exam. The average percentages for each cognitive level tested are graphed in Figure 5.19(b) - 73.3% analysis, 8.3% synthesis, 18.3% evaluation.

For Instructor #23 we were only provided with one homework assignment. On this assignment the students were asked to respond to nine questions, 44% of which were at the comprehension level and 56% of which were at the application level.

A fairly unusual combination of cognitive levels was required on Instructor #24's evaluation instruments; the two lowest levels and the

Figure 5.18 (a, b_1, & b_2)



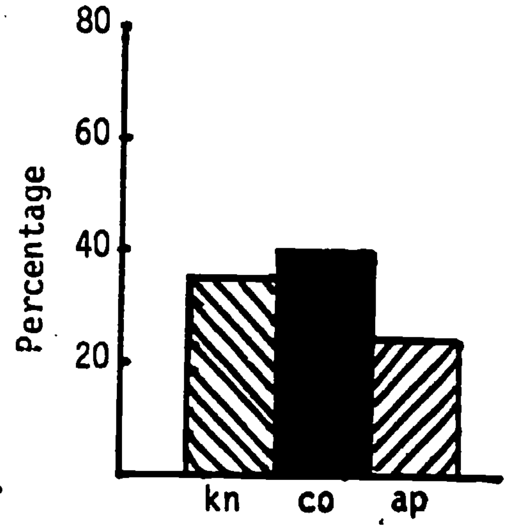
(a)

(a) - Percentage of cognitive levels required on exams for Instructor 16

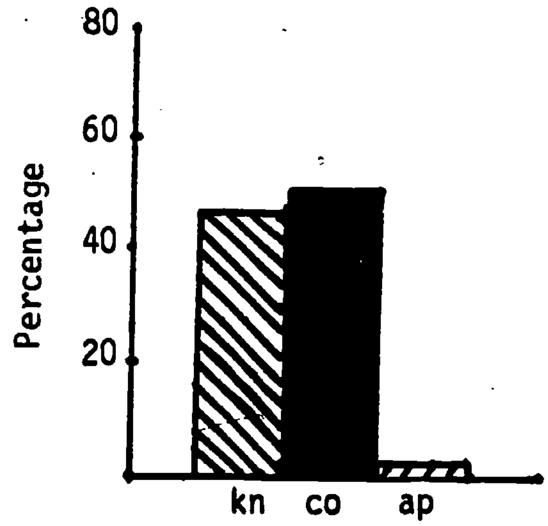
1 - Quiz #1
2 - Quiz #2
3 - Quiz #3
4 - Quiz #4
5 - Quiz #6

6 - Exam #1
7 - Make-up exam
8 - Final exam

——— = knowledge
- - - = comprehension
▷▷▷▷ = application



(b_1)



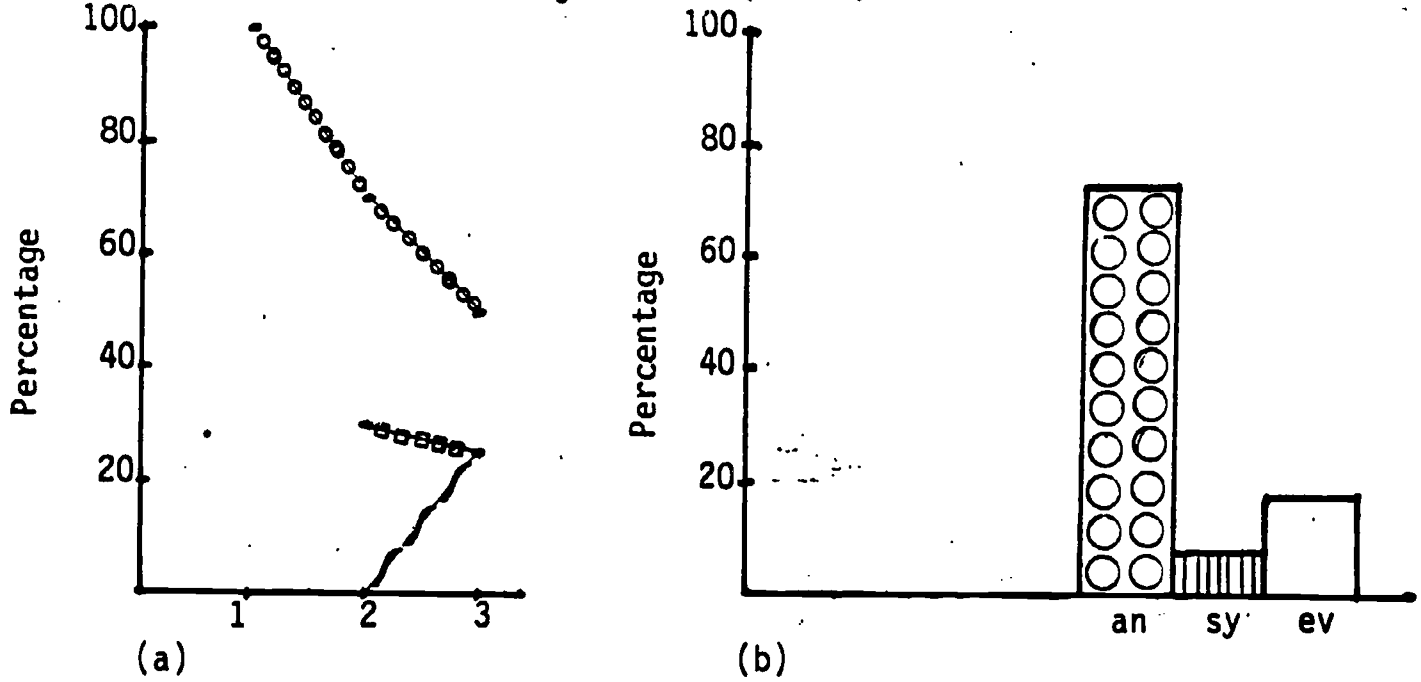
(b_2)

(b_1) - Average percentages of cognitive levels required across five quizzes for Instructor 16

(b_2) - Average percentages of cognitive levels required across three exams for Instructor 16

kn - knowledge
co - comprehension
ap - application

Figure 5.19 (a & b)



(a) - Percentage of cognitive levels required on exams for Instructor 20

1 - Exam #1 = analysis
2 - Exam #2 = synthesis
3 - Final exam = evaluation

(b) - Average percentages of cognitive levels required across three exams for Instructor 20

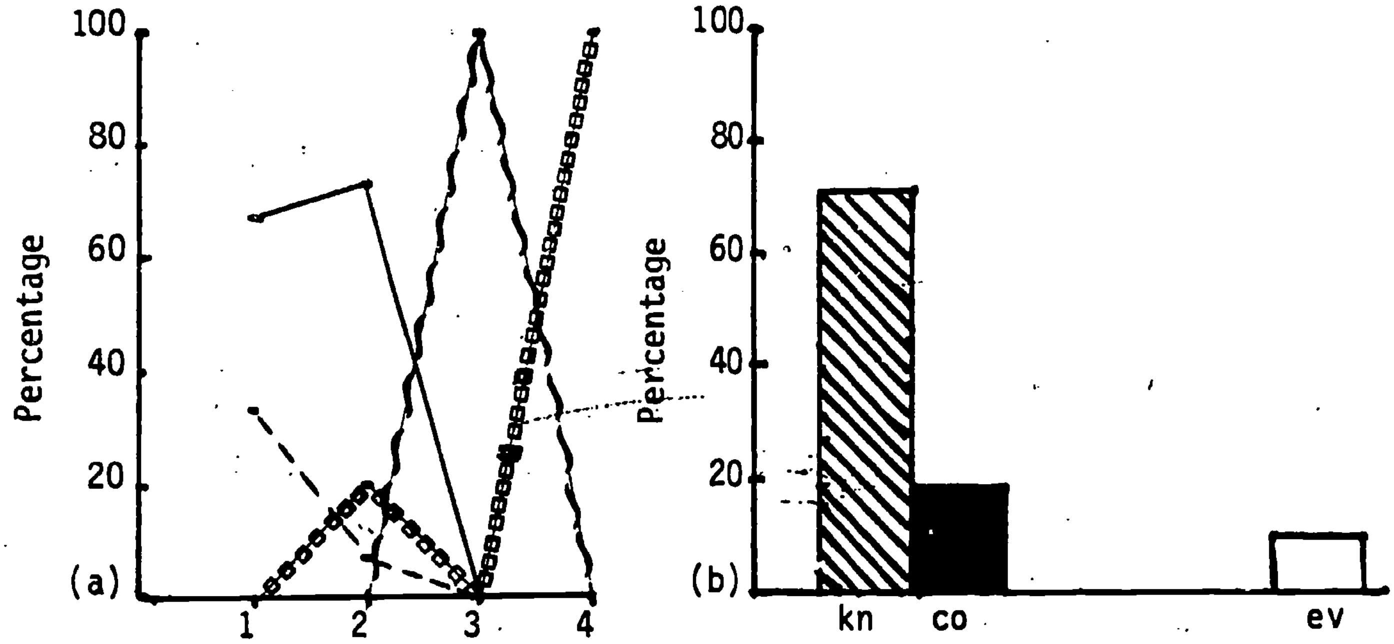
an - analysis
sy - synthesis
ev - evaluation

two highest levels. As is indicated in Figure 5.20(a) the mid-term exam included questions at the knowledge and comprehension levels and the final exam included questions at the knowledge, comprehension and evaluation levels. Both of these exams were comprised of true/false multiple-choice and essay questions. The Written Final Project required the students to perform at the synthesis level and the Extra Credit Essay was at the evaluation level. The average percentage of each cognitive level required on the two exams are graphed in Figure 5.20(b) - 71% knowledge, 19% comprehension, 10% evaluation.

The evaluation instruments for Instructor #25 consisted of a Written Report and a Final Exam. For the written report the students were able to choose between two essay questions--one (the easy one) which required the students to respond at the comprehension level and the other (the hard question) which required them to respond at the evaluation level. On the Final Exam the students were given two essay questions from which they were to choose one to answer. Both of these questions required the students to respond at the analysis level. (The observer who sat in on this course commented, "This is not an easy course!") Also, as noted earlier in this report, this was the only lower-division required course which was rated in the top five in the enjoyment ratings (refer to Table 5.8, p.48).

The cognitive levels required in the evaluation instrument of Instructor #27 are graphed in Figure 5.21(a). Here, as in many other large classes, questions at the knowledge and comprehension levels predominate. All of the exams in this class were comprised of

Figure 5.20 (a & b)



(a) (b)

(a) - Percentage of cognitive levels required on exams and written assignments for Instructor 24

1 - Midterm exam
2 - Final exam
3 - Written final project
4 - Extra credit essay

—— = knowledge
- - - = comprehension
= synthesis
= evaluation

(b) - Average percentage of cognitive levels required across two exams for Instructor 24

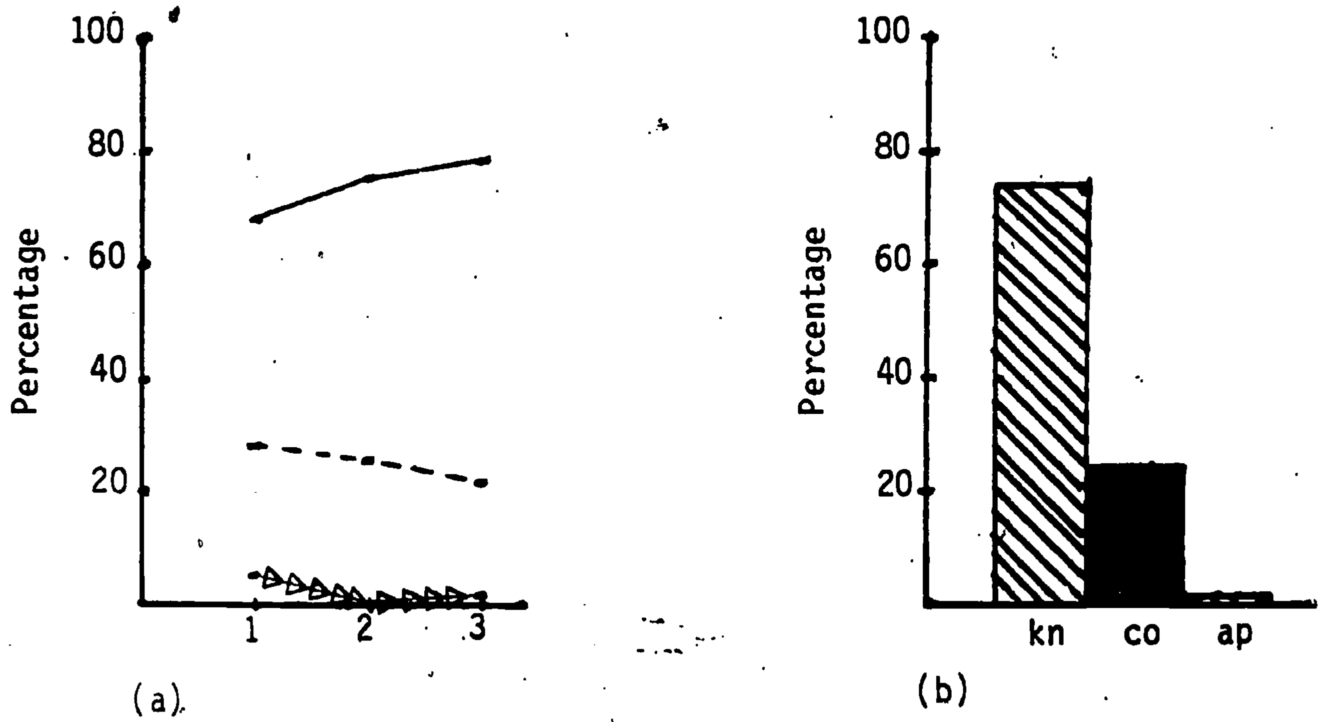
kn - knowledge
co - comprehension
ev - evaluation

multiple-choice questions. Figure 5.21(b) shows that 74% of the questions across the three exams were at the knowledge level, 24.7% were at the comprehension level and only 1.3% were at the application level.

The last instructor in the College of Liberal Arts whose evaluation instruments were analyzed was Instructor #28. This instructor was ranked #1 in the enjoyment ratings despite the fact that he only gave two exams (consisting of one question each), one at the synthesis level (the mid-term) and one at the analysis level (the final). The students did not have several questions from which to choose, they all had to answer the same questions.

Range of cognitive level across enjoyment rankings of Instructors. On the Student Attitude Survey which was discussed earlier, the students were asked "How did you enjoy attending this class?" The students then rated how well they liked the course on a scale of 1 (yes, very much) to 5 (no, not at all). Averages of these ratings were computed for each instructor and a ranking of the most enjoyed course down to the least enjoyed course was formed. When the range of cognitive levels was determined for each professor based on his/her quizzes, exams, homework assignments, and term papers it was found that instructors whose evaluation instruments required that the students use analysis-, synthesis-, and/or evaluation-level thinking processes were rated in the top half of the enjoyment rankings (see Table 5.31). The rankings for the five instructors whose evaluation instruments went beyond application were ranked 1, 2, 3, 5, and 7, respectively. The implication is that students who are challenged to use analytical, synthesis, or evaluative

Figure 5.21 (a & b)



(a) - Percentage of cognitive levels required on exams for Instructor 27

1 - Exam #1
2 - Exam #2
3 - Exam #3

——— = knowledge
- - - = comprehension
▷▷▷▷ = application

(b) - Average percentages of cognitive levels required across three exams for Instructor 27

kn - knowledge
co - comprehension
ap - application

TABLE 5.31

Cognitive Levels Tested by Instructor/Enjoyment Rating

	Mean	Type Class*	Required?	# Students	% Given A	B	C	D/F	Cr	Avg GPA	Instr. Code	Cognitive Levels** K	C	Ap	An	S	E
1.	1.3548	U	N	130	20	35	26	5	6	2.74	28					x	x
2.	2.0000	U	N	200	8	28	22	11	24	2.32	24	x	x			x	x
3.	2.0057	L	R	220	27	43	16	8	-	2.90	25		x		x		x
4.	2.1186	U	N	90	20	23	26	13	9	2.51	27	x	x	x			
5.	2.1688	L	N	200	13	29	35	14	1	2.40	12		x	x	x		
6.	2.2110	U	N	140	26	43	16	5	9	2.87	11	x	x				
7.	2.2281	L	R	300	10	30	31	21	-	2.17	20				x	x	x
8.	2.3826	L	R	140	10	30	28	29	-	2.01	13	x	x	x			
9.	2.5739	U	R	130	18	21	30	27	1	2.18	15			x			
10.	2.7059	U	N	140	13	54	26	3	-	2.78	17	x	x				
11.	2.7113	U	R	350	32	36	23	5	1	2.95	22	x	x	x			
12.	2.8296	L	R	250	30	32	17	14	1	2.74	29	x	x	x			
13.	2.8356	U	N	110	13	28	31	11	3	2.47	26	x	x	x			
14.	2.9914	U	R	200	9	36	31	15	3	2.37	21		x	x			
15.	3.2658	U	N	120	12	31	36	13	3	2.39	14	x	x	x			
16.	3.3016	L	R	120	6	12	22	44	2	1.47	23		x	x			
17.	4.0561	L	R	130	10	12	33	38	1	1.83	16	x	x	x			
18.		U	R	300	13	19	31	18	1	2.23	18			x	x		
19.		L	R	300	8	28	37	16	-	2.23	19	x	x	x			

*Type Class
U = Upper division - Jr/Sr
L = Lower division - Fr/Soph

**Cognitive Levels
K - Knowledge
C - Comprehension
Ap - Application
An - Analysis
S - Synthesis
E - Evaluation

thinking enjoy the course more. Further research into the relationship between students' attitudes toward a course and the cognitive level required by the exams, etc., would be worthwhile.

Support Assistance Needs Survey Data

During the Spring semester, 1981 a survey was sent to 126 faculty members who were teaching large classes or had taught large classes during the previous semester in the four target colleges. The purpose of this survey (see sample in Appendix E) was to acquire information from the UT faculty concerning the adequacy of the support assistance which is provided to them. Sixty-nine completed survey forms were returned, a response rate of 55%. The results obtained from this survey are shown in Table 5.32.

The survey form was divided into three sections: (1) a section which dealt with TA/clerical assistance, (2) a section which asked about the media assistance, and (3) a section concerning the teaching/learning environment in specific classrooms on the UT campus.

Under TA/clerical assistance needs, the overall feeling seemed to be that more help was needed; especially for grading, leading help/discussion sessions and the development of AV aids. The average amount of additional TA time which is needed is approximately 15 hrs./week.

TABLE 5.32

Support Assistance Needs Survey Results

Survey Question	NS	B	E	LA	Overall
# responses	29	24	7	66	69
1. Average class size	190	180	190	210	190
2. Average #TA hrs/class/week	23	17	25	18	20
3. Other forms of assistance?	y=8 n=8	y=10 n=5	y=4 n=1	y=6 n=25	y=28 n=39
4. Could use more help?	y=7 n=8	y=11 n=2	y=1 n=4	y=18 n=9	y=37 n=23
5. Current TA's responsibilities					
Teach Labs	5	0	2	1	8
*Grading	9	9	1	28	47
*Office hrs.	7	7	0	20	34
*Help/discussion sessions	8	4	0	8	20
Record keeping	1	7	1	4	13
AV assistance	1	4	0	5	10
Test preparation	1	6	0	12	19
Proctoring	2	4	1	0	7
Teaching	1	0	0	0	1
Lecture asst.	0	2	0	6	8
6. How many additional hrs/week of TA/grader/clerical assistance could be used?	10	20	10	10-20	~15
7. What additional duties would TA perform?					
*Grading	4	3	-	9	16
*Help/discussion sessions	2	4	-	11	17
*AV assistance	2	3	-	5	10
Office hours	-	3	-	4	7
Proctoring	-	1	-	3	4
Library research	1	1	-	1	3
Course development	1	-	-	1	2
Teaching	-	1	-	-	1

TABLE 5.32 (continued)

Survey Question	NS	B	E	LA	Overall
Record keeping	-	1	-	5	10
Test preparation	-	3	-	3	6
Divide work more evenly among TAs	-	-	-	4	4
8. Media assistance currently using in classes:					
*Chalk and blackboard	15	12	4	29	60
*16mm films	8	5	2	16	31
*Slides	9	9	2	9	29
LP albums	2	1	-	3	6
*Handouts	12	12	5	22	51
*Overhead projector	9	8	5	15	37
Videotapes	-	8	-	1	9
Audiotapes	2	5	1	5	13
Other	1	-	-	5	6
9. Media assistance would like to use but currently don't or cannot:					
Chalk and blackboard	-	-	-	-	0
*16mm films	-	1	-	4	5
*Slides	-	-	-	5	5
LP albums	-	-	-	3	3
Handouts	-	-	-	2	2
Overhead projector	-	-	-	3	3
*Videotape	4	2	-	10	16
*Audiotape	2	1	-	2	5
*Other	2	2	2	1	7
i.e.,					
a. Wall maps					
b. Computer-terminal projection device					
c. Audience response system					

TABLE 5.32 (continued)

Survey Question	NS	B	E	LA	Overall
10. Major obsticle to obtaining use of the above media assistance.					
*Not enough funds	2	4	-	11	17
*Rooms don't have facilities	2	2	1	3	8
Not enough time to make	-	-	-	3	3
Equipment failures	-	2	-	-	2

*Highest number of responses to that item.

Under Media Assistance needs the respondents said they currently use (in order of # respondents indicating use): (1) chalk and blackboard, (2) handouts, (3) overhead projector, (4) 16mm films, and (5) slides. Though many of the respondents were happy using what they were currently using, a number indicated that there were some forms of media assistance they would like to use, but could not presently do so. These forms of media assistance (in order of their preference) are: (1) videotapes, (2) other (i.e., wall maps, computer-terminal projection device, audience response systems), (3) 16mm films, (4) slides, and (5) audiotape. The primary obstacle to obtaining the needed types of AV assistance is that not enough departmental funds are appropriated for this type of expenditure. The secondary obstacle is that many of the large classrooms are not equipped with the AV-oriented instructor in mind.

The instructors who responded to this survey were also asked to comment on the teaching/learning environment provided by the particular rooms they have used for teaching large classes. Their comments were combined with those received in the interview portion of the study and are summarized in Appendix G.

Finally, the respondents were asked to provide any additional comments about the adequacy of the support assistance available at UT-Austin. The following statements provide a summary of these comments:

Natural Science

1. Most faculty members who responded feel that there is relatively adequate support for lower-division courses, but not for upper-division courses.

2. Upper-division courses should be smaller (50 student maximum).

3. The large lecture halls are poorly designed and there are not enough of them.

4. The CTE staff should supervise the design of all new classrooms and future renovation projects.

5. Large class instructors need paid time (2-4 weeks) to develop and improve courses.

Business

1. Need more TAs.

2. Need better and more multi-media facilities.

3. Need more money to develop AV aids.

4. There needs to be more emphasis on the quality of teaching.

Engineering

1. The equipment in multi-media rooms and general purpose classrooms should be checked daily and serviced immediately if needed.

2. Faculty members need more time for teaching preparation.

Liberal Arts

1. Need more TAs.

2. Need funds for handouts and media aids (especially films).

3. Need more media-equipped facilities in which to teach large classes.

4. Need a centralized AV department which provides services to all with little or no charge.

Instructor Interview Data

Each instructor who participated in the Direct Observation portion of the LCAP study was interviewed by an LCAP staff member. In addition, 24 other instructors who were teaching large classes or who had recently taught a large class volunteered their time to be interviewed. The interviews lasted approximately 45 minutes and were audio-taped. A list of specific questions was used to guide the interviews (see Appendix D).

Similar interviews were conducted by Stephen C. Brock in 1976 at Kansas State University. In these interviews the instructors identified four main problem areas in teaching large introductory college courses: student anonymity, student heterogeneity, utilizing teaching assistants, and testing and grading. These instructors' approaches to dealing with the above problems are presented in Brock's paper "Practitioners' Views on Teaching the Large Introductory College Course." The advice given by these instructors is very similar to that given by the UT faculty who were interviewed for this study. Thus, the problems identified and approaches to dealing with these problems here at UT can be utilized by instructors at other institutions in which large classes are taught.

In the UT interviews the instructor comments have been broken down into the following categories:

1. Comments concerning interactions with students
   a. Methods to help students learn
   b. Instructional assistance
   c. Getting feedback from students
   d. Encourging student participation
   e. Motivating students
   f. Homework
   g. Keeping the noise level down

2. Ways to personalize instruction

3. Level of main goals for large classes

4. Instructor comments about exams
   a. Problems in giving exams to large classes
   b. Evaluation procedure
   c. Returning exams and homework (logistics)
   d. Grading exams in large classes
   e. Ways to deter cheating
   f. What to do when students challenge exam grades

5. Some differences between large and small classes

6. The ideal class size

7. Characteristics of a good instructor

8. Suggestions to the novice large class instructor
   a. Techniques
   b. Organization
   c. Discipline
   d. Miscellaneous

9. The teaching/learning environment at UT-Austin

10. Miscellaneous comments

11. Recommendations to the administration

<u>Comments concerning interactions with students</u>.

To begin with, the primary concern of the faculty members who were interviewed was the lack of personal interaction with the students in large classes. Because there is very little contact between the student and instructor, the instructors try using many methods to assist the student in the learning process. For achieving student learning, they were unanimous in their feelings that organization, on the instructors' part, is essential. This organization is evidenced in clear, written handouts and objectives, repetition of main points, and the skillful use of multi-media to enhance lectures. Second, the instructors felt that instructor enthusiasm is essential to encourage the students' involvement in the content. Eye-contact, use of a variety of teaching strategies, interesting examples and illustrations are only a few of the ways to show the students that the instructor enjoys what he/she is teaching <u>and</u> enjoys teaching. The third way to assist student learning is to get them actively involved in class. The consensus was that passive students are not actively engaged in the learning process and, thus, do not learn as much as students who are involved somehow during the lecture. A fourth method for assisting student learning is for the instructor to be available to answer questions and provide personal help during his/her office hours. It is sometimes difficult to convince students to come see the instructor, so he/she must work at convincing the students that they are welcome and wanted during those hours. The thing most often mentioned by students as being most helpful to them in learning the course content is the scheduling of help sessions periodically during the semester. Many of the instructors who were interviewed concurred with them. And, finally, many of the instructors felt that taking attendance or giving "pop" quizzes also provide a means for the students to keep up in class and, thus, learn more.

Instructional assistance, in the form of handouts, multi-media assisted lectures, controlled notes, etc. provide the students with tangible assistnce in organizing their learning. If complex theories or drawings are shown on overhead transparencies or slides, it is much easier for the students to attend to what is being said about the topic if they are not frantically trying to transfer what they see on the screen to their papers. The instructors feel that this type of assistance is especially necessary in large classes.

Often it is difficult to get feedback from students in large classes concerning their progress in learning the content or their opinions about the instructor's ability to convey the content to them. Many of the instructors who were interviewed said that they give relatively frequent short (1-3 questions) quizzes to obtain feedback on the students' progress with the content and they usually ask the students to provide some feedback to them on the back of the quiz about how they felt the course was going at that time. Also, research indicates that students who are tested frequently and provided with feedback on their progress learn the content better and retain it for a longer period of time than do those who are only tested once or twice a semester (Bloom, 1980).

Getting students to participate in large classes is usually <u>very</u> difficult. The size of the class makes many students reticent to share their ideas and many students also feel that if they ask a question they will be wasting the time of the other 100+ students in the class. To encourage student participation the instructors who were interviewed stated that the instructor must present him/herself to the class as being a very accessible person. Several things which provide this type of atmosphere are when the instructor is courteous to the students who wish to participate and when he/she uses positive reinforcement (i.e., "Yes, that's an excellent idea") to let the students know their contributions are appreciated. In addition, if the instructor wishes for the students to answer questions, he/she must ask questions frequently, directing them to different people, and provide ample time after the question for the student to formulate an answer.

Motivating students in large classes seems to be another area of concern for the instructors. For many instructors, grades are used to motivate students to study. Others try to impart motivation to the students through their own enthusiasm. Still others attempt to relate the content being discussed to their progress in future courses or to their future careers. Probably the most effective means of motivation consists of a combination of these techniques.

Assigning homework (which will be checked) in a large class can become a real headache for the instructor unless he/she has ample graders or TAs to assist in checking it. However, for some courses, homework is an essential part of the learning process. One suggestion for instructors of these courses is that the students be required to submit their homework on a standard size paper. This makes it much easier for the instructor to keep track of it. Another suggestion is to have all homework assignments returned in the smaller discussion sections. This takes much less class time.

Frequently, when students get in a large class, they tend to talk more during the class because they assume the instructor will not know who is talking. The instructors who were interviewed agreed unanimously that the only method for dealing with this problem is to set down some rules right at the beginning of the semester and enforce them. These rules on classroom behavior should be put in writing and also stated verbally several times. The noise problem and ineffective discipline or governing procedures in large classes were often stated by students as a source of frustration in large classes.

Ways to personalize instruction.

Students in large classes frequently state that they feel like nothing but numbers. They usually don't know the instructor and they also may never get to know the students who sit near them in class. The instructors who were interviewed indicated that though one never knows all of the students in one's large classes, nevertheless, the students seem to appreciate any sincere attempt by the instructor to learn the names and faces of as many as possible. There are several methods which can be used to help instructors become acquainted with their students. One method is to have the students fill out a background information sheet the first day of class. This provides a little more information about each student than his or her name and thus makes it easier to match names with certain characteristics. Another method for getting to know the students is for the instructor to visit the labs frequently or lead a different discussion section each week. Students can also be encouraged to talk to instructors if they stay a while after class. In addition, instructors can provide an open invitation to talk with them in his/her office. Seating charts are also a valuable tool for learning names.

Several instructors indicated that students seem more willing to talk if they (the instructors) introduce themselves on the first day and indicate why they are teaching the course and why they are interested in the subject. This little bit of self-disclosure makes the students feel they know the instructor on a more personal basis.

The use of humor in lectures is also a way to "break the ice" with students. Students frequently rate instructors who used humor to liven up their lectures as being more effective. Again, they probably feel closer to the instructor because they know he/she has a sense of humor.

One thing that the interviewed instructors stressed is the necessity of beginning and ending on time! If the instructor indicates in this way, that class time is a valuable commodity, students will respond by arriving on time and not leaving early.

Finally, instruction can be personalized if the instructor is receptive to <u>all</u> student questions and treats the students as a group of individuals. Indicating a concern for the students through verbal and non-verbal actions helps break down the barrier in large classes.

<u>Level of main goals for classes.</u>

One of the questions which was asked during the LCAP interviews was, "What are your main goals for the students who are taking this course?" The goals which were stated were then categorized according to Bloom's

Taxonomy of the Cognitive Domain. The results are shown in Table 5.33. As we can see from this information, a majority of the goals for these large classes are at the Knowledge/Comprehension level. This may be because most of these classes are introductory courses, but in many cases it is because the instructors feel they have to give multiple-choice exams in order to get them graded rapidly. The instructors who indicated higher level goals for their students also indicated that they give essay exams, either exclusively or in conjunction with other types of exam questions.

Instructor comments about exams

Giving exams in large classes seems to be the biggest problem faced by the instructors. It takes a great deal of time and clerical assistance to type, collate and staple 100+ exams. It also takes quite a bit of class time to pass out the exams and make sure everyone's exam has all of the proper pages in the correct order and that everyone has an answer sheet. Due to the crowded conditions in many of the large lecture halls on campus, the instructor must develop 2-3 forms of the exam to deter cheating. This, also, is quite time-consuming.

During the interviews the instructors were asked what types of evaluation they used to determine a student's final grade. Their responses are given in Table 5.34. This table shows that most of the instructors give objective exams and most of them give 3-4 exams during the semester. Totally subjective exams are only given by some of the instructors in Liberal Arts while several from Natural Science and one

TABLE 5.33

Cognitive Levels for Main Goals of Large Class Instructors

Department	Know./Comp.	Level of Goal Application	Anal./Syn./Eval.
Economics	2*	4	
History		1	2
Government		1	1
Psychology	4	4	2
Classics	1	1	
Astronomy		1	1
Home Economics		1	1
Geography	2		
Engineering	3	2	
Business	20	4	
Total	32	19	7

* Number of instructors who, when interviewed, stated a goal which could be categorized into this level of Bloom's Taxonomy.

TABLE 5.34

Forms of Evaluation Used in Large Classes

Type of Evaluation				# Exams				Types of Exams		
College	Paper	Quizzes	Homework	1	2	3	4	Obj.	Subj.	Both
Liberal Arts	3*	1	2		3	8	3	2	3	3
Natural Science	1	1	2		2		2	3		2
Engineering					1			1		
Business	1	1	1		2	1	4	4		1
Totals	5	3	5		8	9	9	10	3	6

*Number of instructors who, when interveiwed, said they evaluate students in this way. Some instructors used more than one method of evaluation.

from Engineering give exams which contain both objective and subjective questions. (Because some of the interviews strayed into other topics, the data do not necessarily represent responses to this question from all of those interviewed.)

A major logistical problem in large classes is determining the most efficient way to return exams and/or homework papers. If an instructor has a class of 200-500 students this process could conceivably take most of the class period. However, some of the instructors offered the following solutions to this problem:

1. Place the exams/homework in boxes which have been alphabetized. These boxes are then placed either on the stage at the front of the room or at spots around the perimeter of the room. Call out several letters at a time and have students go to the box which is marked with the first letter of their last name.

2. Have papers in folders which are alphabetized and let the TA come a little early and stay a little late to hand them out.

3. For returning homework, have them put their row number on the sheet before they hand it in and then pass them back by row.

4. If the class has discussion sections, hand them back in those smaller groups.

The task of assigning grades in a large class also poses a problem. This is because the grades in a large class tend to form a continuum with no natural breaks between A's and B's or C's and D's. Because of this the large class instructors who were interviewed have suggested that one <u>must</u> specify a point/grade policy at the beginning of the course and not deviate from it. Another suggestion is that large class instructors should either make the exams long enough or difficult enough so that they can be scaled up. This makes the grades spread out more. And finally, several instructors suggested that large class instructors should use criterion reference grading. Above all, they stress, set your standards and stick to them but always be _extremely_ fair.

Because of the crowded seating conditions in many, if not most, of the large lecture halls methods to deter cheating are necessary for each instructor to develop and use. The interviewed instructors stressed that students must know that cheating is not tolerated in the class _and_ the instructor must know his/her rights as an instructor and the proper methods for dealing with cheaters. The best ways to deter cheating seem to be: (1) put space between each student (if possible), (2) have an ample supply of proctors in the room, (3) make up 2-3 forms of the exam, and (4) check each student's ID as he/she turns in the exam. This takes a lot of time, but it seems to be necessary.

Though it doesn't happen frequently, instructors must be prepared in case a student decides to challenge his/her exam grade. The interviewed instructors provided three possible solutions to the students' challenge.

1. Make the student defend his/her answer _in writing_ with references.
2. For essay exams, let the student grade his/her own paper using the answer key, then have him/her defend that grade if there are discrepancies.
3. Let any student who has a complaint bring it to you and you will re-grade the _whole_ exam. (The grade will usually go down if the instructor rather than the TA grades it.)

Differences between large and small classes

During the interviews the instructors were asked what they might do differently if they were teaching the content being presented in their large class to a smaller group. The primary differences centered on student involvement; the smaller the class the more student participation and involvement in the class. The major differences which they cited are listed below:

Large

(?)
1. Lecture must be more formal.
2. Feel like you are doing a service for the department.
3. Must have good TA support
4. Must establish control at the beginning of the semester.

(+)
5. Gives instructor more of a "high".
6. Students inclined to laugh more freely, clap and boo.
7. Efficient method of information transfer.
8. More diversity of opinion.

(-)
9. Students more likely to be absent.
10. Students read paper.
11. Students arrive late and leave early.
12. Students talk in class.
13. Takes more preparation time.
14. Can't have much student participation.
15. Can't get to know students or their weaknesses or strengths
16. More physically and mentally demanding.
17. The paperwork and record keeping are extremely time-consuming.
18. The class spirit doesn't develop. The students remain individuals.

Small

(+)
1. More discussions.
2. Can sense the level of student understanding.
3. Cover as much material as large class but with discussion.
4. Students more attentive and participatory.
5. Can build lectures around student questions.
6. Students can do in-class presentations.
7. You can assign more written work.
8. You can have more reserve readings.
9. You can skip over some of the material.
10. You don't have to rely on AV aids as much.
11. You can teach procedures and techniques.
12. Can get to know the students.
13. Can go more into the "meat" of a subject.
14. Can be more flexible.
15. Can give essay exams.

(-)
16. Don't have anyone to assist. with AV aids.

Large (con't)

19. Grading is the hardest part of teaching a large class.
20. <u>Must</u> be <u>very</u> organized.
21. Can't provide individual feedback to students.
22. You have to be a showman.
23. Students won't ask questions in class.
24. Have to give objective tests.
25. Cover less material because you feel you have to repeat more often.

As can be seen from these lists, negative comments tend to predominate in the large class list while the comments about small classes are primarily positive. This indicates instructors have a more positive feeling about teaching smaller classes and a more negative feeling about teaching larger classes. Perhaps if more support were provided for large class instructors they would not enter this situation with such negative attitudes.

Ideal Class Size

When asked what size class they would prefer to teach 59.5% of the instructors who were interviewed said that they prefer classes with from 1-50 students and 73.8% indicated they preferred classes with less than 100 students (see Table 5.35). More of the instructors in Liberal Arts and Business like larger classes than do those in Natural Science or Engineering. The subject matter taught in the courses probably has a lot to do with these preferences. Problem solving and the other skills needed in the more technical fields can be taught more effectively with smaller teacher/student ratios in the classes.

TABLE 5.35

LCAP Instructor Class Size Preferences

College	Class Size 1-15	16-30	31-50	51-100	101-200	200+	Totals
Liberal Arts	7*	2	5	3	1	3	21
Natural Science		2	1	2	2		7
Engineering		1	3				4
Business	1	2	1	1	4	1	10
Total	8	7	10	6	7	4	42
	19.0%	16.7%	23.8%	14.3%	16.7%	9.5%	
	59.5% (1-50)			40.5% (51-200+)			
	73.8% (1-100)				26.2% (101-200+)		

*Number of instructors who chose this size class as the size they would prefer to teach.

Characteristics of a good large class instructor

When the instructors were asked what qualities an instructor must have if he/she is going to be an effective and good large class instructor, the thing which they mentioned first was -

"Show your students you really care about them."

There was a unanimous feeling that if the students feel that the instructor is concerned about each of them and their progress, they will work harder in the course and enjoy it more. There are many ways to communicate this concern, most of which were cited previously in the section entitled Ways to personalize instruction on p.203.

Along with caring about the students, an effective large class instructor should -

"Take the students very seriously and let them know that you take your teaching very seriously."

Students need to know that their ideas and comments are valued and welcomed during class. Instructors (especially in large classes) should never indicate verbally or non-verbally that a student's answer is dumb or worthless. If this instructor attitude is communicated to the students it will stifle their curiosity and creativity. It will also snuff out all student participation.

Though the class is large, the LCAP instructors stressed that the good instructor -

"Maintains eye contact with the class."

To do this the good instructor moves about during the lecture and looks directly at the individual students. This gives the students the feeling that the instructor is speaking directly to each individual. If the classroom has aisles, the good instructor will walk up and down the aisles while lecturing, maintaining eye contact while walking. The LCAP instructors all felt that the more the instructor brings the lecture out to the students, the better the students feel about the class.

Another extremely important quality which is exibited by good large class instructors is -

"Enthusiasm about the subject."

This enthusiasm must show in the instructor's voice inflection, energetic lecture style, facial expressions, etc. This takes quite a bit of work on the instructor's part, but enthusiasm is catching (and so is the lack of it).

Along this same line of thought, a number of the LCAP instructors stressed that the good instructor -

"Has got to be a performer with a persona that is somewhat different from the one you are from day to day."

Thus, even if the instructor is basically a shy person, it will help if he/she can project the image of a person who is accessible and welcomes student-teacher interaction, both during and after class. This persona acquisition may not be necessary, however, for instructors who are basically outgoing persons. (It seems, from our observations during LCAP and prior to this study, that the most effective large class instructors are somewhat "hams" and enjoy "playing to large audiences.")

A final quality which the LCAP instructors felt is necessary for effective large class instruction is -

"Confidence in yourself and what you are doing."

This quality is shown when the instructor demonstrates that he/she can cope with unexpected circumstances (e.g., if the bulb blows in the overhead be able to continue on the board). This confidence in oneself is also manifested when the instructor takes responsibility for whatever happens in the class. For example, if the students come in late, leave early, talk in class, etc., the instructor is demonstrating a lack of confidence in his/her ability and right to govern by not setting down and enforcing rules which deal with these student activities.

Thus, the LCAP instructors who were interviewed see the effective large class instructor as a person who communicates his/her concern and accessibility to the students (by eye contact, enthusiasm, learning names) while maintaining some strict rules for their in-class behavior.

Suggestions to the novice

To a person who is faced with teaching a large class for the first time it can be an unnerving experience. To assist these first-timers, the LCAP instructors were asked to provide suggestions which they would give to someone who is in this situation. Their comments have been classified into three areas; Organization, Technique, and Discipline, and are listed below:

Organization

1. Be organized and consistent!
2. Be very efficient in managerial things so the class flows smoothly. This helps reinforce that you think class time is a precious commodity.
3. Outline everything in explicit detail - have citations available if students ask.
4. Be prepared!
5. Put all assignments in writing on a handout so they won't get misinterpreted.
6. If you do calculations, show all the mathematics so they can see it. Make it precise so a student who hasn't worked with fractions or percentages or whatever for a few years will be able to follow what was done.
7. You can be dull and boring, but it's better for the students if you are dull and boring in an organized fashion.

Technique

1. Talk to someone who has done it, and done it well!!

2. Be enthusiastic about the subject matter!
   a. Don't teach anything you aren't interested in (if possible).

3. Use various teaching methods - lecture, discussion, AV aids, guest lecturers, etc.

4. Deliver the information in segments -- don't lecture the whole time. Leave time periodically for questions.

5. Encourage student questions.

6. Be able to present the material in a clear, organized fashion and in an interesting manner.

7. You must have a sense of humor (not necessarily for only telling jokes, but for life in general).

8. Don't get flustered; be in control!

9. Be incredibly, scrupulously fair!

10. Remember that it is a performance and that you are on stage and better look good. You must work at it (the presentation) all the time and you are never satisfied. You must be prepared.

Discipline

1. Get control and establish rules of behavior at the very beginning.

2. Be sure the students know that you care if they learn.

3. Encourage study throughout the semester - not just before exams.

4. Don't let grades get too high on the first exam. Attendance tends to nosedive if you do.

Though this may seem like a great deal for the novice large class instructor to remember and attempt to do, the experiences of these instructors as well as those interviewed by Brock (1976) at Kansas State University, indicate that keeping these things in mind can make teaching a large class a better experience.

Miscellaneous comments

Throughout the interviews with the LCAP instructors there were times when the instructors would mention something which affected their teaching in large classes, but the statement was difficult to classify into one of the major categories being used by LCAP staff. These comments provide some valuable insights into large class instruction and it was felt they should not be omitted from this summary. (These comments are written below. No attempt will be made to comment on these statements; they are self-explanatory.)

1. There is a difference between teaching Fall and Spring; Spring classes seem to jell much faster.

2. The point must be made that size affects the quality of the enterprise.

3. There are only two reasons to have a lecture. One is that the information being conveyed is not published. The other is that the audience is incapable of reading.

4. Because we are overcrowded and under-staffed, though we have excellent facilities and excellent courses (in Engineering), the students are probably learning a little less. They are getting less valuable experience.

5. The students have commented that they felt their writing skills have really suffered here because they are never asked to write anything.

6. Good students seem to feel that frequently their comprehension is not adequately judged because one cannot give essay exams in a large class.

7. Students feel that their attention in class suffers because of the cramped conditions in many of the rooms.

8. In the article in the UT Most on the "Best and Worst Professors in the University", it was interesting to note that all of the professors who were cited as being really good professors in large classes have similar characteristics: entertaining, active, caring and perhaps overly dramatic.

Recommendations to the Administration

During the interviews the instructors were asked to provide us with some suggestions, which could be passed along to the administration, concerning things which they felt could be done to improve the quality of teaching/learning in large classes here at UT. These recommendations have been divided by College and are listed below:

Liberal Arts

1. Control over TAs at the end of the semester so they don't leave without completing the grading, etc. Perhaps a release on their last paycheck.
2. Large classes should be 4 hr. courses with the 4th hr. being a discussion section.
3. Instructors of large classes should have 6-weeks summer salary support one summer to reorganize or develop the course and develop and/or find more visual aids.
4. Provide more assistance for entering Freshmen during Orientation on how to get along in large classes.
5. Large classes should only be assigned to people who want to teach them.
6. Recognition of some sort should be given to people who teach large classes. (As though it were important and appreciated.)
7. Provide money for more TA assistance so there can be more written work assigned and more discussion sections.

8. Do away with the Pass/Fail system. It makes students apathetic toward a course.

9. Provide more funds for AV aids.
   a. Provide, say, $200/semester for each large course for materials. This needs to be a budget item and not in the departmental operating budget.

10. Improve the atmosphere in large classrooms by painting them bright colors and decorating them in some way.

11. Need more large lecture halls with media facilities that are designed for teaching!
    a. Someone from CTE should be on all planning committees for new teaching facilities.

12. Need more medium-range auditoriums which seat 100-120.

13. Make sure people who become TAs can speak and write English!

14. Need more smaller classrooms in which to break up into discussion groups.

15. Need a nice AV library with equipment. We have an excellent book library, why shouldn't we have an excellent AV library?

16. 398T courses should concentrate more on presentation skills and not so much on writing test items.
    a. CTE should be given more people so they could teach it - the TAs would learn more.

17. Have the CIS percentiles compared only among large classes.

18. Stop hassling people with large classes. Give them more time to get grades in so they could give something besides multiple-choice exams.

Natural Science

1. Need to have plenty of blackboard space - especially in math.

2. Need more TAs and graders.

3. Provide money to hire proctors for exams in large classes.

4. Put more emphasis on teaching in personnel decisions with more objective evaluations of it.

5. Don't put young novice faculty into large classes; let them teach some smaller classes first to learn about the teaching process.

6. Make it clear that good teaching is valued here at UT and that it is a skill that can be improved.

7. People who teach large classes should <u>want</u> to teach them.

<u>Engineering</u>

1. Are we letting economics dictate too much? Is the level of confidence as high in large classes as in small classes?

2. Put some pigeon-holes outside the rooms for handing back papers.

3. Put more money and time into the frequent checking and repair of equipment in rooms (i.e., overheads).

4. Limit enrollment via academic qualifications either at the beginning level or at some intermediate level.

<u>Business</u>

1. Spend a little more time and money in the maintenance of buildings and equipment.

2. Screen those who will be teaching large courses to make sure they <u>want to</u> and <u>can</u>!

3. Persons who teach large classes should get additional help in the form of TAs, graders, proctors, clerical assistance, etc.

4. University needs to have a standardized form for listing mass lectures with discussion or lab sections listed in the class schedule.

5. Rennovate BEB 151 - it is a <u>terrible</u> room!

6. Give instructors release time before they begin teaching one of these big classes to prepare.

7. The reserve procedure in the library needs to be streamlined. It takes 2-3 <u>weeks</u> to get something put out.

8. It would be very helpful to have a room (like a mail room) where students could go to pick up exams and homework. Have one of these rooms in each building with alphabetical slots.

Summary of Recommendations

In looking over these recommendations they appear to fall into three major categories. First, the instructors feel that the facilities and equipment could be better maintained to provide a better atmosphere in which to teach these classes. Many instructors who use visual aids to enhance their lectures frequently are faced with malfunctioning equipment which causes them a great deal of frustration. Many also feel that the students would learn more effectively (and this is supported by research) if the lecture halls were not so drab (Sommer, 1969; Sommer, 1974). Second, there seems to be alot of concern in the area of TA support. According to the findings of this study (see section on Cognitive Levels of Professor's Evaluative Instruments, p.164) students feel they learn more and they enjoy classes in which they are tested via essay exams or a combination of objective questions and subjective (essay) questions. In order to test the students' knowledge in this manner, however, the instructor must have ample TA/grader support. Most of the instructors interviewed stated that they need additional TA support if they are going to use essay exams and/or papers to test the students' understanding of the content. And third, there needs to be more evidence from the administration that teaching is an important function in the university (i.e., without it there would be no University). This evidence could be povided in many ways: (1) if the administration would act on the first two recommendations stated above; (2) if faculty members were encouraged to improve and update their courses periodically, with the administration providing summer salary for several weeks to accomplish this task; (3) if funds were designated for each class to enable instructors to develop and use slides, transparencies, handouts, and films to promote greater student learning, and (4) if the administration would acknowledge that teaching well takes a great deal of time and effort but the results are well-educated, satisfied students. (For additional ideas for rewarding/recognizing teaching, please see article "Creating New Rewards for Faculty" in Appendix G.)

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APPENDIX A

SAMPLE FLIER SENT TO LARGE CLASS INSTRUCTORS

Please fill out and return this portion.

I am interested in participating in the following phase of the Large Class Analysis Project:

Direct Observation phase

Interview phase

Name: ____________________

Dept: ____________________

Campus Phone: ____________________

One of our staff will contact you with more information.

Return to:

Dr. Karron Lewis
Center for Teaching Effectiveness
Main 2202

PLEASE JOIN US IN THE

LARGE CLASS ANALYSIS PROJECT

A STUDY OF COMMON ATTITUDES AND PRACTICES IN LARGE CLASSES AT UT

CONDUCTED BY THE CENTER FOR TEACHING EFFECTIVENESS

WITH FUNDS PROVIDED BY
THE OFFICE OF THE PRESIDENT
THE UNIVERSITY OF TEXAS AT AUSTIN

Many faculty teach classes of 100+ and there are more to come. To assist the faculty in dealing with these classes, the Office of the President has provided funds to conduct a study of large classes during the 1980-81 academic year. This pamphlet is to acquaint you with the study and to solicit your participation and help.

TYPES OF PARTICIPATION

The study will be conducted at two levels of faculty participation:

A. DIRECT OBSERVATION: A total of 20 instructors (10 each semester) in the colleges of Business Administration, Natural Science, Liberal Arts and Engineering will be needed for the direct observation part of the study. This will involve the following:

1. having a student attitude survey administered at the beginning and end of the semester (20 minutes each time) in one large class;
2. keeping a log on the large class giving the instructor's comments and impressions about the "care and feeding" of that large class;
3. allowing a LCAP staff member to sit in on one class meeting a week to observe the types of activities which commonly occur;
4. sitting with a LCAP staff member for a 30-45 minute interview about your large class;
5. audiotaping 4 class periods for more accurate analysis of any questions posed during the class.

Any instructor interested in participating at this level can have a fuller explanation of the plan by contacting us at 471-1488.

B. INTERVIEW: A total of 50 additional large class instructors are being asked to discuss the "care and feeding" of large classes with an LCAP staff member in an hour interview to be scheduled at their convenience during the semester. The interview will be taped and the ideas and suggestions given by each instructor will be added to the rest to compile a list of recommended practices.

At the conclusion of the study we hope to:

1. learn what it is about large classes which students like and don't like and how that affects their learning;
2. learn what it is about large classes that instructors like and don't like and how that affects their teaching;
3. identify problems in large classes which are common in different disciplines;
4. identify problems which are unique to certain disciplines;
5. identify alternative solutions to the problems of large classes;
6. identify the levels of thought which are commonly taught in large classes;

The final product will be a booklet on large classes, common problems encountered and suggested solutions to alleviate those problems based on the experiences of the faculty here at UT. For the individual participant, it will provide an opportunity to explore his or her own thoughts on the teaching of large classes and share that experience with colleagues.

We hope you are intrigued enough with the idea of this study to volunteer your time and ideas. We particularly hope you are interested in participating in the Direct Observation component and we welcome the opportunity to explain it to you in more detail. If you are interested in being a contributor to this study or if you would like more information, please fill out the reverse side of this form and return it to the address indicated.

APPENDIX B

STUDENT ATTITUDE SURVEY

LARGE CLASS ANALYSIS PROJECT

Universities the size of Texas are faced with the prospect of having more and more large classes. In an effort to determine ways to make these classes useful learning experiences for students, the Office of the President has made funds available to the Center for Teaching Effectiveness to study student and faculty attitudes and ideas about large classes. We appreciate your cooperation in helping us conduct this important study.

SECTION I: Please mark your responses to each item on the separate answer sheet.

Columns

1-4 The last 4 digits of your social security number

5 My classification is:

1 = Freshman 2 = Sophomore 3 = Junior 4 = Senior 5 = Other

6 My sex is:

1 = Male 2 = Female

7 How many large (100+ students) classes have you attended before this one?

1 = none 2 = one 3 = two 4 = three 5 = four or more

8 Is this class:

1 = elective 2 = required

9 Do you think you are going to enjoy attending this class?

Yes, very much No, not at all

1 2 3 4 5

10 The college or school in which you are enrolled is: (Mark only one response)

0 = Liberal Arts	4 = Business Admin.	7 = Education
1 = Engineering	5 = Fine Arts	8 = Communication
2 = Pharmacy	6 = Architecture	9 = Other
3 = Nursing		

SECTION II: There are many things that an instructor does in class or builds into the course materials that are designed to help students learn efficiently. Below we have listed some of the things that other students have said were useful to them. PLEASE RATE THE FOLLOWING ITEMS BASED ON THEIR IMPORTANCE IN HELPING YOU LEARN. Use the scale below to respond to items 11 - 19.

1 - not important at all
2 - somewhat important
3 - moderately important
4 - quite important
5 - extremely important

11. Having the course topics and assignments aimed directly at your interests.
12. Feeling at ease when you talk to the instructor individually.
13. Being challenged by the material and the instructor to think for yourself.
14. Being able to control the pace and manner in which you learn.
15. Having the course material and assignments well organized.
16. Being able to actively participate in class.
17. Getting frequent feedback on your progress.
18. Having strong outside support material, like the text and supplementary readings.
19. Having an instructor who is very knowledgeable in the subject.

If there is something you feel is important to your learning which we have left out, please describe it briefly on the sheet provided.

- -

SECTION III: Your Preferred Class Size. Rank the following size classes according to the size class in which you feel you learn most efficiently. (#1 = most preferred class size.....#5 = least preferred class size.)

20. less than 15 students
21. 16-30 students
22. 31-50 students
23. 50-100 students
24. over 100 students

What is it about a class of the size you have ranked #1 that usually makes it so effective for you? (Please respond on the sheet provided.)

- -

SECTION IV: There are a lot of statements made about the pros and cons of large versus small classes. We'd like to get your reactions to some of these statements. Please use the scale below to indicate the extent to which you agree or disagree with each of the following statements.

1 - disagree strongly
2 - disagree moderately
3 - no opinion
4 - agree moderately
5 - agree strongly

<u>AS CLASSES GET LARGER</u> --

25. I get less feedback on how well I understand the material during the semester.
26. I feel less like a participant in the class.

27. Instructors seem to put more effort into the organization of the course.
28. The course content becomes mostly facts to be memorized.
29. I have the opportunity to take more responsibility for my own learning.
30. A good textbook and relevant outside readings become more important to my understanding of the content.
31. The pace of the course becomes less geared to the students' pace of learning.
32. I have more control over how involved I am in the class.
33. I am less likely to get to know other students in the class.
34. The material in the course can be covered more efficiently.
35. I'm less challenged to think for myself.
36. I feel I have more freedom because I am part of a crowd and not so noticeable.
37. The course is usually taught at a lower intellectual level than I like.
38. I am less likely to seek out the instructor for individual help.
39. The overall quality of instruction seems to get better.
40. I feel more distant from the instructor.
41. A students' inability to take good notes in class makes it difficult for him/her to do well on exams.

If you have any additional ideas about large versus small classes, please tell us about them by writing on the sheet provided.

- -

THANK YOU

FOR

YOUR COOPERATION!

LARGE CLASS ANALYSIS PROJECT

(Sheet for Additional Comments)

SECTION II: If there is something you feel is important to your learning which we have left out, please describe it below.

SECTION II: What class size did you rank #1?______________ What is it about a class of this size that usually makes it so effective for you?

SECTION IV: If you have any additional ideas about large versus small classes, please tell us about them below.

APPENDIX C

EXPANDED COGNITIVE INTERACTION ANALYSIS SYSTEM

AND

A BRIEF EXPLANATION OF ITS USE

Expanded CIAS Categories

1 - Accepting Student Attitudes
    1h - Humor

2 - Positive Reinforcement
    2f - Affective Instructor Comments

3 - Repeating a Student Response
    3f - Corrective Feedback
    3b - Building on Student Response

4 - Questions
    4c - Knowledge/Comprehension
    4e - Application (examples)
    4a - Analysis
    4y - Synthesis
    4j - Evaluation/Judgment
    4f - Affective
    4s - Process or Structure
    4r - Rhetorical Questions
    4p - Probing Questions
    4d - Calling on a student to respond

5 - Lecture
    5v - Simultaneous Verbal and Visual Presentation
    5e - Examples, Analogies
    5r - Review
    5x - Answering a Student Question
    5m - Mumbling
    5t - Reading Text Verbatum

6 - Providing Cues
    6m - Focusing on Main Points
    6d - Directions
    6s - Assignments, Process

7 - Criticism

8 - Cognitive Student Talk
    8c-8f - Answers to Questions 4c-4f
    8n - Doesn't Know
    8q - Student Question
    8h - Student Laughter

9 - Non-cognitive Student Talk

0 - Silence
    0b - Writing on Board (without talking)
    0m - Mumbling (whole class)
    0l - Listening/Watching

Expanded Cognitive Interaction Analysis System Categories

1 - Accepting Student Attitudes: Comments that communicate a non-threatening acceptance of student attitudes; student attitudes may be positive or negative; "You appear to be upset about this." "I'm glad to see you are all happy about the results from last week's test." "I realize this is somewhat difficult at first, but you'll catch on in no time."

   1h - Humor: Jokes or humorous statements made by the teacher. This is never negative, degrading or embarrassing in design or result.

2 - Positive Reinforcement: Praising students; communicating a definite value judgment indicating that the instructor really likes what the student said or did; "Excellent!" "Very good!" "Exactly right!"

   2f - Affective Instructor Comments: Statements made by the instructor which reveal his/her own feelings; "I'm feeling good today." "I really enjoy this slide." "This is not my favorite section."

3 - Repeating a Student Response: Teacher statements which repeat in the same or very similar words a student comment. This indicates that the teacher has heard the student statement but does not indicate whether it is correct or not.

   3f - Corrective Feedback: This includes negative statements which are non-punitive and non-threatening; saying "no" or "yes" or "That's correct" in a manner that provides feedback to students. This category would also include statements such as: "I don't want to deal with that subject now", or "I don't understand that question."

   3b - Building on Student Response: Teacher statements which build on the ideas of students. The teacher is developing the student's idea rather than his/her own idea. Ex: "As Tom stated, we can see that..."; "Let's develop Jane's idea a bit more."; "That idea suggests that..."

4 - Questions (If the level of the question cannot be determined, the observer should code a numeral 4 with no subscript.)

   4c - Knowledge/Comprehension: Factual (who, what, when, where) and Descriptive (describe steps) questions as well as questions which require the student to translate something into his/her own words, use an equation to solve a problem, or translate a statement into an equation.

   4e - Application: Questions which require the student to apply concepts to a specific situation or solve a problem where equations are not given. (Ex: "Can you give me an example..?", "How can we apply this...?")

   4a - Analysis: Questions which ask the student to distinguish relevant from extraneous material or distinguish facts from hypothesis. (Ex: "What does this mean?" "Why would...be true?")

4y - Synthesis: Questions which ask the student to design an original answer to a problem. (Ex: "Can we put these ideas into some pattern?")

4j - Evaluation/Judgment: Questions which ask the student to judge the value of materials in terms of internal and external criteria. (Ex: "Which is the best alternative?" "Is that conclusion right?")

4f - Affective: Questions which solicit student affective responses. (Ex: "Do you like...?" "How do you feel about that?")

4s - Process or Structure: Questions which relate to process including assignments or to the furthering of discussion. (Ex: "Are there any questions?" "Is the assignment clear?" "Would you repeat that?")

4r - Rhetorical Questions: Questions for which the teacher clearly expects no answer from the students.

4p - Probing: Questions which ask a student to clarify his/her answer, those which give hints to desired responses, or those which refocus the response to relate it to something else. (Ex: "Could you elaborate on that?" "Why do you say that?")

4d - Calling on Student: Calling on a student by name (or recognizing a student's desire to participate) with the intent that the student should talk.

5 - Lecture: Teacher statements which provide new information (not building on student information) to the students.

5v - Simultaneous Visual and Verbal Presentation: When a teacher uses a visual aid (overhead transparency, chalkboard, slides, etc.) in conjunction with the presentation of new material.

5e - Examples, Analogies: The teacher provides verbal descriptions of examples or analogies to illustrate points in the lecture.

5r - Review: The teacher reviews or restates concepts or facts discussed at an earlier time. (Ex: "As we said yesterday...")

5x - Answering a Student Question: Factual statements made by the teacher in reply to a student's question.

5m - Mumbling: Teacher lecture which is very soft or otherwise difficult to understand.

5t - Reading Text Verbatum: Teacher reads directly from textbook, overhead transparency, slide, etc.

6 - Providing Cues: Statements which indicate the scope and/or sequence of the content to be discussed. (Ex: "Today we will be looking at...")

6m - Focusing on Main Points: Statements which emphasize the importance of specific portions of the content being discussed. (Ex: "The first main point I want you to remember is..." "Be sure you understand the importance of this paragraph.")

6d - Directions: Statements which indicate that a student do something in response. (Ex: "L-ok on page 614." "Observe that blue line which separates the East from the West.")

6s - Assignments, Process: Statements which describe assignments or processes which the students are expected to complete. (Ex: "Your assignment for tomorrow is..." "Fill out the paper according to the directions given at the top of the page.")

7 - Criticism: Negative, punitive comments; strong criticism; blaming students. (Ex: "That's ridiculous." "Don't interrupt me when I'm giving my lecture.")

8 - Cognitive Student Talk: Talk by students which is subject-matter oriented; recalling facts; expressing ideas or opinions about topics under study. (Student comments which pertain to the subject but are not teacher solicited are recorded as 8 with no subscript.)

8c - 8f - Answers: Student answers to teacher questions 4c - 4f.

8n - Doesn't know: Student states he/she doesn't know the answer to a teacher question.

8q - Student Question: Student initiated question.

8h - Student Laughter: Student laughter as a response to an instructor comment or joke.

9 - Non-cognitive Student Talk: Talk by students which is not related to the subject matter; management comments by students. (Ex: "Can we leave now?" or "We sure could use a break.")

0 - Silence: Three seconds or more of silence; pauses when no communication exists.

0b - Writing on Board or Transparency (without talking): Teacher writes on the board or transparency without talking.

0m - Mumbling: Periods when the entire class or sections of the class are talking and no specific individual interactions can be discerned.

0l - Listening/Watching: Periods of time when the class is listening to a recording, watching slides or a film and no verbal communication is taking place.

Explanation of the Use of CIAS

The Expanded Cognitive Interaction Analysis System is designed to record the verbal interactions which occur in classrooms in Higher Education. It consists of 45 categories into which the verbal interactions which occur in a college or university classroom may be recorded.

One category from this system is recorded every three-seconds or when the interaction changes (whichever occurs first). The resulting sequence of numbers provides an in-depth look into the verbal activity which occurred in the classroom. For example, it is possible to detect what happens after an instructor poses a question (4). If the observer recorded a zero (0) there were three seconds of silence following the question which allowed the students some "think-time". If the 4 is followed by an eight (8), a student immediately responded to the question. A 4 (Question) followed by a 5 (Lecture) indicates that the instructor either answered his/her own question or, when a student didn't respond immediately, the instructor decided to elaborate or explain a concept or portion of the question further.

Using the total number of categories recorded, the observer can calculate the % of Teacher Talk which occurred as well as the % of Student Talk which took place. The percent of time the teacher or students spent in any one category can also be calculated to discover, say, whether the instructor spent an inordinate amount of time answering each student question.

Thus, this system can provide a great deal of quite specific feedback concerning the interactions which occur in classrooms in Higher Education and this feedback can be productively utilized to assist instructors in modifying and improving their teaching skills.

APPENDIX D

QUESTIONS ASKED DURING LCAP INTERVIEWS

QUESTIONS ASKED DURING LCAP INTERVIEWS

1. Which courses are you teaching or have you taught that are large?

2. What are your goals for the students in these courses?

3. What are your students like? (backgrounds, attitudes, etc.)

General

1. What kinds of things have you found that you can do which are most useful in helping the students learn?

   1a. How are these different from what you would do in a small class?

2. What do the students do that makes teaching a large class interesting?

3. What do the students do that makes teaching a large class difficult?

4. How do you motivate the students to learn?

5. How do you encourage student participation?

6. How do you evaluate student learning?

   6a. How do you write exams that are challenging but easy to grade?
   6b. Do you have suggestions about ways to give feedback to students?

Details

1. How do you get to know your students? Do you take roll?

2. How do you handle office hours?

   2a. How many office hours do you keep?
   2b. How many students do you usually see during your office hours?

3. How do you coordinate lecture with the lab or discussion sections?

4. How do you hand back papers and handouts efficiently?

5. Do you use more handouts in a large class? Why or Why not?

6. How do you grade efficiently and fairly in large classes?

7. How do you get feedback from your students? (About how they feel the course is going as well as how well they have mastered the content.)

8. How do you keep the noise level down in large classes?

9. If you could teach any size class, what would be your preference?

Miscellaneous

1. Is there anyone else who has taught a large class whom you would recommend we talk to?

2. Are there any other specific questions you would like to see answered by this study?

APPENDIX E

SUPPORT ASSISTANCE NEEDS SURVEY

LARGE CLASS
SUPPORT ASSISTANCE NEEDS
SURVEY

NAME:________________________ DEPARTMENT:________________________

(Note: If you are not teaching a large class this semester please answer the survey for the class(es) you taught last semester.)

1. What size classes are you teaching this semester (i.e., # students)?

   Class #1__________ Class #2__________ Class #3__________

2. How many TA hours do you have for each class?

   Class #1__________ Class #2__________ Class #3__________

   Do you have other forms of assistance (i.e., graders, proctors, etc.)?

   yes_____ no_____ How many?________________________

   Could you use additional assistance? yes_____ no_____

   How much more? _________ hours

   Currently, what are your TA's primary responsibilities?

   If you could get more TA time, what additional duties would you assign to him/her?

3. Do you have access to secretarial assistance for the preparation of exams, quizzes, and handouts? yes_____ no_____

   If not, would this type of assistance for your largest classes be helpful to you? yes_____ no_____

   Please comment:

4. Please (1) check the types of media assistance you currently use in your large classes and (2) circle those you would like to use if you could get access to them:

   ___ chalk and chalkboard
   ___ 16 mm films
   ___ slides
   ___ recordings (LP's)
   ___ handouts (class session outlines readings, diagrams, etc.)
   ___ overhead projector and transpariencies
   ___ videotapes
   ___ audiotapes
   ___ other________________________

   For the items you circled above, what seems to be the major obstacle to your gaining access to them?

Are there any media services on campus that you use regularly? Which ones?

5. What classrooms do you teach in this semester?

Class #1____________ Class #2______________ Class #3________ _______

Please describe how each of these classrooms could be improved to make it a more pleasant teaching/learning environment:

Classroom #1 -

Classroom #2 -

Classroom #3 -

Have you taught a large class in any classroom on campus that you particularly liked? If so, which one was it?_______________

What characteristics made it such a good classroom?

6. Please provide any additional comments below which you may have concerning the adequacy of the support assistance you have for teaching here at UT.

Please return to: Karron Lewis
Center for Teaching Effectiveness
MAI 2202

APPENDIX F

PROGRAMMED WORKBOOK FOR CIAS

Programmed Workbook
for Developing Coding Skills
using
Johnson's
Cognitive Interaction Analysis System
(CIAS)

by
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Faculty Development Specialist

Center for Teaching Effectiveness
The University of Texas at Austin

Cognitive Interaction Analysis System (CIAS)*
(*n ·ating scale is implied)

TEACHER TALK

1. Accepting student attitudes. Comments that communicate a non-threatening acceptance of student attitudes; student attitudes may be positive or negative; "You appear to be upset about this." "I'm glad to see all are happy about the results from last week's test."

2. Positive reinforcement. Praising students; communicating a definite value judgment indicating that the instructor really likes what the student said or did; "Excellent!" "Very good!"

3. Corrective/feedback. Includes negative statements which are non-punitive and nonthreatening; saying "no" or "yes" or "that's correct" in a manner that provides feedback to students; repeating a student's response so all students know the answer was correct or acceptable.

4. Questions. I· ‾ 'e. rhetorical questions; all questions raised by the teacher; calling on student by name to respond to a ques..ion.

5. Lecture. Communicating facts, expressing ideas, giving examples.

6. Providing cues/directions. Words that signal importance; "This is important to remember." "These next four items are very important in our study." Directions the instructor expects the students to follow: includes procedu..l directions.

7. Criticism. Negative, punitive comments; strong criticism; blaming students; saying "Ridiculous" or "That's silly" or "Don't interrupt me when I'm giving my lecture."

STUDENT TALK

8. Cognitive student talk. Talk by students which is subject matter oriented; recalling facts; responding to teacher questions or directions with subject matter responses or subject matter questions; expressing opinion or ideas about topics under study; analyzing, synthesizing, evaluating; subject-matter questions raised by students.

9. Non-cognitive student talk. Talk by students which is not related to subject matter; management comments by students; "Can we leave now?" or "Can we take a break?" or "Will we have the quiz tomorrow?" or "I went to the game Saturday and didn't have time to prepare my lesson."

C. Silence. Three seconds or more of silence; pauses, when no communication exists.

Programmed Workbook for Developing Coding Skills using Johnson's Cognitive Interaction Analysis System (CIAS)

This is a workbook which will help you learn to use the Johnson's Cognitive Interaction Analysis System (CIAS). An audio cassette recording is available to use with this workbook.

Prior to beginning this workbook, read the first twelve (12) pages in Johnson's Cognitive Interaction Analysis System and Computer Program. Concentrate on becoming thoroughly familiar with the ten basic categories in the Johnson's system (described in the table on page 1). This workbook will provide you with practice to help you improve your skills in using the system. You will progress more easily and rapidly if you have a definition of each category at hand.

Directions

This workbook is set up in the question-answer format which is usually found in self-paced programmed materials. The optional cassette tape recording is of actual classroom interaction episodes which you are asked to code periodically as you acquire proficiency in the system.

As you progress through the question-answer portion, you are asked to use a blank sheet of paper to cover all of the material below the question you are working on. As you complete each question or item, move the blank sheet down to reveal the answer; these are located on the left hand side of the page. Respond to each question by inserting the appropriate answer in the blank or by choosing between given answers. After answering each question, move the blank covering sheet down to check your answer.

If you are utilizing the cassette tape, when you reach specified points in the workbook, you will be asked to listen to a certain section of the tape. (These points are indicated by an asterisk - *. If you are not using the taped episodes, skip over the questions marked in this manner.) These tape selections are provided to test your skill in coding classroom verbal interactions utilizing what you have learned to that time. The taped selections will be incorporated most toward the end of the workbook when you are asked to code more involved verbal interactions. Directions for utilizing the taped selections are provided both on the tape and in the workbook.

Guidelines for Coding CIAS

Because severa problems may arise when you begin deciding into which category a verbal statement belongs, several ground rules or basic guidelines have been established. These guidelines will help you to develop consistency in categorizing instructor and student statements.

1. Do not record CIAS during the opening of the class session when the professor is dealing with management tasks (e.g., checking attendance) instead of cognitive aspects of the lesson. [Do note the time that this activity begins and ends and make a note about what type of activity is occurring.]

2. Begin to record CIAS when the professor and/or students engage in cognitive aspects of the lesson. Begin and end each coding session with a category 0 in order to enable both the first and last verbal interactions to be tallied in the matrix. Also, one assumes that each lesson which is coded begins and ends with silence (even though this may not actually be the case).

3. Record the numeral representing the verbal interaction category in use -- one every three-seconds.

4. If more than one type of interaction occurs during a three-second interval, the observer records a category number for each change which occurs. If no change occurs within three seconds, the continuing category is recorded again. For example, within a three-second interval, the instructor may ask a question, a student answers, and the instructor praises the student's response (4 8 2). The observer should record all three categories. On the other hand, if the instructor lectures for more than three seconds, a series of 5's would be recorded until the interaction category changes.

5. Category 0 (silence) must be a full three seconds in length before it is recorded. If five seconds of silence was followed by a one second question, the recording would be one zero followed by one four (0,4). If the beginning of a three-second period of time had one second for a question followed by five seconds of silence, a four would be recorded followed by one zero (4,0).

6. Category 1 is a nonthreatening feeling tone used by the professor to express acceptance of positive or negative student expressions; includes jokes that are not made at the expense or embarrassment of the student. (1h in Expanded CIAS) The effect of an instructor's statement on the students and not what the instructor intended is the crucial criterion for categorizing a statement. For example, if the instructor attempts to be clever and make a joke, but the students respond as though it were criticism, it would be recorded as a 7 and not as a 1.

7. Category 2 communicates a positive, enthusiastic rewarding of a student's comments.

8. Repeating a correct student response is recorded as a category 3 (if not repeated enthusiastically).

9. Correcting a student response, in a non-punitive manner, is a category 3; e.g., "No. The correct response is..."

10. Rephrasing a student's comment in the form of a question is recorded as a category 4; e.g.,

    Student: "It is a desolate area and would deter growth potential."(8)
    Professor: "Are you saying that the location is isolated from modes of transportation?"(4)

11. All teacher statements presented in question format, even rhetorical questions, are recorded as category 4; record a 4 when the teacher

calls on an individual by name with the intent that the student should talk; e.g., "Joyce?"

12. All directions, including procedural directions, are recorded as category 6; e.g., "Review in your mind..." or "Over the weekend, read..." or "List these on your paper."

13. When the teacher calls on an individual by name with the intent that the student should follow some directions, record a 6; e.g., "John, go to the board and calculate your response" or "Bill" (indicating Bill is the next person to go to the board and work the problem).

14. Jokes made at the expense or embarrassment of the student are recorded as 7's.

15. All student cognitive talk is recorded as 8's. If a student begins talking after another student (student-student interaction) a slash (8/8) is inserted between the 8's or 9's to indicate there has been a change of speaker. Unison group responses are recorded as an 8 (if they are content oriented).

16. All student non-cognitive talk is recorded as 9's.

17. Do not use the cognitive interaction analysis system if the class views a 16 mm sound film, listens to a lengthy audio-tape, or spends the class time in silent reading. Merely record the time and write a comment describing the situation. Wait until the instructor is again engaged in cognitive verbal interaction.

18. When in doubt, record the category which is congruent with the predominant mood of the class session. For example, if the situation isn't a clear category 2 or 3, think about the previous statements. If the teacher has consistantly accepted student responses by repeating or rewording them instead of enthusiastically praising the student's talk, record a 3.

19. When communication is undecipherable or when chaos exists, cease recording, note the time, and write a comment. When the class settles and cognitive interaction is reinstated, note the time and begin recording again.

20. An observer records a category 1 when the instructor recognizes the effects the environment may have on students. For example, if the instructor says, "The classroom is getting warm" or "This slide is kind of dark", it would be recorded as a category 1.

Please turn the page and begin answering the questions. It is suggested that you use pencil for writing in your answers so that you will be able to change your responses if you wish to do so. Remember, if you are not using the tape recording, skip over all questions marked with an asterisk (*).

	1. One popular means for recording classroom verbal interactions was developed by Ned Flanders. It is called ______.
1. Interaction Analysis	2. An adaptation of this system has been developed by Glenn R. Johnson for use in higher education. The adapted system is called _____.
2. Cognitive Interaction Analysis System (CIAS)	3. CIAS divides the verbal interactions which can be coded into three major sections. These are: a.________, b.________, c.________.
3. teacher talk, student talk, and silence	4. The development of CIAS was influenced by two prominent educational researchers: a.___________ and b.__________.
4. Ned A. Flanders and Benjamin S. Bloom	5. There are four major elements in the Quality of Instruction as stated by Bloom: a.__________, b.__________, c.__________, d.__________.
5. a. Cues used by the instructor b. Participation by the students c. Reinforcement techniques the teacher uses d. Feedback/correctives provided by the instructor	6. The categories which denote teacher talk are _____, _____, _____, _____, _____, _____, and _____.
6. Categories 1,2,3,4,5,6, and 7.	7. Student verbal statements are coded in categories _____ and _____.
7. Categories 8 and 9	8. Category _____ tells us that 3 seconds of silence was observed by the coder.
8. Category 0	9. An observer records a category 5 to indicate a type of teacher talk we often refer to as ______.
9. Lecture	10. When a teacher makes a statement such as "In the constitution of a country, the Supreme Court helps set traditions," the observer would code that statement as a category _____.

10. Category 5	11. Explaining, discussing, giving an opinion or giving facts or information are all types of teacher talk which would be classified into category _____.
11. Category 5	12. Which category is the one recorded most often in a classroom observation using CIAS?
12. Category 5	13. When a teacher asks a question an observer would code a category ___.
13. Categor~~y 4~~	14. When a teacher asks a rhetorical question such as "When an instructor starts a particularly smelly demonstration in the front of the lecture room, it takes several minutes for the odor to reach the back of the room. How can this be if the smelly molecules are moving so rapidly? Simple. The smelly molecules...", really expecting no definite answer at that time, the observer would classify this as category _____.
14. Category 4	15. "What is the best time of day for choral rehearsals?" is an example of a teacher statement which would be included in category _____.
15. Category 4	16. A student's answer to a teacher's question would be recorded as a category _____.
16. Category 8	17. Any student statement which is obviously a response to a teacher question, direction, or statement would be coded in category _____.
17. Category 8	18. T: Mark, who wrote music which sounds very similar to this? S: I don't know. It all sounds the same to me. In the interaction above, the student response (would, would not) be coded as a category 8.

18. Would. Even though this is not the answer the teacher expected, it still concerns the student's grasp of the content.

19. In the following dialogue, identify the category for each lettered statement. Letters appear following each statement.

T: Boiling is a phase change in which a substance goes from the liquid to gas phase. a.____ Melting is going from what to what, David? b.____
S: Melting is going from solid to liquid. c.____
T: A third type of phase change, sublimation, is from solid to gas. d.____ Can anybody think of a good example of something that sublimes? e.____
S: CO_2. f.____

---

19. a. 5 d. 5
b. 4 e. 4
c. 8 f. 8

*20. Now you are going to have an opportunity to practice what you have learned so far. While listening to Segment #20 of your cassette recording of a teacher and a class, code the statements you hear using the four categories discussed so far (0,5,4, and 8). Throughout this section you will hear a "ping" sound periodically. Record the category for the verbal statement just completed immediately upon hearing each "ping". Record your numerals in vertical columns to facilitate future interpretation. Use the space to the left for recording your categories.

---

*20. You should have recorded the following: (To conserve space, the categories are given below horizontally in groups of five. Mark your tallies off in groups of five to assist you in comparing your data.)

00555 54838 88888 84884 88348 88855
55555 55555 54488 8880

*21. If your answers were incorrect or if you disagree with any of the answers at the left, ask your instructor to clarify your specific questions. If necessary, replay this portion of the tape and code it again.

---

*21. When the coding of Segment #20 of the tape is clear to you, go on to the next item.

22. One of the rules for coding verbal interactions using CIAS is that you record a category every ____ seconds or when a ____ in interaction category or speaker occurs, whichever comes first.

---

22. Record a category every 3 seconds or when a change in interaction category or speaker occurs.

*23. Timing in coding CIAS is relatively important. To get some practice in "feeling" the 3-second interval, Segment #23 of the tape consists of a straight lecture. All you do is record a "5" every 3-seconds. At the beginning of the tape a "ping" will occur every 3-seconds but it will disappear toward the end of the tape segment. Record your 3-second practice drill in the space at the left.

---

*23. You should have recorded a total of approximately 88 category 5's. You should have recorded approximately 64 tallies after the "ping" stopped.

24. How did you do? If you had some trouble after the "pings" ceased, try tapping your foot lightly as if you were marching. You should tap your foot twice every second at a march tempo.

---

25. When a teacher accepts a student's idea without placing a value judgment upon it, we code that as a category _____.

---

25. Category 3

26. Very often a teacher may shift from building on a student's idea (category 3) to giving his/her own ideas (category 5). For example: "As Rick said earlier, if we add NH_3, lead will precipitate. But NH_3 will also react with some ions in a different manner. When we add NH_3, copper will form a soluble deep blue complex."

"As Rick said earlier..." is category _____.

---

26. Category 3. The second and third sentences are category 5 because the teacher begins initiating his own ideas.

27. To determine whether or not a teacher statement should be coded as a category 3 the coder should ask him/herself _____________.

---

27. Is this teacher's statement his/her own idea or that of the student?

28. When a student answers a teacher's question, and then the teacher repeats the student's answer, the teacher statement would be recorded as a category _____.

---

28. Category 3. Repeating a student's response is always classified as Category 3.

29. When the teacher says, "No, Joe, that's not quite right," this would be recorded as a category ____.

---

29. Category 3. Negative statements which are non-punitive and non-threatening and provide feedback to the student concerning the correctness of his answer is recorded as a Category 3.

*30. Segment #30 of the cassette tape is a short progress test to see if you know the five categories we have covered so far and to determine if you have developed a 3-second "feeling" for coding. REMEMBER: Record another number every THREE-seconds -- OR when the behavior CHANGES. Record your CIAS in the space at the left.

---

*30. You should have recorded:

04448 33888 88888 88888 84888 88883 88848 88888 88888 48448 48348 34834 880

If you disagree with a code replay the tape and look at a watch as you read these codes.

31. When a teacher uses praise or encouragement, what category would you record it in?

---

31. Category 2

32. Is a statement like, "Uh,huh, continue", classified as a category 2?

---

32. Yes. Any form of verbal encouragement is classified as a category 2.

33. "That's right, Dave. Exactly right," would be categorized as a category ____.

---

33. Category 2

34. When a teacher indicates that a student's answer is correct by nodding his head, that (is, is not) coded as a category 2.

---

34. Is not. CIAS concentrates solely on the verbal interactions. No non-verbal signs or cues are coded.

35. In the following dialogue, identify the category number for each lettered statement. Letters appear following the responses:

T: The Sinfonia of the 17th Century was a predicessor of the Symphony as we know it. a.____ It was often used to introduce vocal compositions. b.____ Where do we remember hearing that it occurred most, however? c.____ Jackie, where would people of the 17th century usually be when they heard a sinfonia? d.____

S: At the opera. e.____

T: Exactly! f.____ How was the sinfonia incorporated into an opera? g.____

S: They were used like overtures and in-between acts. h.____

T: Right. i.____ And because of this, they were often composed "on the spur of the moment". j.____ Did the audiences usually pay much attention to these instrumental interludes? k.____

35.

a. 5	d. 4	g. 4	j. 5
b. 5	e. 8	h. 8	k. 4
c. 4	f. 2	i. 2	

*36. Practice in recognizing and recording teacher reinforcement (Category 2) is contained in Segment #36 of the cassette tape, as well as the five categories learned previously. Record your CIAS in the space at the left.

---

*36. You should have recorded:

05555 55554 48888 88884 88888 88888
24888 88555 55444 84835 56648 44888
85544 88823 34444 88888 84822 0

If you have discrepancies or any questions, ask your instructor for clarification.

37. Talk by students which is not related to the subject matter is recorded as category ____.

---

37. Category 9

38. If a teacher asks, "When did Mendeleev publish his periodic table?" and a student replies "1869", the student's response is recorded as a category ____.

---

38. Category 8

39. If the student above had replied instead, "Will we have a quiz tomorrow?", his response would be coded as a category ____.

39. Category 9	40. Category 6 is defined as ________________.
40. Providing cues/directions	41. A statement such as "Larry, please list all of the ions in Group IV on the board," would be coded as a category _____.
41. Category 6	42. A statement such as "You remember from an earlier lesson we discovered these genres of literature," would be coded as a category _____.
42. Category 6. Providing cues to important information is coded as a category 6.	*43. The next segment of tape (Segment #43) includes all of the categories covered thus far (0,5,4,8,3,2,9,6). Remember to record one category every 3-seconds or whenever the verbal interaction changes. Record your CIAS in the space at the left.

*43. You should have recorded:

06655 55555 48235 55566 56004 82490

44. In the following dialogue, identify the category number for each lettered response. Letters appear following each statement.

T: Now we've all seen the film, Deliverance. a._____ And, I want us to think just for a few minutes what qualities of drama this film illustrates. b._____ Ray, what kind of film do you think it is? c._____
S: It's suspenseful. d._____
T: It's suspenseful! e._____ I agree! Yes! f._____ Patty? g._____
S: In some way it's concerning the situation about...perhaps the environment. h._____
T: Yes! Right! i._____ The environment! j._____ In what ways specifically? k._____
S: The destruction of it. l._____
T: Ah! Very good! m._____ The destruction of the environment. n._____ The...go on. o._____
S: The destruction of it...then also ... p._____

T: Well, actually, what were they doing? q.____
S: They...for industry... for... r.____
T: They were going to build a dam. s.____
S: Uh, huh. t.____
T: Right! Good! u.____ Rick, what else might this film concern? v.____
S: Will we be seeing some more films? w.____

44.

a. 5	k. 4	u. 2
b. 6	l. 8	v. 4
c. 4	m. 2	w. 9
d. 8	n. 3	
e. 3	o. 6	
f. 2	p. 8	
g. 4	q. 4	
h. 8	r. 8	
i. 2	s. 3	
j. 3	t. 8	

*45. Segment #45 of the cassette tape will give you practice in recognizing all of the categories studied thus far. Record your coding in the space at the left. Remember to record one category number every 3-seconds or whenever the verbal interaction changes.

---

*45. You should have recorded:

04488 23483 24455 44832 34400 44455 55666 66555 55560 05445 54888 83346 6550

If you made any mistakes or if you disagree, ask your instructor for clarification.

46. ____________ is the phrase which describes the statements we classify into category 1.

---

46. Accepting student attitudes

47. "That's kind of tough to read, isn't it?" is an example of a category ____.

---

47. Category 1

48. "That's good work, Dave", is an example of a category ____.

---

48. Category 2. Be sure you see the difference between a category 1 and 2.

49. When the teacher says "I've often felt that way myself", the coder records a category ____.

49.	Category 1	50.	"That's an interesting idea, Jim", is an example of category _____.
50.	Category 2	51.	"Who can review for us the steps we need to follow for this experiment?" would be coded as a category _____.
51.	Category 4	52.	"If you students are going to talk, please leave the room", is an example of a statement which would be coded as a category _____.
52.	Category 7. This statement is intended to criticize the students' persistent talking.	53.	"Look at page 472, problem 18" would be coded as a category 6. (True or False)
53.	True	54.	What phrases and/or words are used to describe category 7?
54.	Criticism	55.	"I'm the teacher in this course -- unless, of course, you think you know more than I do about this subject!" would be classified as a category _____.
55.	Category 7	56.	What distinguishes a category 6 from a category 7?
56.	A category 6 is recorded when the teacher is merely giving directions or providing feedback to the student and there is no criticism implied. On the other hand, category 7 is recorded when a teacher either criticizes a student or defends his capabilities or position.	*57.	This next tape segment corresponds to Question 57. Record CIAS on this segment paying special attention to categories 1 and 6. Record your categories in the space below. (REMEMBER: Record one category every three-seconds or when the verbal interaction changes.)

*57. You should have recorded:

04444 44811 44844 88366 66448 83166
66666 66666 66660 64666 66444 6660

If you made any errors, go back over the tape segment and try to get each category straight in your mind.

58. Write the key words or phrases which describe each of the Cognitive Interaction Analysis System Categories below:

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

---

58. 1. Accepting student attitudes
2. Positive reinforcement
3. Corrective/feedback
4. Questions
5. Lecture
6. Providing cues/directions
7. Criticism
8. Cognitive student talk
9. Non-cognitive student talk
10. Silence

*59. Two more rules concerning the coding of CIAS need to be emphasized at this point. First, a category 0 is recorded whenever a 3-second period or longer elapses in which there is silence. Silence is often very critical when analyzing teacher-student interactions. It is important that it be recorded accurately. Second, when communication is undecipherable or when chaos exists, cease recording, note time, and write a comment. When the class settles and cognitive interaction is reinstated, note the time and begin recording again.

The next teaching episode (Segment #59) will last approximately 2 minutes. This will give you an opportunity to code some more complete teacher-student interactions. This segment is relatively simple, however, and you shouldn't have difficulty in coding it. Review all of the categories before beginning. When you feel ready, go ahead with Segment #59. Record your categories in the space at the left.

---

*59. You should have recorded:

05555 44484 34834 83484 84834 84835
41144 83488 34483 55441 40554 83340
6240

If you made any mistakes or do not agree with the above coding, go back through the tape until it is completely clear.

60. In the following dialogue, identify the category for each lettered statement. Letters appear following the statement. (All of the categories are included.)

T: What you've got here is a graph of pressure versus temperature. a._____ You pick out one pressure and one temperature and that will tell you exactly what phase you are in. b.____ Now, under what pressures can liquid water exist at temperatures above 100°C? c.____ (Silence)...d.____ Steve, where does it change to liquid water? e.____

S: At 760 torr. f.____

T: At 760 torr. g.____ What happens if you go above 760 torr? h.____

S: It would be liquid. i.____

T: It would be liquid. j.____ That's right. k.____ So, the question is, at what conditions can liquid water exist at temperatures above 100°C? l.____ What would you say to that? m.____

S: I don't know the answer to tnat one. n.____

T: You didn't read the assignment, did you? o.____ Kathy? p.____

S: It can exist at pressures above the boiling point line. q.____

T: That's right. Exactly right! r.____ As long as you can maintain a pressure above the liquid, a pressure on the system which is in excess of the vapor pressure at that temperature, the water will be a liquid rather than as a gas. s.____ Now, look at the next line over...80°C. t.____ What phase would you have to be in in that instance to allow you to boil water? u.____

S: It would be in the liquid phase. v.____

T: Well, you're close. w.____ Actually, in the case of boiling water, I'm talking about an equilibrium. x.____ That's kind of a tricky question. y.____ It would be the liquid and gas at equilibrium if its boiling. z.____

S: What time is it? aa.____

60.	a. 5	f. 8	k. 2	p. 4	u. 4
	b. 6	g. 3	l. 4	q. 8	v. 8
	c. 4	h. 4	m. 4	r. 2	w. 3
	d. 0	i. 8	n. 8	s. 3	x. 5
	e. 4	j. 3	o. 7	t. 6	y. 1
					z. 5
					aa. 9

*61. Segment #61 of the cassette is a longer section -- 5 minutes -- and is generally more difficult. If you completed Segment #59 without much difficulty, you should not have a great deal of trouble with this section. Keep your 3-second interval steady and accurate. Use the space below to record your analysis.

---

*61. You should have recorded:

06666 48374 83268 34848 34834 83556
66548 35448 24834 48358 38366 55554
83055 55555 54483 55448 34823 45832
35484 83234 68255 48368 38354 48434
83482 25550

If you made any mistakes or if you disagree, go back through the tape segment until you understand why each category was chosen.

62. You are now conversant in Johnson's Cognitive Interaction Analysis System and relatively proficient in the use of it. You are now ready to analyze your own verbal interactions with your students.

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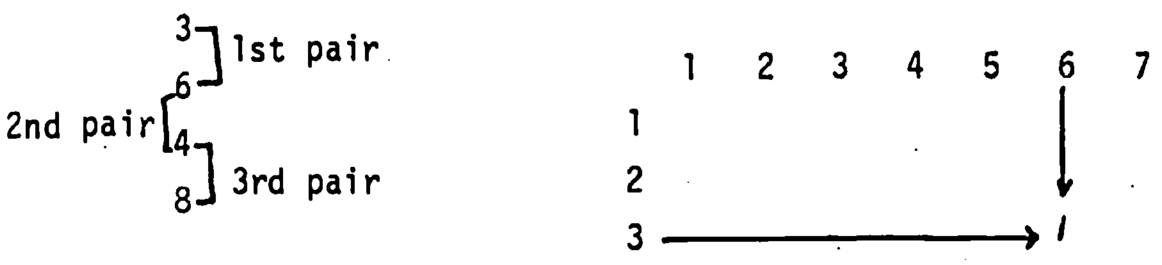
63. This completes the workbook exercises. You should now be able to discuss verbal interaction in the classroom in terms of Johnson's Cognitive Interaction Analysis System.

Recording CIAS Data in a Matrix*

After the observation data have been collected, the numerals recorded are paired (tallies) and transferred to a 10 x 10 matrix. (A computer program is available which will simplify the process immensely.)

The first numeral of each pair designates the row while the second numeral of the same pair designates the column. The tally for a pair appears on the matrix where the two numerals intersect; e.g., a tally in the 3-6 cell means a 6 followed a 3 (3 preceded a 6). As a reminder, the last numeral of the previous pair is combined with the next numeral recorded to form the new pair:



Use a Clockwise Flow to Analyze a Matrix

It is recommended that one use a clockwise flow when analyzing the actual data appearing in the 100 cells of a 10 x 10 matrix. The clockwise flow will begin to reveal patterns on the matrix. For example, one would look for concentrations in the areas shaded in the matrix below to find a pattern where an instructor asks a question, the student responds to the question, and the teacher provides corrective/feedback.

category	1	2	3	4	5	6	7	8	9	0
1										
2										
3										
4										
5										
6										
7										
8										
9										
0										

One would study the shaded areas in the matrix on the next page to find a pattern where an instructor asks a question, the student responds to the question, and the teacher provides positive reinforcement.

*From Johnson's Cognitive Interaction Analysis System and Computer Program by Dr. Glenn Ross Johnson, June 1978.

category	1	2	3	4	5	6	7	8	9	0
1										
2										
3										
4										
5										
6										
7										
8										
9										
0										

If I want to know the kind of categories that preceded harsh criticism by the teacher, I would look down column seven (excluding the 7-7 cell). If one or more tallies appear in the 6-7 cell, I know that cues/directions preceded harsh criticism. If one or more tallies appear in the 0-7 cell, I know that silence preceded the harsh criticism. I excluded the 7-7 cell because the 7-7 cell indicates the use of criticism for more than three consecutive seconds.

Conversely, if I want to know the kind of categories that follow a teacher's questions, I will look along row four (excluding the 4-4 cell). If several tallies appear in the 4-8 cell, I will know exactly the number of time pupils responded immediately to the teacher's questions.

The matrix located on the next page displays the data collected by one observer using the Cognitive Interaction Analysis System in a college English classroom. The English lesson was about 30 minutes long (one tally recorded every three seconds; 618 tallies X 3 seconds for each tally = 1854 seconds ÷ 60 seconds = 30+ minutes).

Silence (See Table 1) accounted for approximately 4% of the total time. SC = Silence Category; calculated by taking the total tallies in column 0 and dividing by the total number of tallies. SC was 25 ÷ 618 = 4.05%. The 4% for silence was similar to my FIA (Flanders' Interaction Analysis) findings for silence in college settings.

The teacher talked about 80% of the total time. TT = Teacher Talk; calculated by taking the total tallies in columns 1 through 7 and dividing by the total number of tallies. TT was 497 ÷ 618 = 80.4%. The 80% teacher talk was similar to my FIA findings for TT in college classrooms.

The students talked about 15.5% of the total time. PT = Pupil Talk; calculated by summing the total tallies in columns 8 and 9 and dividing by the total number of tallies. PT = 96 ÷ 618 = 15.5%.

Cognitive Interaction Analysis Matrix

Second number of pair

First number of pair

Categories	1	2	3	4	5	6	7	8	9	0	Total Tallies
1	4	0	1	3	1	1	0	1	0	0	11
2	0	0	1	8	1	5	0	1	0	0	16
3	2	7	19	25	8	4	0	5	0	1	71
4	1	1	0	88	5	3	0	56	0	14	168
5	0	1	0	15	89	10	0	0	0	0	115
6	0	0	0	15	6	89	0	0	0	6	116
7	0	0	0	0	0	0	0	0	0	0	0
8	3	7	50	6	1	1	0	28	0	0	96
9	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	8	4	3	0	5	0	4	25
Total Tallies	11	16	71	168	115	116	0	96	0	25	618
% Total Time	1.8	2.6	11.5	27.2	18.6	18.8	0.0	15.5	0.0	4.0	

Percentages

SC = 4.05%
TT = 80.42%
PT = 15.53%

Ratios

PTC = 1.00
PSSR = 0.29
TSSR = 0.58

Totals

Q = 80
CF = 52
R = 16

We can also look at the number of different times the teacher asked questions, the number of different times the teacher used corrective/feedback, and the number of different times the instructor used positive reinforcers.

The teacher raised eighty different questions during the lesson. Q = Questions; indicates the number of different times the teacher asked questions. Calculated by taking the sum of column 4 and subtracting the tallies located in the 4-4 cell. This procedure provides a fairly accurate inference. Q = 168 - 88 = 80. It seems fair to conclude that the teacher used a Socratic approach during the lesson.

TABLE 1

Data Analysis Calculations

SC = Silence. SC indicates the percent of the total time devoted to silence (each 3-seconds of silence). It is calculated by taking the total number of tallies for category 0 and dividing by the total number of all tallies.

TT = Teacher Talk. TT indicates the percent of the total time the teacher talked. It is calculated by taking the sum of categories 1+2+3+4+5+6+7 and dividing by the total number of tallies.

PT = Pupil Talk. PT indicates the percent of the total time the students talked. It is calculated by taking the sum of categories 8+9 and dividing by the total number of tallies.

PTC = Pupil Talk Cognitive. PTC indicates the amount of total pupil talk that involved cognitive aspects of the lesson. It is calculated by taking the sum of category 8 and dividing by the total number of tallies for categories 8+9.

PSSR = Pupil Steady State Ratio. PSSR indicates the total amount of pupil talk that was txtended pupil talk of more than three seconds in length. It is calculated by taking all the tallies in the 8-8 cell plus the 9-9 cell and dividing by the total number of tallies for categories 8+9.

TSSR = Teacher Steady State Ratio. TSSR indicates the total amount of teacher talk that was extended teacher talk in a category for more than 3-seconds. It is calculated by taking all the tallies in cells 1-1, 2-2, 3-3, 4-4, 5-5, 6-6, and 7-7, and dividing by the total number of tallies for categories 1+2+3+4+5+6+7.

Q = Teacher Asks Questions. Q is fairly accurate inference about the total number of different times the teacher asks questions. Q is calculated by taking the sum of column 4 and subtracting the tallies in the 4-4 cell.

CF = Teacher Provides Corrective/Feedback. CF is a fairly accurate inference about the total number of different times the instructor provides corrective/ feedback to student talk. CF is calculated by taking the sum of column 3 and subtracting the tallies in the 3-3 cell.

R = Teacher Provides Reinforcement. R is a fairly accurate inference about the total number of different times pupils receive positive reinforcement from the instructor. R is calculated by taking the sum of column 2 and subtracting the tallies in the 2-2 cell.

The teacher used 52 different corrective/feedback statements. This, too, is a fairly accurate inference. CF = Corrective/Feedback; calculated by using the total number of tallies in column 3 minus those in the 3-3 cell. The teacher appeared to use a substantial amount of corrective/feedback during the lesson, and I think this was advisable when dealing with the new topic. The category 3 tallies were prompted by the large number of teacher questions followed by student responses which the teacher could use for corrective/feedback.

The teacher used sixteen positive reinforcers -- another fairly accurate inference. R = Reinforcers; calculated by using the total tallies in column 2 minus the tallies in the 2-2 cell.

Some interesting ratios have also been provided for the Cognitive Interaction Analysis System. All of the pupil talk was cognitive. PTC = Pupil Talk Cognitive; calculated by taking the sum of column 8 and dividing by the sum of columns 8+9. PTC was $96 \div 96 = 1.00$.

Most of the talk by the pupils lasted no more than three seconds. PSSR = Pupil Steady State Ratio; calculated by taking the sum of the tallies in the 8-8 and 9-9 cells and dividing by the total tallies in columns 8+9; PSSR = $28 \div 96 = 0.29$.

A little over half of the teacher talk lasted more than three seconds in length. TSSR = Teacher Steady State Ratio; calculated by taking the sum of the tallies in cells 1-1, 2-2, 3-3, 4-4, 5-5, 6-6, and 7-7 and dividing by the sum of the total tallies in columns 1 through 7. TSSR = $4 + 19 + 88 + 89 \div 11 + 16 + 71 + 168 + 115 + 116 = 289 \div 497 = 0.58$.

One can also note that a greater percentage of the total time was devoted to categories 3, 4, 5, 6, and 8 than was devoted to categories 1, 2, 7, 9, and 0.

An analysis of the ratios provided me with some additional inferences to consider. The teacher appeared to be in complete control of the lesson (inference drawn from total number of tallies in all steady-state cells), and he/she made a substantial use of questions (category 4) and corrective/feedback (category 3) to enhance student learning. The student responses to teacher questions were short (small number of tallies in 8-8 cell compared to total number of tallies in column 8). The climate of the classroom appeared to encourage student participation (tallies in categories 1 and 2 versus the zero number of tallies in category 7). This was obviously a cognitive oriented lesson (large number of tallies in categories 3, 4, 5, 6, and 8).

APPENDIX G

COMMENTS ON PARTICULAR UT LARGE CLASS TEACHING FACILITIES

COMMENTS ON PARTICULAR UT LARGE CLASS TEACHING FACILITIES

The instructors who were interviewed as well as those who completed the Support Assistance Needs Survey made many comments about the teaching/learning environment which is created in many of the large classrooms on the UT-Austin campus. The specific rooms and the comments are given below. The rooms which the instructors liked are indicated by asterisks - one (*) indicates they feel it is better than the average, two (**) indicates they feel it is an excellent room. The rooms which the instructors disliked are indicated by minus signs - one (-) indicates they feel the room is somewhat worse than the average, two (--) indicates they think it is an extremely difficult room in which to teach.

Best Rooms

Building and Room Number	Comments
*AC Aud. or 21	1) Not laid out properly, difficult to see all students. 2) Needs a phone line from AC to Computation Center. 3) Good general shape and seating arrangement; walkway by slide screens. 4) Can see every member of the class. Reduces loud, rhetorical bombasts and need for mikes.
**ART Aud. or 1.102	1) Not enough blackboard. Nice. Good microphone. 2) Art 1.102 is designed for large classes in every respect. Excellent podium-controlled AVs. Only place. I teach my large (250+) class there and it is easy.
**BEB 106	1) Excellent audio and video facilities, good acoustics.
**BEB 150	1) More chalkboards (I really am old-fashioned). 2) This is an excellent classroom. However, teaching would be made much easier if a wireless microphone system could be installed. 3) I think BEB 150 is a good room. One needs ample aisle space, which it has. Could use more blackboard space, sides as well as front.
*BUR 106	1) I'm up on stage. Media specialist (is there). 2) Lower the stage. 3) Good lighting; wide aisles.

Building and Room Number	Comments
*BUR 109	1) Install some left-handed desks. 2) Good sight-lines, bright lighting, enough blackboards, and especially the presence of a media attendant to whom I can simply hand my slides at the beginning of the hour.
BUR 112	1) PA system really works!
**EDB 104 or ALKIVA	1) Beautiful - perfect. Comfortable chairs. Media assistant. Circular configuration. You can teach 30 or 120. 2) Room is fine. 3) Good design; acoustics, furniture; lighting; AV equipment; microphone. 4) Good arrangement and media facilities.
**GEO 100	1) It is fully equipped. 2) The room-lights and projectors operated from podium in front; screens are high out of the way of heads and the blackboards. Also, there are two levels of blackboards which slide up and down so that early lecture material can be saved and used throughout the lecture for reference. 3) Easy to hear; equipment which works.
**GSB 1.216	1) Very nice. Magnificent room. Slant and spacing of chairs. Back row not too far away. Seats are comfortable. Don't have to use a mike. Can maintain eye contact with students. 2) All GSB rooms are excellent. 3) All classrooms in GSB are excellent. Fully equipped and comforatable for the students. 4) Full range of multi-media equipment; the seating arrangement is such that one feels close to the students.
**GSB 1.218	1) Excellent room; well lighted, etc. Audio visual equipment, etc, etc. 2) An excellent room. 3) Excellent. 4) Space; lighting facilities; desks for all students with plenty of elbow room; no access problem for those who come in late; full media facilities.

Building and Room Number	Comments
**GSB 2.202-2.204 or others on this floor	1) Multimedia facilities; good sound facilities; adequate board space; set up for good eye-sight contact.
*Jester Aud. or A121A	1) Nicest I know on campus. 2) Works very well as is. 3) Heating/cooling controls unaccessible; frequently uneven, uncomfortable climate; desperately need flashlight-pointer for use on slides; would like a cordless microphone. 4) Needs an adequate electric pointer to take better advantage of the excellent rear-projection screens. Needs a Wallensak sound-slide unit. 5) AV staff needs improvement. 6) Media available; support technical person on duty. 7) This classroom is <u>far</u> superior to other classrooms I've used (e.g., BUR 106). I'm told AC 21 is even better.
*PAI 301	1) This room is quite nice in contrast to almost any other lecture theatre which has been assigned to Biology lecturers (with the exception of the new Welch Auds.). 2) Large, good air circulation, good projection room and equipment available to lecturer or TA, good acoustics.
**WEL	1) Any one of the large classrooms in the new portion of WEL are good. I need space between each student to aid in determination of individual work on daily quizzes. 2) It had intimacy. Good acoustics means that you can communicate with every member of the class. Reduces loud, rhetorical bombasts and need for mikes.
**WEL 1.308 and 2.246	1) Ability to use more than one overhead. 2) It is a fine classroom. However, the projector controls don't work. 3) Fine. 4) Excellent. 5) Multiple overhead capacity. 6) Acoustics, primarily, and seating. 7) Excellent lighting, acoustics, and AV facilities. The staff in charge of these rooms are very competent and are very cooperative; their assistance greatly releives the instructor.

Building and Room Number	Comments
WEL 1.308 and 2.246 (con't)	8) The facilities and media assistants were very good, but the physical structure of the auditorium is even better. I have no problems conducting discussion sections for 80 people; there is some intimacy. 9) Excellent acoustics and media facilities; comfortable, attractive environment.
*WEL 1.316	1) Lighting could be better for students. 2) Improve lighting; it is very uneven and difficult to control, especially when half the bulbs are burned out. 3) It is an excellent classroom. 4) Excellent acoustics and media facilities. 5) Good space, acoustics, support. Is isolated from competing noise. 6) No problems.
WEL 2.222	1) Spacious; good sound; good projection facilities.
*WEL 2.224	1) Could be better acoustically. Only one overhead screen. Lighting is bad, especially in the front rows. Really nice. AV specialist. Not too long and not too wide. 2) Ability to handle 2 overhead projectors at one time would be nice. Better lighting in first 3 rows.
**WEL 2.246	1) Would be difficult to improve. It is an excellent facility that is made even more so by the assistance of the AV staff in Welch. 2) AV staff. 3) Fine. 4) Also, WEL 1.316 and 1.308 are good. Acoustics are excellent. WEL 2.220 is also good for over 400 students, but blackboards cannot be used effectively. 5) It is comfortable, modern and extremely functional. Gives instructor access and control of lighting, etc. Has excellent audio-visual capacity. Excellent room!
WEL 2.308	1) The room is well-arranged. The acoustics are good.

Building and Room Number	Comments
**WEL 3.502	1) No chalk. Nice,wide instead of deep. Media assistant. 2) This room is great for my course. It has lost of blackboard space, which is what I need most. Also the students are not too far back (the room is not deep - front to back; deep rooms can be a problem). The one problem is that the (more or less permanent) podium blocks the view of students in the first few rows. 3) Has a full-time person to run audio visual equipment. That is a very nice feature of the room. The room is nearly perfect, but I could not find chalk many times. 4) Again, for my purpose: large blackboard, students not too far away; easy entry/exit for students (to minimize disruptions). 5) Roomis wide but not deep so the students are close to the front. Entrance to the room are in back so late students don't distract too badly. Good blackboards; sloped seating area; good acoustics; good lighting.

Worst Rooms

--BAT 7	1) On a stage. Not enough board space. Stage is dark. Equipment is not accessible. Can't see the students in the back. 2) Larger blackboard which would be visible in the back of the room. Facilities for hanging wall maps and charts. Light controls accessible to the instructor. PA system which is reliable (it was down for over a week; presently makes a distracting noise). 3) Bad acoustics; room is too large for effective teaching; poor blackboard space; stage is huge and dark. 4) Oil the desks so they don't squeak so much when being raised and lowered. Take out every other row of seats (or so) to eliminate the need to lower desks in order to walk down an aisle. 5) Better sound system, control of lights (by instructor) and more electrical outlets so one can use microphone as well as other projection equipment. 6) More blackboards; better sound system.

Building and Room Number	Comments
--BEB 151	1) 15 seats/row (cramped). Disaster! Low student ratings. Late students very disruptive. Cramped seats. 2) This is perhaps the most difficult room in the BEB. The students rated it in the bottom 20% of classrooms. Frankly, nothing short of complete renovation would do. 3) No real complaints. 4) These rooms are compact and are very good for lecture and discussion. Their only drawback is that the seats are so close together, exams cannot be given in them.
--BEB 155	1) Overhead screen too high to reach. No built-in visual aids. Not enough blackboard space. Acoustics not too good. Seats very uncomfortable. Bad student evaluations. 2) More board space. The current chalkboard is 12-14 ft. high and 6 ft. wide. I am 5'5". 3) This room should be gutted. The auditorium style chairs should be replaced with seating similar to that in GSB 1.218 - chairs with long desks in front of the students. 155 is murder on students and faculty. 4) Acoustics are poor, placing a strain on the voice of the lecturer (there is no amplification equipment) and the ears of students beyond midway in the lecture hall. The decor is depressing, frankly, and there are no arrangements for audio-visual machinery to be installed on a semi-permanent basis. Even the lighting leaves something to be desired. Some of the seats were borken and never fixed throughout the semester. All of these defects need to be remedied.
-BEB 166	1) Awful for exams. Chairs nailed down. 2) BEB 166 seems to be a nice room for a large class. The semi-circular construction of the seating seems to give a good feeling to the class atmosphere. 3) This room is terrible for exams. Need aisles in the room, less crowded.
-BEB 360	1) Terrible place to have a seminar. Doubt anyone in the Business school discusses anything. We moved (illegally) to the Union.

Building and Room Number	Comments
BUR 116	1) Too narrow! Last rows are miles away! No outlet in the middle of the room for my own projector. Microphone cord is too short. Microphone won't attach around neck. Make a new outlet.
BUR 212	1) This is not a pleasant classroom. However, an earlier attempt to remodel it was not very successful.
BUR "Wells"	1) YUK!!
ECJ 1.202	1) Amplifier for PA system was not functioning for most of Spring 1981. Sometimes overhead projectors are unreliable.
--GAR 1	1) Satisfactory. 2) Bad teaching environment. Students have difficulty in hearing. Little equipment. The equipment available is an overhead and a vacuum-tube microphone which doesn't work!! 3) Is a dungeon. Hard to conceive a place less conducive to learning. But much better than the "pits" in Burdine which are an educational disaster! No air conditioning (i.e., sleepy students).
--GAR 3rd floor	1) Garrison Hall is horrible! Noisy, crowded, etc., etc.!
GEA 105	1) Better ventilation system, less squeezed together, and narrow chairs; less noisy chairs.
GOL 105	1) Huge room with all those little chairs. Ugh!
Hogg Aud.	1) Terrible!!
--Jester A217A	1) Attrocious. Wider than deep so you have your back to some. No AV facilities. Floor is flat. 2) The room is much wider than it is long - the students on the ends of each row can't see the board. 3) Lack of screen; impossible to show slides.

Building and Room Number	Comments
PEB 311	1) Not effective for classes larger than 50 students. The room is not one that could be improved very much for large classes (up to 95 students).
-RLM 4.102	1) Makes you feel like there are alligators in a moat between the students and you. Not enough board space.
SSB 410	1) Don't have the ability to fully darken the room for slides and films.
WEL 2.310	1) The room is a bunker, but nothing can be easily done about it.
WEL 3.305	1) Extended tables instead of arm-chairs; slower rise to the rear of the room; more space per student.
Wooldridge Labs	1) Less of a theatre atmosphere.
WRW 102	1) Too crowded. Students too far from board to see well.
WRW 201	1) Acoustics bad. Stuffy. Cramped.

Adequate Rooms

BEB 161	1) Seems o.k.
BEB 165	1) Good.
BEB 265	1) No real complaints.
BEB 458	1) No problems.
BEL 222	1) Worst one. 2) Nice room, but needs more blackboard space, less of a stage. A stage creates a barrier to good teaching.
BEN 222	1) O.K., but could use better audio-visual facilities.
CAL 100	1) Classroom as such is adequate. However, there has been constant noise from workmen, which on several occasions has disrupted the class. 2) Good acoustics, stage about level with audience.

Building and Room Number	Comments
CMA Aud. (A2.320)	1) Need better equipment (that doesn't always break down) and good technicians. 2) Very nice.
GB 100	1) O.K.
GEA 101	1) Lock the exterior door so people cannot enter while the class is in progress.
GSB 1.212	1) More intimate, informal atmosphere.
Hogg 14	1) Students are all in easy eye contact and it is possible to hear and answer their questions without using a microphone and amplifying system.
MEZ 420	1) Need a larger seminar room.
PAI 2.48	1) These are relatively new classrooms. They are generally comfortable but seating is somewhat crowded.
RLM 6.114	1) O.K.

APPENDIX H

"CREATING NEW REWARDS FOR FACULTY"

article by John M. Bevan

Creating New Rewards for Faculty

by John M. Bevan
Vice President for Academic Affairs
College of Charleston, South Carolina

It is not too surprising that few incentives have been introduced to encourage continued development, renewal, and evaluation of faculty. The rewards as catalogued are promotion, tenure, modest salary increments, teaching load reductions, and occasionally a distinguished chair. After tenure, very little beyond promotion to the rank of full professor can be expected, except the final gesture of "professor emeritus." Maybe there's an "Outstanding Teacher Award" or an "Outstanding Research Award" along the way, but these are not specific attainments faculty members strive for or request.

Somwhere we've lost sight of faculty as a group of very different individuals needing varieties of incentives and opportunities to stimulate and extend potential. Faculty evaluation repeatedly substantiates this judgment, yet the reward response to it is standard and somewhat sterile. With the encroachment of the "steady state" status it becomes imperative that new approaches to reward be explored - approaches that are less summative in character and more reinforcing in a dynamic process. Following are a few suggestions.

IN-HOUSE VISITING LECTURERS. During an interview with her dean, an associate professor in art history mentioned she would be interested in serving as a resource person to colleagues, i.e., entertaining invitations to lecture in colleagues' classes where her expertise could be used. Following an extended discussion of these suggestions, the young professor was given a one-course load reduction for the fall and spring semesters and her appointment as an in-house visiting lecturer was announced to her colleagues.

By the middle of the next summer, her fall program was scheduled with lectures, such as "Scientific Concepts of the Modern World as Reflected in Art" (Introduction to Biology), "Man's Visualization of His Gods" (History of Religion), "The Interaction of Mind-Eye Patterns" (General Psychology), "Transformation of Medieval to Renaissance as seen in Visual Art" (History of Western Europe), "Concepts of Baroque Style" (Baroque Music).

Requests to lecture were followed always by a conversation with the respective colleagues to determine objectives and purposes for the presentation. Also, conversations were held after lectures and requests for additional lectures were frequent. Both colleagues and lecturer reported great satisfaction and a desire to continue the arrangement because of its implications for strengthening interdisciplinary studies.

As a result, consideration is now being given to designating, on a three-year rotating basis, one visiting lecturer from each of the four academic divisions. Such an appointment, regarded as prestigious, stresses the importance of faculty members as resource persons and provides satisfactions supportive of dynamic development.

SEMINAR FOR FACULTY - A TRAINER RESOURCE. In writing to his department chairperson, one faculty member stated,

> I would like to see selected faculty members teach 25 percent fewer courses over a designated period of years nad use the available time to improve the quality of the institution in other ways. For example, a faculty member could conduct a year-long seminar that would be of interest to colleagues and students in his or her own and related departments. He or she could act as a mentor to colleagues interested in learning more and possibly doing research involving his or her field.

The department to which this faculty member belongs had been responsible for introducing a mini-computer to the campus and for offering a two-semester seminar in computer languages to 18 faculty members from eight disciplines. Because of the extensive use faculty and students are making of them, 15 terminals and disc storage capacity are now inadequate. In such an undertaking, the faculty members who are involved derive a sense of their importance to the development of their colleagues, their department, and their institution.

MASTER TEACHERS. One of the fascinating contradictions in academe is the practice of reducing a professor's teaching load as a reward for good teaching. An outstanding teacher is relieved of courses in order to do research, when it would seem more appropriate to reduce teaching activities to make more of the person's time available to others who might benefit and learn from his or her supervision in perfecting approaches to instruction.

Such a person could be designated as a Master Teacher, given a three-year, 11-month contract with a one-course load reduction each semester. Summer would provide opportunities to update teaching, prepare seminars for faculty, and be a resource person to colleagues in matters pertaining to the philosophy and improvement of teaching. The Master Teacher could work individually, or with others similarly designated, presenting seminars or lectures to interested colleagues, conducting mentor training sessions, and being available generally for observation and discussion.

These Master Teachers would represent a core of faculty concerned about good teaching and the correlation of academic programs to institutional objectives.

DISTINGUISHED RESEARCH PROFESSORS. These individuals would be so designated because of their recognized accomplishments in research, their knowledge of funding sources for research, their enthusiasm for and encouragement of scholarly pursuits, and their willingness to assist colleagues in designing and preparing research proposals. One such person could be chosen from each of the academic divisions, and contracts similar to those of Master Teachers arranged.

These persons would not replace the staff officers responsible for providing support services for research efforts, but would supplement their services, including providing assistance with research planned to study outcomes of new instructional approaches. Of course, if a director of research is not available, then these faculty may help fill that void.

It should be recognized that Distinguished Professors would not go about campus checking to see whether colleagues are doing research. They would be available to encourage and aid faculty who express an interest in research, e.g., running interference for those trying to secure research space, finding seed money for pilot studies, or obtaining a reduction in teaching load for others needing time for writing. As well as being resource persons on campus, they could serve as scholar examples.

MINI-GRANTS. Mini-grants can be an important means of maintaining and enhancing personal growth and a source for professional and instructional improvement. It's surprising how such grants can enhance educational climate, help shape the faculty as a dynamic resource pool, stimulate attention to the skills of teaching, and provide the transition from minimal scholarly pursuits to mature scholarship. Excerpts from the regular annual report of a physics department exemplify the role of such grants as well as the dynamics of the resource pool concept mentioned earlier.

> One faculty member, aided by a mini-grant, attended a Department of Energy-funded education workshop and is helping to develop, through the Center for Metropolitan Affairs and Public Policy, a grant proposal which includes a city/college energy conservation program. When funded, this proposal will also provide undergraduate research opportunities. Another faculty member will conduct seminars on teaching for the department and other interested colleagues to pass on what he learned from his contacts with a nationally known teacher during three weeks sponsored by the college mini-grant.

Tentative plans are being made to turn a room in the science building into a learning center. The room will include individual study areas, a mini-computer terminal, space for long-term lab projects, and a testing area for a self-paced course...

> In addition, we will continue to be active participants in campus faculty development activities and off-campus professional conferences and workshops. We feel that these activities will lead to improvement in the overall scholarship and learning climate at the college. (Morgan, 1979)

INTERNAL SABBATICALS. Sabbaticals are typically available after each six years of full-time service, with full salary provided for one semester or half salary for two semesters. Under this scheme, the average faculty member winds up taking advantage only of one sabbatical in three because of inconvenience, cost, unpreparedness, or inability to "break" the routine. Yet, sabbaticals are designed to function as "growth" periods. This being the case, they should be more frequent and "implanted" into the scheme of routine.

For instance, if every eighth consecutive semester a faculty member were free of regular responsibilities to engage in research, writing, and study according to an agreed-upon plan, and if everyone in every department were scheduled similarly but in a rotating arrangement, a creative, dynamic atmosphere might ensue.

The mechanics are rather simple: a faculty member is not scheduled to teach during the eighth semester and no replacement is employed. Course schedules are published for a two-year period to allow majors to arrange required courses well in advance, assuming that all required courses are offered within any two-year period. Within this scheme sabbaticals would occur in a younger faculty member's career immediately following the critical third-year evaluation and in time to define a program that might take into consideration pertinent observations and recommendations.

A second sabbatical would follow closely the tenure decision. In fact, it would not be difficult to arrange subsequent summative reviews to coincide with regularly scheduled "growth" leaves.

Many within and outside of academe will look on such a scheme as "featherbedding." When one-eighth of a staff is free every semester, even though it is to engage in activities that enhance the institution's thrust, the inevitable conclusion will be drawn that funds are being wasted in overstaffing. This is unfortunate because such a program is needed to maintain vitality during a steady-state period when little new blood gets into the system. It is a reward format and at the same time a prescribed antidote to the lethargy that routine inflicts on academe.

BANKING CREDITS. In a few colleges, course credit overloads or hours hours credited for directing independent study are "banked," and when the equivalent of a semester's load has been accumulated (usually within a designated time period, such as three years), the holder of the "banked" credits is entitled to a semester's leave for study and research. Likewise, an overload in one semester may mean an equivalent load reduction in the next semester.

Through this means, faculty members may secure time for writing, fo working up new courses, for doing research to improve classroom instruction, for spending additional time with students in independent study. Banking time for creative ventures (time to be creative) is based on dollars earned from tuition paid for hours taught and for which no extra compensation was paid.

AFTER-TENURE REWARDS. For all intents and purposes, formal evaluation ends when tenure begins. It appears to be assumed that the level of accepted competence attained in the six-year probationary period will be maintained and enhanced. Furthermore, it appears that the reward systems within academe were defined to reinforce efforts during the period of probation primarily, because after tenure the only remaining plus most faculty might expect is promotion to professor or the distinction of holding a departmental chair reserved for the exceptional few.

So much more in the way of creativity and production may result from post-tenure evaluation scheduled at six-year intervals, and an added salary increment might be the reward for significant and continued development after each such evaluation. If this added increment were as much as $1500. the total increase in salary over a career could be very substantial. Too, other rewards limited to tenured professors should make a difference, e.g., partial support for study abroad or opportunity to participate in certain internships and exchange programs.

AFTER RETIREMENT - PROFESSOR EMERITI. The assignment of professors emeriti to the library can broaden the intellectual offerings of the library by identifying learned and experienced individuals as consultants and by making available library resources to which students might not otherwise have access.

A job description for a "Coordinator of Library Resources" in one college included the following:

> ...would supervise the work of three to five professors emeriti and librarians emeriti of the college. The emeriti would be given office space in the library and would work in close conjunction with the Coordinator of Library Resources....

In this program the talents and experience of professors emeriti who become members of the reference staff are utilized to support students in their special projects, in tutorials, and in independent study. They provide assistance also to the regular faculty and are expected to be familiar not only with library resources at the college, but also with those of the libraries of the region. They advise students concerning library resources and the special skills and interests of college personnel. They provide the usual advice, guidance, encouragement, and evaluation for as many student projects as their abilities and activities allow. When feasible and appropriate, the emeriti accompany students to libraries and research centers of neighboring institutions.

The professors emeriti in the library can open many doors which the professor in the classroom can refer to only by way of recommendation. Students have a resource, and aging faculty have a continuously rewarding outlet. Too, such professors augment their retirement income in an amount up to the Social Security allowance, or according to the salary differential of the professor at the time of retirement and that paid his or her young replacement. An annual informal evaluation determines future assignments to students. (Bevan 1978)

LITTLE THINGS. These "little things" not only give satisfaction, they contribute to growth. A professor writes an article and is surprised and pleased when a colleague comments on its content, and when the dean sends a note indicating appreciation and the desire to discuss the thesis and conclusions put forth. Or, a professor derives benefits from critical reactions to the results reported on a new instructional approach introduced into a course. Or, reinforcement is received when a student or colleague expresses "thanks" for assistance in arriving at a critical decision. Or, one receives support when told that every lecture is better than the last.

The most meaningful comment a colleague a colleague made to me early in my career was to the effect that had he been giving my lecture, he could have done a much better job in getting my points across. The 30-minute conversation that followed introduced me to many of the subtleties about formal presentations and how to monitor student reactions when lecturing. It's important to remember that both positive and negative recognition is more effective for learning than no recognition at all. Too, never enough in the way of little things is said between colleagues, when frequently these little comments, if straightforward and sincere, best serve to help a colleague know how he or she stands.

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APPENDIX I

ONE STUDENT'S REACTION TO LARGE CLASSES
(Article from THE DAILY TEXAN)

Reporter's Notebook

The other day I was sitting in a room full of administrators and educators, listening attentively as they deliberated on the subject of small classes.

"There is a need to cut down on the number of small classes a university provides," one educator said. "We just can't afford to have them."

I admit small classes may be costly to individual institutions, but if we were to eliminate money as a primary factor, it might be interesting to look at who is really being hurt by the elimination of small classes — faculty or students.

BEING A student at the University gives me some authority to speak on the effect of larger classes as a means of effective teaching.

As a freshman, I enrolled in a biology class, along with at least 200 others. Not having gone to a high school where large classes were taught, the size of the class inhibited my participation and willingness to learn.

I was easily distracted by the noise level in the room, and if I arrived 15 minutes before the class was to begin, the best seat I could find was on the last three rows.

Never having been a number, a nameless creature whom my professor would probably never meet, I felt slighted by the education I was getting, thinking this was not the best way for me to learn.

I'M NOT advocating individual instruction or classes with only 10 students, but I feel that classes of 100 or more are a disservice to the students.

No one asked student opinion when deciding whether to eliminate small classes from the formula funding. But without student input, there is no need to discuss faculty salaries or workloads. If student level decreased and the University was no longer the largest in the state, there would be no argument as to how many hours an instructor must spend in direct instructional activities, for the number of classes would ultimately decrease while faculty levels might remain the same.

Do people really consider what is best for students when making important decisions that ultimately effect them? Do Legislators really want to know what faculty members are doing with their time or do they want to ensure that students will receive more individualized instructional time as a result of the reporting system?

THE FACT THAT the definition of small classes has been a controversy for several years should make educators re-evaluate where their priorities lie.

For while administrators continue to argue over the definition, classes do not become smaller, but continue to get larger.

Is there a limit as to the maximum number of students which can be enrolled in a class? Of course, students hear a class is closed at adds and drops, but that seems to be the only time we hear of limits as to the number of students that can be placed in one class.

ONE MUST STOP to consider the possibility that space is the only factor preventing classes from reaching a level of 300 students, and if that is the reason I regret what others will face when they come to college hoping to enhance their education.

Small classes may soon become a thing of the past, but I would hate to see our educational system be more concerned with the financial loss it would suffer as a result of teaching small classes, than the education of its students which the state claims is its No. 1 priority.

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