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Title: SOME EFFECTS OF VIDEO-TAPE FEEDBACK ON SELECTED VERBAL AND NONVERBAL TEACHING BEHAVIORS OF PROSPECTIVE ELEMENTARY TEACHERS

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This investigation was designed to determine the effectiveness of video-tape feedback as a technique to modify some selected behaviors of untrained prospective elementary teachers. Four verbal and four nonverbal behaviors were considered; they were: teacher questioning, teacher telling, teacher distractive verbal, teacher allowing for pupil verbal, teacher constructive nonverbal, teacher distractive nonverbal, teacher permitting pupil nonverbal, and silence.

Two microlessons, each of ten minutes or less duration, were taught by each participant. Participants in the study were a) 20 prospective teachers who taught two microlessons each without the aid of supervisory or video-tape feedback, b) 20 prospective teachers who received only supervisory feedback between their first and second teaching experiences, and c) 20 prospective teachers who received

both supervisory and video-tape feedback prior to their second presentation. The prospective teachers were considered untrained as indicated by an average of less than one quarter hour credit each in courses in education.

A change in a behavior was determined by comparing the proportion of time spent on a behavior on the first and second microteaching episodes. The time interval technique of measuring behavior was employed. In this study every ten seconds a mark was recorded indicating the behavior that was in evidence during the majority of the interval. All microlessons were video-taped and all measurements were taken from video-tape replays.

Findings

The following conclusions were drawn from the data obtained and analyzed in the study.

1. There is a significant difference in the change of the proportion of a lesson devoted to telling between prospective teachers receiving feedback and prospective teachers receiving no feedback.

2. There is a significant difference in the change of the proportion of a lesson given to pupil verbal behavior between prospective teachers receiving feedback and prospective teachers receiving no feedback.

3. There is a significant difference in the change of the proportion of a lesson spent in distractive nonverbal behavior between prospective teachers receiving feedback and prospective teachers

receiving no feedback.

4. There is no significant difference in the change of the proportion of time given to verbal or nonverbal behaviors between the prospective teachers receiving supervisory feedback and the prospective teachers receiving supervisory feedback with a video replay.

In each of the categories in which there was a significant difference, a trend seemed to be emerging. One possible explanation of this trend could be interpreted to suggest that supervisory feedback with video-tape replay did not produce as great a behavioral change as supervisory feedback alone.

Some Effects of Video-Tape Feedback on Selected Verbal and Nonverbal Teaching Behaviors of Prospective Elementary Teachers

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

SOME EFFECTS OF VIDEO-TAPE FEEDBACK ON SELECTED VERBAL AND NONVERBAL TEACHING BEHAVIORS OF PROSPECTIVE ELEMENTARY TEACHERS

I. INTRODUCTION

The purpose of this study is to investigate the effectiveness of video-tape feedback as a technique to modify some selected behaviors of untrained prospective elementary teachers.

Background

During the past few years there have been numerous developments in curricula. The potential benefit of these developments depends in part on the personnel responsible for their implementation. One of the results has been the need to develop the potential teaching abilities of teachers to the optimum. There has been considerable concern by educators as to which methods and procedures are most effective and efficient in producing competent teachers. Flanders (11, p. 126-133) and others have attacked the problem by considering the tasks of a teacher as being partially described by a set of behaviors. It is inferred that the development of special category systems for behaviors is necessary if the training of teachers is to be other than superficial.

The use of video-tape recording has emerged as one excellent

way to facilitate the recording and study of teaching behaviors. Evans (8, p. 1-19) has shown that the use of video-tape recording makes it possible to render a comprehensive view of the total classroom situation in terms of teacher and pupil behaviors. Allan (2, p. 5) has attempted to analyze teaching by separating it into well defined components and in so doing considers a set of teaching behaviors in the development of prospective teachers.

Need for the Study

Teachers of methods courses often are frustrated when they find little or no evidence of the trainee actually exhibiting a change of behavior (3, p. 52). Presentations to the trainees emphasizing the desirability of certain behaviors are apparently ineffective in many instances. Some type of laboratory experience might be useful but this poses a problem. The mechanics of college and school administration do not allow for the desirable degree of flexibility needed to provide for teacher training. Time is one factor of concern. A methods class which meets three hours a week for 12 weeks probably has fewer than 30 hours devoted to presentations of lessons by students. If each prospective elementary teacher can present a lesson and have it critiqued in one hour of class time, at most 30 lessons can be practiced during a term. In many methods classes, depending on the number in class, few prospective teachers can be given the

opportunity to present more than one lesson. The use of longer class periods for which students receive the same amount of credit may cause conflicts in the students schedule and also tie up the supervisors time. Frequently in situations involving extra time, the supervisor either accepts an overload or does a job that may well be less than adequate. The trainee may have to sacrifice an extra year due to schedule conflicts or on the other hand bear an excessive load. The use of elementary school pupils as subjects for the prospective teacher also has its limitations. Administrators are concerned as to how much time pupils should be subjected to a trainee rather than the regular classroom teacher. Synchronizing the elementary pupils available release time with the time available to trainees is often difficult to build into an overall schedule.

To a degree microteaching (see page 11) coupled with videotape feedback has provided possible solutions to some of these problems. The time factor can be controlled. Lessons of five to ten minutes duration are easy to arrange in a schedule. The time demend on supervisors, trainees, and elementary pupil is reasonable. The techniques of using microteaching jointly with videotape feedback is promising in some areas. However, one essential question remains unanswered: Is this technique effective in producing modification of teacher behavior? Some educators are optimistic. Gardner (13, p. 45) believes that it is possible for dramatic

behavioral changes of teachers to be produced and sustained using the technique of microteaching. Borg (7, p. 16) formulates the following conclusion:

> Thus, the minicourse model, along with other instructional models that employ microteaching, modeling, and video-tape feedback, continue to show promise as a tool for developing specific teacher skills and behavior patterns.

Structure of the Study

The study involved 75 students at Eastern Oregon College enrolled in a course for prospective teachers. The students were randomly assigned to three groups of 25 members each. Members of each group received the same treatment except for feedback on the first teaching experience.

Initially, all 75 students were given the same introductory information concerning some of the desirable qualities of a teacher. Among the qualities stressed were those behaviors used in the study. No attempt to train the students was made at this time nor was any special emphasis placed on any behavior used either in or out of the study. The students of each group were randomly assigned to classes of five members each. Each class worked as a unit in which each member taught two microlessons to the other four members in his class. The second lesson was taught no later than seven days after the first lesson.

All the students received the same treatment from the beginning of the study through the time of their first presentation. Here the similarity ends, for members of different groups received different types of feedback. Members of group I, considered as the control group, were given no feedback by way of the supervisor or of a video-tape replay. Second lessons were taught with the same lack of training as the first with the exception of the degree of help the first teaching experience may have provided.

The second group was considered as experimental I. Students in this group had their first lesson critiqued by the supervisor. Suggestions were offered concerning the behaviors considered in the study. Members of group III, experimental II, received the same treatment as those in group II except they were provided additional feedback. Each member of this group viewed a video-tape replay of the lesson.

All lessons were video-taped in an attempt to keep the conditions for teaching as uniform as possible and to facilitate the collection of data. The difference in treatment for the groups was the type of feedback provided during the interim between the first and second presentation.

Limitations of the Study

The study is subject to the following limitations.

1. Teaching experiences were limited to microlessons. Under this plan each lesson was to last at most ten minutes.
2. Selection of pupils to be taught in each teaching experience was limited to members of the prospective teacher's peer group. The four nonteaching members of each class played the role of students in each microlesson.
3. Attention was given to just eight categories of teacher behavior; four verbal and four nonverbal behaviors. The verbal behaviors were: questioning, telling, distractive, and teacher allowing for pupil verbal behavior. The nonverbal behaviors studied were: constructive, distractive, teacher permitting student nonverbal behavior, and silence.
4. All microlessons were video-taped at the same location. A special recording studio was outfitted as an elementary classroom.
5. All lessons were content oriented in an area of mathematics.

Overview of the Hypotheses

The considerations in the study fall into two general areas relating to amount of feedback and types of feedback in the modifying of teacher behavior.

First, it is proposed that prospective elementary teachers receiving feedback about their first teaching experience will show a

greater change in selected teacher behaviors on the presentation of their second lesson than counterparts who receive no feedback between presentations. This statement is related to a general feeling that it is the supervisory feedback a prospective elementary teacher receives rather than the teaching experience that most influences behavior modification. It is further suggested that the modification of verbal as well as nonverbal teaching behaviors occur to the same degree.

Second, it is proposed that prospective elementary teachers whose feedback includes a video-tape replay of their first presentation will show a greater change in selected teacher behavior on their second presentation than prospective elementary teachers who receive feedback with no video-tape replay. This supports the idea that the types of feedback directly influence behavior modification. More specifically, this suggests that video-tape feedback is a significant factor in behavior modification.

Definitions of Terms and Abbreviations

Behaviors

Const. Constructive nonverbal behaviors are those nonverbal behaviors of the prospective elementary teacher which tend to enhance, amplify, or in general promote the lesson, i. e., the prospective

elementary teacher properly uses audio-visual aids, facial expressions, gestures, eye contact or maintains a physical position with respect to the class which does not distract from the lesson.

Dist N. Those nonverbal behaviors of the prospective elementary teacher which may cause the other members of the class to become aware of these behaviors at the expense of the purpose of the lesson are considered to be distractive nonverbal behaviors, i.e., the prospective elementary teacher ignores raised hands, adjusts hair, manipulates something in the hand, gazes out the window, evades eye contact, writes illegibly on the blackboard, keeps back to class while talking, pays no attention to student participating, or reads everything from notes or book.

Dist V. Distractive verbal behaviors include those verbal behaviors of the prospective elementary teacher which may allow the class to become inattentive, uninvolved, or distracted from the intent of the lesson, i.e. the prospective elementary teacher answers own question, unnecessarily repeats questions and statements, speaks too fast, speaks at such a level as to be inaudible to members of the class, continued use of "ah" or similar expressions, talks to self or uses improper grammer.

Pupil N. The nonverbal behaviors by the nonteaching members of the class which positively contribute to the lesson are adjudged to be nonverbal pupil behaviors, i.e., pupil works problems at the

blackboard, helps with flannelgraph, arranges cuisenaire rods, uses tools to measure or physically moves to carry out an act of participation in the lesson.

Pupil V. The verbal behaviors by members of the class, other than the prospective elementary teacher teaching the lesson, which are endeavors to contribute to the lesson are called pupil verbal behaviors.

Quest. Questioning refers to those verbal behaviors of the prospective elementary teacher teaching a lesson which solicit a verbal response from members of the class.

The term silence refers to a period of time used for the purpose of contemplation about a statement that has just been made or a question that has been asked.

Tell. Telling denotes those verbal behaviors of the prospective elementary teacher teaching a lesson, other than questioning, which facilitate the atmosphere of learning.

Class

This is the term given to each group of five prospective elementary teachers who work as a unit in the presentation of the microlessons. One member of this group teaches a lesson while the other four members play roles of pupils at the appropriate grade level of the lesson.

Groups

The control group consisted of 25 prospective elementary teachers randomly assigned from the total of 75 prospective elementary teachers involved in the study. Each member of this group taught a second lesson without the benefit of any supervisory feedback from their first teaching experience.

The 25 prospective elementary teachers in the experimental I group were also randomly assigned. Each member of this group had a conference with his supervisor after the first lesson was taught. In the conference the prospective teacher was critiqued with respect to the behaviors being studied. Suggestions for improvement were offered. This was the only source of feedback given before the presentation of the second lesson.

Each member of the experimental II group was provided feedback about the presentation of the first lesson in two ways. A conference was held with the supervisor in which the prospective elementary teacher's behaviors were carefully evaluated. The lesson was viewed on video-tape at which time the prospective elementary teacher was given suggestions for improvement. As in the other two groups the 25 members were randomly assigned.

Microlesson

In this study a microlesson refers to a complete lesson in mathematics but scaled down in terms of time. The lesson may run from three to fifteen minutes in duration.

Microteaching

This refers to the teaching of a microlesson.

II. REVIEW OF RELATED LITERATURE

Measuring Classroom Behavior

The task of measuring classroom behavior is indeed quite complex. The concept of behavior itself must be carefully analyzed. This analysis must be performed in such a way as to provide explicit categories so that the process of recording the behaviors can be accomplished in a reliable fashion. The techniques for measurement should be related to the recording process to provide an efficient and valid form of measurement. However classroom behaviors are measured, the equipment and personnel used must be located in a position which will cause as little distraction to the teacher and class as possible.

Classroom behaviors have been considered in several different ways. Allen (2, p. 5) states that although it is difficult to determine what a good teacher is, it is possible to discover something of what the teacher does. This approach regards behaviors as teaching skills. These skills are presented in five categories: response repertoire, questioning skills, creating student involvement, increasing student participation, and presentation skills.

Flanders (11, p. 128) has developed a system of interaction analysis for observing and coding the verbal interchange in a

classroom. Ten categories are considered under this plan. They are: accepts feeling, praise, student idea, asks questions, lectures, gives directions, criticism, student response, student initiation, and silence.

The two preceeding examples of work in the area of classroom behavior point to the fact that verbal behaviors seem to have been studied more than nonverbal behaviors. This is true but in part the reason may be found by consideration of the equipment needed to observe and record lessons in the classroom. Movie cameras and television equipment have been quite expensive, to say nothing of their conspicuousness in the classroom. Attempts at other methods of observing and recording proved to be inadequate. Another reason for primarily considering verbal behaviors is the complexity of classroom behaviors. Researchers need to focus on some area and thus the area of verbal behaviors was chosen.

It should not be inferred that nonverbal behaviors have been completely overlooked. Horn (14, p. 1-40) and Pucket (23, p. 209-212) were instrumental in initial attempts to measure classroom behaviors. Their work contained a category for such nonverbal behaviors as "pupil raised hand." Even though other researchers mention nonverbal behaviors most have been content to confine their studies to verbal behaviors.

Evans (9, p. 221) states that the shortcoming that looms above

all others in existing research on classroom behaviors is the neglect of the study of nonverbal behaviors. He, jointly with Balzer, developed a category system for teacher behaviors. To do this, every verbal and nonverbal behavior of the classroom that was perceived as influencing the teaching-learning situation was considered. Behaviors that were in some manner related were grouped together. As a result the seven categories developed were: management, control, release, goal setting, content development, effectivity, and undecided. Subcategories were given and divisions were made quite specific so that there was little doubt as to what constituted a behavior and to which category the behavior belonged. Examples of behavior in one group included the following: looks up from work, stops walking, and turns and stares. The development of this category system for classroom behaviors prepares the way for a more detailed look at the classroom.

Efforts to obtain objective measurements of classroom behaviors have taken many forms. Usually the form was dictated in part by the way the behaviors were categorized. Puckett (19, p. 254-255) used a set of symbols which required the observer to make variations on the symbols to record a given behavior. To use this system an observer must remember the exact details of at least 14 different symbols and associate these with the corresponding behaviors. The symbols were repeated to indicate repetition of a behavior.

Acheson (1), Koran (15) and Olivero (21), of Stanford University used rating sheets to measure behavior change. These forms were usually filled in by the researchers or supervisors but high school students were trained to do the evaluation in the work done by Olivero (21). In a study undertaken by Steiner (25) of the Ohio State University, two rating forms were used. The first was filled out with the cooperation of a student teacher, his cooperating teacher, and his college supervisor. The second form was completed by the members of the class taught by the student teacher.

Several of the foregoing methods of measurement rely to a large extent on the ability of the rater to remember what has transpired during a lesson and then be able to accurately recall and record this information in an objective manner. Investigators have devised other methods of measurement in an effort to be more objective. Orme (22) determined shifts in response strengths of the dependent variable by counting the number of desired responses in each lesson. Researchers (7, p. 12) at the Far West Laboratory for Educational Research and Development used at least two different techniques for measurement. The number of words in a pupils response was recorded in considering one behavior while a stopwatch was used to time other behaviors such as length of teacher talk. Flanders (11, p. 127) has trained observers to classify all verbal behaviors every three seconds. Evans (9, p. 222) also used the time interval concept

and applied it to both verbal and nonverbal behavior measurement. In his research it was found that the ten second interval was most promising. Shorter intervals were tried but many behaviors were not completed. Longer intervals allowed for the loss of many behaviors. The time interval method has the advantages of keeping a running account of the classroom activities and condensing the voluminous quantity of data obtained by either a second by second account or the word count method.

Microteaching

The problems of teacher training are many. One of great concern is how to provide adequate laboratory experience for every prospective teacher. When do intern teachers have time to try out new ideas? Should these ideas be forced on a class of 20 or 30 pupils? If the intern has the time and a class, where can the needed supervisors to critique such lessons be obtained? To help surmount some of the problems Allen (13, p. 45) of Stanford University developed a technical skills approach called microteaching.

Microteaching can be defined as (27):

> ...a scaled down teaching encounter in which the intern teaches for short periods of time, 5-20 minutes, to a group of four students, on some topic in his teaching subject.

Gardner and Bartholomew (13, p. 45) in their study of modifying

teacher behavior state:

> Microteaching consists, then, of selecting a single component of teaching behavior for primary focus and providing the opportunity for a pre-service or inservice teacher to teach a scaled-down lesson aimed at perfecting the selected skill.

A scaled-down teaching experience relates to more than just the time factor. It is probably best described by Gage (12, p. 602) who describes microteaching as:

> ...a scaled-down teaching experience. It is scaled-down in terms of time because it lasts 5-10 minutes. It is scaled-down in terms of class size because the trainee teaches a group of not more than five pupils. It is scaled-down in terms of task ...

Microteaching does provide a way to work with some of the problems of teacher training. Young (26) who worked with Allen at Stanford University suggests some of the importance of microteaching.

> If a teacher wishes to try a new approach in a particular lesson, he ordinarily must wait until the following year to test alternatives to that lesson. In microteaching, the teacher can experiment with several alternatives with a limited number of students each time with the opportunity for immediate evaluation and additional trials. Following this limited application, the plan can be presented to the classroom. In this way teachers may experiment with new methods and new content without the risk of defeating student learning and with much more satisfactory timing.
>
> Many teachers have expressed a desire to study, develop and refine teaching strategies in accordance with expanding demands on teaching. Microteaching provides this opportunity (26).

Microteaching has been used in the training of teachers in an

attempt to develop and modify certain behaviors. Ashlock (3, p. 53-54) reports the use of five minute lessons dealing with a very limited topic. A student taught the lesson to four of his peers. The student teaching the lesson was free to state and make assumptions concerning the previous knowledge of the pupils. The evaluation of the lesson was based upon the teaching-skills identified at Stanford University. Among these skills are: using questions effectively, controlling pupil participation, and providing for feedback from pupils.

Koran (16, p. 47-52) used microteaching in the training of science teachers. The typical format included one teacher presenting a lesson to four students. The lesson was critiqued and then retaught. Both the first and second presentations were to be five minutes in length. Skills such as reinforcement, silence, probing and higher order question seemed to be the skills which showed the most promise for development.

Allen (2, p. 9-12) sums up the advantages of microteaching by saying it: provides safe but realistic practice, focuses on specific skills, facilitates continuous training, enriches supervision, provides a setting for the modeling of instructional skills, and facilitates research.

For the purposes of this study the microteaching function of focusing on specific skills becomes quite important. In addition to

this, the fact that microteaching lends itself to various measurement techniques makes its use even more desirable.

Television and Video-Tape

The methods of recording and securing classroom behaviors have been inadequate until recent developments in the area of portable television recording. Prior to this time use was made of narrative records, audio-tape recorders, and in some instances sound with motion pictures. Each of these methods had its own limitations. Narrative records took a great deal of time, also they were defficient in portraying all the action and climate of the classroom. Audio-tape was limited to work with verbal behavior. Motion pictures would "capture" the behaviors of a classroom quite well but it took time to develop the film and the process was relatively expensive. Recent developments with the portable video-tape recorder have filled much of the gap left by the other methods. A complete unit can be assembled for less than two thousand dollars (13, p. 46). The equipment is simple to operate so that most teachers can effectively use it. Another advantage is the possibility of instant replay.

Teacher training has extensively employed the technique of modeling. Using this technique prospective teachers are shown by example or in picture form, desirable behavior patterns. Orme (22) studied the effects of Symbolic-Pictoral Modeling in which the

desired behaviors were transmitted by a filmed model. His work supports the hypothesis that Symbolic-Pictoral Modeling leads to greater gains in learning than the method in which desired behaviors are transmitted by written or verbal directions.

The basis for modeling in teacher training can possibly be placed in proper prospective by looking at one of the sources of its inception. Several researchers point to the work of Mowrer (20). The theory purposed by Mowrer is described in the following quote.

> Of the various interpretations of imitative learning, the sensory feedback theory of imitation recently proposed by Mowrer (1960) is elaborated in greatest detail. According to this theory, if certain responses have been repeatedly positively reinforced, proprioceptive stimuli associated with these responses acquire secondary reinforcing properties and thus the individual is predisposed to perform the behavior for the positive feedback. Similarly, if responses have been negatively reinforced, response correlated stimuli acquire the capacity to arouse anxiety which, in turn, inhibit the occurrence of the negatively valenced behavior (5, p. 3).

Bandura and Ross (5, p. 3-11) considered this idea in a study involving children. Results of the study provided strong evidence that exposure to filmed aggression heightened aggressive reaction in children. Since the aggressive reaction study involved both verbal and nonverbal behaviors, researchers felt the theory would lend itself to the study of classroom behaviors. Some of the studies using video-tape have used a model teacher displaying the desired behaviors the viewer should attempt to duplicate while other studies

have used the model to portray undesirable behaviors. Many schools of education require the trainee to go through a certain period of observation in "live" classroom situations. Video-tapes provide the supervisor with a known set of behaviors and a way of observing them many times.

In 1964 a group from Stanford University studied the nonverbal mannerisms of counselors by use of a video-tape model (18, p. 413-414). Verbal behaviors were held constant by carefully rehearsing inflection of voice and memorization of a script. Some of the nonverbal behaviors considered were: smiling, facial expression, doodling, playing with hair, fiddling with objects, and eye contact. The same year Olivero (21) studied the effects of substituting video recordings for observation in teacher education. Evaluation was accomplished by the use of rating sheets scored by highschool raters. The criteria used in rating included: development of aims, understanding of aims, organization of content, meaning of content, and teacher pupil communication. Results of this study were conclusive to the degree that additional research is warranted.

Koran's work (17, p. 24) portrays a perceptual model in the following manner.

> ... is a video-tape display of a model teacher, in a simulated teaching situation, performing the desired behavior.

This combines the use of video-tape with microteaching. In his work

several behaviors are presented with the suggestion that behaviors such as questioning be further studied. Koran (17, p. 23-24) goes on to say:

> Once these preliminary decisions have been made regarding what behavior to train for, what the behavior looks like when it appears, and how it can be reliably rated, the time is right for designing training methods.

Within the concept of using video-tape coupled with microteaching lies the possibility of studying some of the aspects of well defined behaviors with a small group of participants.

Allen (2, p. 17) advances the following as possible advantages of video-tape.

(1) Video-tape increases the amount of feedback available to the teacher.

(2) Video-tape provides a record of actual behaviors of the teacher and the students. The supervisor and the teacher may refer to this record during the critique.

(3) The supervisor can use the video-tape record for immediate reinforcement of desired teacher behavior.

(4) When constructive criticism is directed at his image on the monitor rather than at his person, the teacher more readily accepts the criticism.

(5) Tapes can be replayed as often as desired or necessary.

(6) Tapes can be kept for future reference. Comparisons of early tapes with later ones may demonstrate, quite dramatically, a teacher's progress.

(7) When a supervisor is not present, a teacher may

use the video-tape himself to examine his own performance.

The work reported by Evans (9, p. 221-225) seems to be a systematic approach for using some of the advantages of video-tape suggested by Allen and making those preliminary decisions referred to by Koran. Thirteen video-tape recordings were made of high school teachers during their regular presentations. Those recordings were viewed repeatedly by the researchers so they could attempt to categorize all similar or related behaviors. The results of the study produced a category system for teacher behaviors. These behaviors are well defined and the study gives an example of the structure that can be used to facilitate research in many areas of teacher behavior. Behaviors were recorded and separated into ten second intervals. The behavior that consumed the largest portion of the interval was considered predominant. Two observers were used. Inter-observer agreement was checked and rechecked and never found below 0. 92. The high level of reliability makes the use of time intervals in research involving well defined behavior categories very attractive.

Recommendations and Conclusions

The studies involving teaching behaviors, microteaching, and the use of video-tape have offered some suggestions and have

presented a few conclusions.

Data from the study by Steiner (25) seem to support the claims that additional feedback and different types of feedback enable the student teacher to progress at a more rapid rate. Borg (7, p. 16) indicates that in the study involving 11 behaviors, the lack of significant success in some areas may have been caused by imposing too many demands on the student teacher. Recommendations by Ashlock (3, p. 56) include: evaluation of microlessons should be based upon a very limited number of criteria. Orme (22) concluded that there is support for the hypothesis that Symbolic-Perceptual Modeling leads to greater gains in learning than does Symbolic-Verbal Modeling. Olivero (21) and others who have worked with video-tape and microteaching have simply reported that their results were conclusive to the degree that additional research is warranted. Koran (17, p. 27), one of the proponents of video-taping in the training of teachers states

> Unless we focus on ways to train teachers which produce predictable behavior change, and use these teachers in the presentation of new curricula, we will not be able to clearly determine what is the effect of a given curriculum or the effect of a specific teacher . . . We must find out which method is most effective in producing a verbal behavior and which is most effective for well defined nonverbal behavior.

Evans (9, p. 224) says that objectivity is a major concern in any study of classroom behavior. The development of a category

system for teacher behaviors illustrates objectivity by the high level of agreement reached by the two observers.

These conclusions along with preceeding ones mentioned earlier in the chapter form the background for the present study.

III. THE STUDY

Population for the Study

Eastern Oregon College, one of the members of the Oregon State System of Higher Education, is a regional liberal arts college with emphasis on teacher education. Fall term, 1970, 1,724 students enrolled with 817 giving education as their major. The population of the study was composed of undergraduates enrolled at Eastern Oregon College, LaGrande, Oregon.

Selection of the Sample

Four sections of "Essentials of Mathematics" for elementary teachers were offered at Eastern Oregon College during fall term 1970. Two of these sections were assigned to the researcher by the Chairman of the Department of Mathematics. Seventy-five students were enrolled in the two sections. By use of a table of random numbers (10, p. 104) the 75 students were randomly assigned to three groups of 25 members each. Many of the students had less than two years of college at the time the study was initiated. Few of the students had education courses in their background.

Due to illness and other uncontrollable factors the groups did not maintain 25 members each. As the significance of the findings

would be changed very little by using groups of 20 members, each group, where necessary, was randomly cut to 20 members. Table 1 gives the distribution of education course hours as background for the sample.

Table 1. Mean number of quarter hours of education of the control and experimental groups.

Group	Hours in Education	n
Control	0.20	20
Experimental I	1.60	20
Experimental II	0.55	20
Total	0.78	60

The information in Table 1 indicates that the participants in the study have an average of less than one hour in education. Some students may have taken their first education course. At Eastern Oregon College this course is titled "School and American Life" and is given for three hours credit. It is a survey course in which the student acquaints himself with the public school system. No time in this course is devoted to formal training with respect to teacher behaviors. Formal training with regard to teacher behaviors is not initiated until each prospective teacher has completed nine hours of general survey type course work in education. The participants of

this study are considered untrained because they have an average of less than one hour in education and no student has more than nine hours of course work in education. The total number of credit hours of college work for each prospective teacher is found in Appendix A.

Null Hypotheses

The hypotheses presented below are arranged into four main sections. Sections I and II are devoted to the change in verbal and nonverbal behaviors between the control and experimental groups. Sections III and IV refer to the change in verbal and nonverbal behaviors between the two experimental groups. The behaviors mentioned are described in Chapter I. The study is planned to test the following hypotheses.

I. There is no difference in the change of verbal behaviors on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

   (a) There is no difference in the proportion of time spent in questioning on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

   (b) There is no difference in the proportion of time spent in telling on the second lesson between the prospective

elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(c) There is no difference in the proportion of time spent in distractive behavior on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(d) There is no difference in the proportion of time allowed for verbal pupil behavior on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

II There is no difference in the change of nonverbal behaviors on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(a) There is no difference in the proportion of time spent in constructive nonverbal behavior on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(b) There is no difference in the proportion of time spent in distractive nonverbal behavior on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(c) There is no difference in the proportion of time spent in nonverbal student behavior on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

(d) There is no difference in the proportion of time spent in silence on the second lesson between the prospective elementary teachers receiving no feedback and the prospective elementary teachers receiving feedback.

III. There is no difference in the change of verbal behaviors between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(a) There is no difference in the proportion of time spent in questioning on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(b) There is no difference in the proportion of time spent in telling on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(c) There is no difference in the proportion of time spent in

distractive behavior on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(d) There is no difference in the proportion of time allowed for verbal pupil behavior on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

IV. There is no difference in the change of nonverbal behaviors on the second lesson between the prospective elemtnary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(a) There is no difference in the proportion of time spent in constructive nonverbal behavior on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(b) There is no difference in the proportion of time spent in distractive nonverbal behavior on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(c) There is no difference in the proportion of time spent in nonverbal student behavior on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

(d) There is no difference in the proportion of time spent in silence on the second lesson between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory and video-tape feedback.

Collection of Data

Data sheets were developed using techniques developed by Evans and Balzer (8, p. 2-10). The final form used was developed by the researcher making use of the experience gained in classroom video-taping over the past four years. Figure 1 shows the format of the data sheet. An example of one of the data sheets can be found in Appendix B.

Each horizontal line on the data sheet represents a ten second interval of time. The vertical lines divide the verbal and nonverbal behaviors into four sections each. A tape of each lesson was studied at least twice. One run was used to record the nonverbal behaviors on the data sheet and another run was made to record the verbal

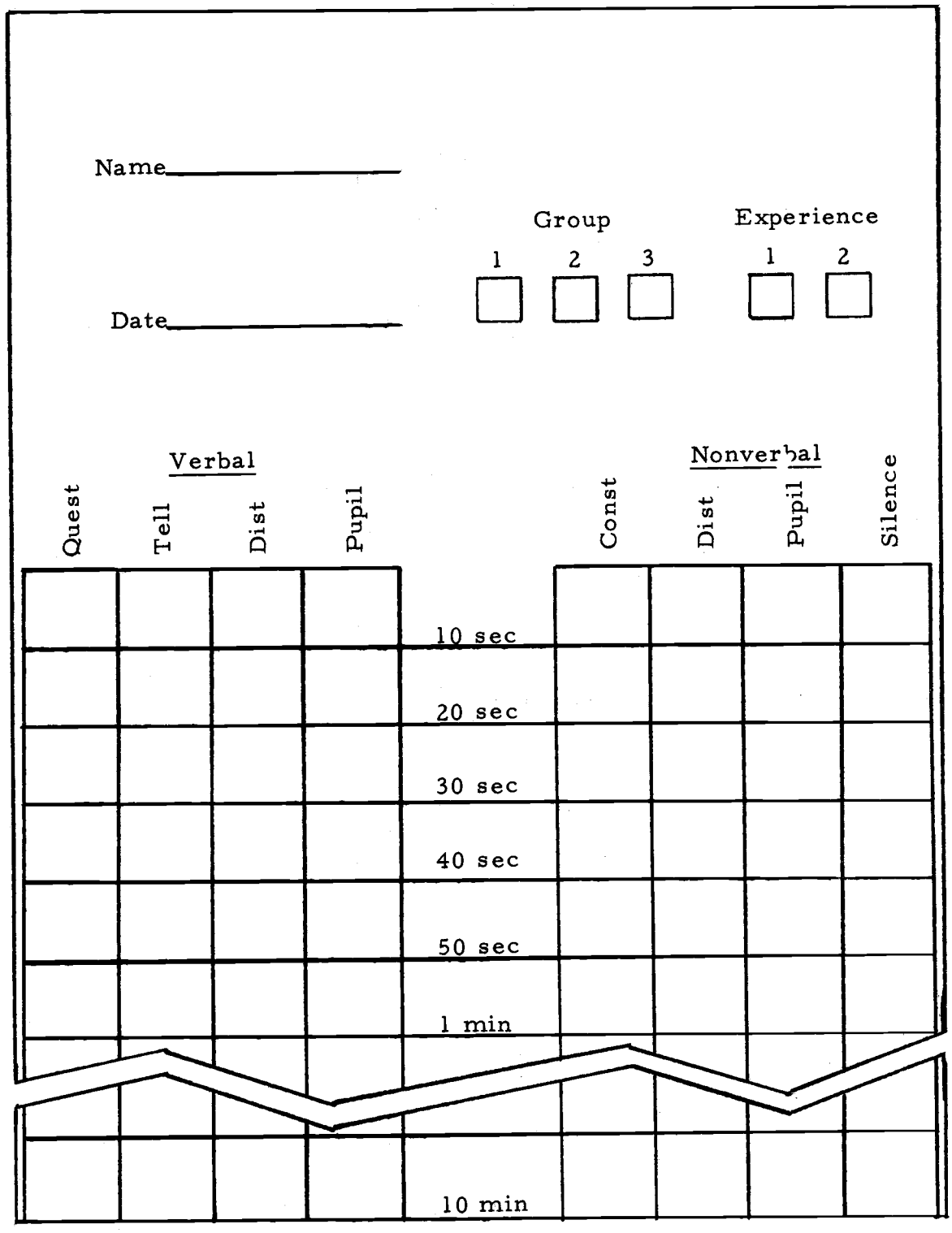

Figure 1. Format of data sheet.

behaviors. Thus, during each ten second interval, one mark was recorded in the appropriate verbal section and one mark was recorded in the appropriate nonverbal section. Decisions as to which behavior should be recorded when two or more behaviors were exhibited during a ten second interval were decided on the basis of what behavior was in evidence during the greater portion of the interval.

Only the first ten minutes of each lesson was subject to the measurement technique. Each ten minute lesson had a total of 60 marks for the verbal sections and 60 marks for the nonverbal categories.

Coding Reliability

The significance of any finding in this study depends in part on the reliability of the coding process. Since all 120 lessons in the study were coded by the researcher, some measures must be taken to determine if any biases were inadvertently introduced. Two additional coders were trained to use the data sheets. Each coder trainee was permitted to practice the marking process until he felt comfortable doing so. This was the only criterion used to determine readiness. At this point each coder randomly selected five lessons to mark. The percentage agreement between each coder and the reseacher was calculated as follows:

$$\% \text{ Agreement} = \frac{\text{Number of Agreements}}{\text{Number of Agreements + Disagreements}} \times 100$$

Table 2. Percent agreement between each coder and the researcher for verbal behaviors on five lessons.

Coder	Quest	Tell	Dist V	Pupil V	Total
A	98	97	-*	87	96
B	95	97	-*	90	96

*No marks were recorded in the category on the selected lessons.

Table 3. Percent agreement between each coder and the researcher for nonverbal behaviors on five lessons.

Coder	Const	Dist N	Pupil V	Silence	Total
A	98	0*	91	100*	95
B	99	67*	98	80*	98

*Fewer than one percent of the marks were in this category on the lessons selected.

The percentage agreement was quite high except in areas in which there were few entries. It so happened that on the five lessons selected by each coder there were few manifestations of distractive nonverbal behavior and silence. As a result, a disagreement of six marks yields a zero percent agreement for coder A on distractive nonverbal behavior and a disagreement of two marks shows only a 67 percent agreement for coder B in the same category.

Scott (24, p. 209-212) suggests the use of an index of inter-coder agreement given by the formula

$$\pi = \frac{P_o - P_e}{1 - P_e}$$

The percent agreement between two coders is designated P_o. The percent agreement to be expected on the basis of chance is specified as P_e.

$$P_e = \sum_{i=1}^{k} P_i^2 ,$$

where K is the total number of categories and P_i is the proportion of the entire sample which falls in the i^{th} category.

This index of inter-coder agreement corrects for the number of categories in the code and the frequency with which each is used. The value of π may vary from 0.00 to 1.00 Table 4 gives the results of computing π for the five lessons independently marked by each coder.

Table 4. Index of inter-coder agreement between the researcher and each coder on five selected lessons.

Coder	Verbal π	Nonverbal π
A	0.93	0.86
B	0.93	0.94

Treatment of the Data

The hypotheses to be tested regarded each lesson as a whole unit with consideration given to the proportion of the time spent in each of the various behaviors. The measurement technique used in the collection of the data adapted very well to the use of proportions. The number of intervals recorded for any behavior was divided by the total number of intervals for the lesson. Verbal behaviors and nonverbal behaviors were considered as occurring simultaneously throughout each lesson. Therefore, the sum of the proportions under each heading, verbal and nonverbal, totaled one. The next step was to find the change in porportion for each behavior from the first presentation to the second. For each behavior the proportion for the first lesson was subtracted from the proportion for the second. A positive result indicated a greater proportion of time was given to the behavior on the second lesson while a negative result indicated a lesser part of the second lesson was given to the behavior. Zero specified that there was no change in proportion of time spent involving the behavior from lesson to lesson. The numbers acquired through the process just described were the measures used in the analysis of variance (see Appendix A).

Hypotheses I and II were similar in respect to consideration of subjects. The control group was the control group described in

Chapter I but experimental I combined with experimental II formed the experimental group. With these as the two groups the method of analysis of variance was used in each of the four parts of hypotheses I and II.

Hypotheses III and IV also pertain to the same groups, experimental I and experimental II. Here also the method of analysis of variance was employed.

In all cases it was predetermined that the F-test would be applicable and that 0.05 level of significance would be used.

Processing the data required transferring the data from data sheets to teletype tape and then completing the process at the computer center at Oregon State University using the permanent program stored under the name Anova-12. This was made possible by a teletype link from Eastern Oregon College to the OS-3 computer in Corvallis. The teletype connection and cost of computer usage was made possible by a National Science Foundation grant to Oregon State University.

Tests of the Hypotheses

In the tests of the hypotheses one factor analysis of variance was the statistical model employed. F ratios were formed by dividing the mean square value for between groups by the mean square value of within groups. A table (6, p. 97-103) of significant values for F was used to determine whether to reject or not reject each null

hypotheses. In cases where the F ratio was large enough to be significant it was determined that the difference in change of behavior was due to the difference in the treatments of the two groups and did not occur by chance.

Hypotheses Concerning Differences between Control and Experimental Group with Respect to Verbal Behavior

Null hypotheses Ia through Id state that there would be no difference in the change of verbal behaviors between the group receiving no feedback and the group receiving feedback.

Table 5. Group means of the control and experimental group for changes in verbal behaviors.

Related Hypothesis	Behavior	Group Mean Score	
		Control	Experimental
Ia	Quest	-0.0182	0.0117
Ib	Tell	0.0495	-0.0597
Ic	Dist V	-0.0096	-0.0067
Id	Pupil V	-0.0217	0.0547

The results shown in Table 5 indicate that the experimental group show an increase in the proportion of time given to questioning and pupil verbal behavior compared to the control group which showed a decrease in both behaviors. Telling registers a decrease for the experimental group while it was increasing for the control group.

Both groups register a decrease for distractive verbal behaviors.

In each column the entries must total zero. This means that any increase in one behavior must be compensated for by a decrease in at least one of the other behaviors. Results for the control group indicate that the increase in telling came by a decrease in the other three behaviors. The experimental group reveals quite a different pattern. Decrease in teacher telling is nearly balanced by the increase in pupil verbal participation. This does not say that the change occurred in the way just described, but the observation certainly poses a possibility.

Table 6. Analysis of variance of the control and experimental group for changes in verbal behaviors.

Hypothesis Tested	Behavior	Mean Square		df	F Ratio
		Treatment	Error		
Ia	Quest	0.0119	0.0241	1,58	0.4928
Ib	Tell	0.1592	0.0343	1,58	4.6410*
Ic	Dist V	0.0001	0.0013	1,58	0.0852
Id	Pupil V	0.0780	0.0140	1,58	5.5817*

*Significant at the five percent level.

Table 6 gives the analysis of variance for the questioning, telling, distractive verbal, and pupil verbal behavior involved in hypothesis I. Hypotheses Ib and Id which respectively asserted that there was no change in telling or allowing for pupil verbal behavior were rejected at the five percent level of significance. The control and

experimental groups did not differ significantly in the change of questioning and distractive verbal behaviors. Hypotheses Ia and Ic were not rejected.

Hypotheses Concerning Difference between the Control and Experimental Group with Respect to Nonverbal Behaviors

Null hypotheses IIa through IId state that there would be no difference in the change of nonverbal behaviors between the group receiving no feedback and the group receiving feedback.

Table 7. Group means of the control and experimental group for changes in nonverbal behaviors.

Related Hypothesis	Behavior	Group Mean Score	
		Control	Experimental
IIa	Const	-0.0581	-0.0012
IIb	Dist N	0.0334	-0.0776
IIc	Pupil N	0.0294	0.0669
IId	Silence	-0.0047	0.0120

Table 7 shows the group means with regard to the behaviors of hypothesis II. Both groups indicate an increase in pupil nonverbal behavior and a decrease in constructive nonverbal behavior. The measures of distractive behavior and silence show the group changes occur in opposite parity.

The control group experienced the greatest change in constructive nonverbal behavior. The decrease in this area seems to be

associated with a shift to distractive and pupil nonverbal behavior. A different trend is quite evident for the experimental group. Pupil nonverbal participation is increased as distractions by the prospective teacher decrease. The results of the analysis of variance are presented in Table 8.

Table 8. Analysis of variance of the control and experimental group for changes in nonverbal behaviors.

Hypothesis Tested	Behavior	Mean Square		df	Ratio
		Treatment	Error		
IIa	Const	0.0431	0.0393	1, 58	1.0957
IIb	Dist N	0.1642	0.0197	1, 58	8.3400**
IIc	Pupil N	0.0188	0.0326	1, 58	0.5759
IId	Silence	0.0037	0.0015	1, 58	2.4087

**Significant at the one percent level.

Null hypothesis IIb which stated that there would be no difference between groups with respect to change of distractive nonverbal behavior was rejected at the one percent level of significance. The other three tests of the null hypotheses, IIa, IIc, and IId, provided F ratios which could not be considered other than that which would be expected by chance. Therefore, they were not rejected.

From the preceeding results it is evident that feedback is quite closely related to a decrease in distractive nonverbal behavior of a prospective teacher. It might be suggested that the prospective

teacher is concerned about correcting his appearance as others see him.

Hypotheses Concerning Differences between Experimental I and Experimental II with Respect to Verbal Behaviors

Null hypotheses IIIa through IIId state that there would be no difference in the change of verbal behaviors between members of the group receiving feedback without a video replay and members of the group receiving feedback with a video replay. Group means for the change of these behaviors are given in Table 9.

Table 9. Group means of experimental I and experimental II for changes in verbal behaviors.

Related Hypotheses	Behavior	Group Mean Score	
		Experimental I	Experimental II
IIIa	Quest	0.0372	-0.0139
IIIb	Tell	-0.0981	-0.0214
IIIc	Dist V	-0.0081	-0.0053
IIId	Pupil V	0.0689	0.0406

Questioning is the only category in which the two groups changed in opposite directions. Here, the group without video feedback increased in proportion of time given to questioning while the group with video feedback decreased in proportion of time given to the same behavior. Both groups registered a decrease in telling and

distractive verbal behaviors. An increase in allowing for pupil verbal participation was common to both groups.

Most behavior change occurred in the categories of telling, pupil verbal behavior, and questioning for the experimental I group. Although the experimental II group experienced some change in every behavior, no one category shows as much change as the corresponding category of the experimental I group. It is also apparent that pupil verbal behavior increased at the expense of all three other categories for the experimental II group.

Table 10. Analysis of variance of experimental I and experimental II for changes in verbal behaviors.

Hypothesis Tested	Behavior	Mean Square		df	F Ratio
		Treatment	Error		
IIIa	Quest	0.0261	0.0219	1, 38	1.1924
IIIb	Tell	0.0588	0.0328	1, 38	1.7905
IIIc	Dist V	0.00008	0.0005	1, 38	0.1705
IIId	Pupil V	0.0080	0.0167	1, 38	0.4801

F ratios listed in Table 10 are far smaller than that needed for the 0.05 level of significance. In this case F must be at least 4.10 for a null hypothesis to be rejected. The results indicate that the two groups do not differ significantly with respect to changes in verbal behaviors. This analysis suggests that the video-tape feedback

as tested by hypotheses IIIa through IIId produced no appreciable change in verbal behaviors. Hypotheses IIIa through IIId were not rejected.

Hypotheses Concerning Differences between Experimental I and Experimental II with Respect to Nonverbal Behavior

Null hypotheses IVa through IVd state that there would be no difference in the change of nonverbal behaviors between members of the group receiving feedback without a video replay and members of the group receiving feedback with a video replay. Table 11 gives the group means for the change in nonverbal behavior.

Table 11. Group means of experimental I and experimental II for changes in nonverbal behaviors.

Related Hypotheses	Behavior	Group Mean Score	
		Experimental I	Experimental II
IVa	Const	-0.0127	0.0103
IVb	Dist N	-0.1002	-0.0550
IVc	Pupil N	0.0935	0.0403
IVd	Silence	0.0195	0.0044

Constructive nonverbal behavior is the only category showing a difference in parity for the two groups. In this category members of the group which did not receive video feedback used less time than members of the group receiving video feedback.

Distractive nonverbal, pupil nonverbal, and silence all reacted to the treatments in the same direction for both groups.

The experimental I group shows considerable change for distractive and pupil nonverbal behavior with some change in all categories. Again, it is apparent that category by category the experimental II group did not change as much as the experimental I group. Most of the decrease in distractive nonverbal behavior for experimental II was seemingly accounted for by the gain in pupil nonverbal behavior.

Table 12. Analysis of variance of experimental I and experimental II for changes in nonverbal behaviors.

Hypotheses Tested	Behavior	Mean Square		df	F Ratio
		Treatment	Error		
IVa	Const	0.0053	0.0318	1,38	0.1660
IVb	Dist N	0.0204	0.0202	1,38	1.0132
IVc	Pupil N	0.0282	0.0219	1,38	1.2884
IVd	Silence	0.0023	0.0013	1,38	1.8061

The F ratios of Table 12 are all much smaller than needed for the 0.05 level of significance. Null hypotheses IVa, IVb, IVc, and IVd were not rejected. This indicates that both groups responded very nearly the same to the given treatments. Feedback involving a video-tape replay did not cause a significant change in any of the four nonverbal behaviors.

Additional Results

Findings in the preceding sections suggest certain possibilities. Significant difference or the lack of it between the control and experimental group could possibly be attributed to the conformity or difference in the two experimental groups. One detail that is noticeable is that the experimental I group has eight prospective teachers who have more college course work than any member of the control group (see Appendix A). Inspection of the means of these eight individuals of group two in the areas where significant differences were found earlier in the study (telling, pupil verbal, distractive nonverbal), yields some informative results. In each case, the mean for the eight prospective teachers indicates a smaller change in behavior than for the rest of the group, i. e. under the category for telling the experimental I group mean was -0.0981 while the mean for the eight prospective teachers in that group was -0.0827. These findings show that the eight prospective teachers had somewhat of a moderating effect on the experimental I group as a whole, rather than producing an effect which might tend to skew the results.

The method of least significant difference, LSD, was employed to give some additional information. The following formula was used to compute the LSD.

$$LSD = t\sqrt{\frac{2\ MSE}{20}}$$

The value for t was found for 50 degrees of freedom as no table was available with a value for 58 degrees of freedom. To be consistent with other parts of the study the five percent level of significance was used. The mean square error for within, with respect to the control group, was used in the formula for MSE. A significant difference was accepted if the difference between the means of an experimental group and control group was larger than the corresponding least significant difference. Table 13 gives the results of this consideration.

Table 13. Least significant difference and difference between means of control group and each experimental group for the eight behavior categories.

Behavior	LSD	Difference from Control	
		Experimental I	Experimental II
Quest	0.0986	0.0556	0.0043
Tell	0.1170	0.1476*	0.0709
Dist V	0.0229	0.0015	0.0043
Pupil V	0.0751	0.0907*	0.0623
Const	0.1259	0.0454	0.0683
Dist N	0.0891	0.1338*	0.0886
Pupil N	0.1146	0.0641	0.0109
Silence	0.0246	0.0241	0.0091

*Significant at the five percent level.

The results found in Table 13 agree in part with the findings presented earlier in the chapter. Significant differences were found in the same three categories as before. However, it now appears as a possibility that significant differences found earlier between the control group and the experimental group were significant because of the contribution of the experimental I part of the total experimental group. In each category, telling, pupil verbal, and distractive non-verbal, the experimental I group show a significant difference from the control group at the five percent level whereas the experimental II group does not. This could be the result of the influence of any number of factors. One possibility is that supervisory feedback with video-tape replay is not as effective in producing behavioral change as supervisory feedback alone.

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study was designed to determine the effectiveness of video-tape feedback as a technique to modify some selected behaviors of untrained prospective elementary teachers. The behaviors chosen for consideration were: questioning, telling, distractive verbal, pupil verbal, constructive nonverbal, distractive nonverbal, pupil nonverbal, and silence. Two microlessons of ten minutes or less duration were taught by each prospective teacher. All lessons were video-taped, which permitted a means of acquiring data as well as providing feedback in desired instances.

Participants in the study were a) 20 students who taught two microlessons each without the aid of supervisory or video-tape feedback, b) students who received only supervisory feedback between their first and second teaching experiences, and c) students who received both supervisory and video-tape feedback prior to the presentation of their second lesson. All participants in the study were students at Eastern Oregon College during the 1970-71 academic year.

The time interval technique of measuring behavior was used to acquire the proportion of time spent on each behavior in a lesson.

The change from the first lesson to the second lesson in proportion of time used on each behavior was determined for each prospective teacher.

The reliability of the coding system was checked by training two coders and subjecting the results of their coding of five randomly selected lessons to percentage analysis and Scott's index of inter-coder agreement. The percentage agreement between the trained coders and the researcher varied from 95 percent to 98 percent. Scott's index of inter-coder agreement showed a low of 0.86 for one coder under the nonverbal category to a high of 0.94 for the other coder also on the nonverbal category.

Analysis of the data revealed that for some behaviors the prospective teachers receiving feedback registered changes significantly different from the changes of the prospective teachers receiving no feedback. In the area of verbal behaviors, telling and pupil verbal behavior showed changes that were significant at the five percent level. The prospective teachers receiving feedback did less telling and allowed for more pupil verbal participation. The questioning and distractive verbal behaviors did not indicate changes which were significant.

Prospective teachers receiving feedback differed significantly from prospective teachers not receiving feedback only in one area of nonverbal behavior. Distractive nonverbal behavior was much less

for the prospective teacher receiving feedback. The changes for the other three nonverbal behaviors did not occur at a level of significance which could be attributed to other than chance.

None of the null hypotheses relating to feedback with video-tape versus feedback without video-tape were rejected. For the eight hypotheses tested in these categories a value of 4.10 was needed for F if the hypothesis was to be rejected at the five percent level. The analysis of the data shows that the F ratios ranged from 0.1660 to 1.8061.

The method of least significant difference was employed to get additional information concerning feedback. Results of this method suggests, as a possibility, that supervisory feedback with video-tape is not as effective in modifying behavior as supervisory feedback alone.

Conclusions

The following conclusions were drawn from the data presented in this investigation.

There is a significant difference in the change of the proportion of a lesson devoted to telling between prospective teachers receiving feedback and prospective teachers receiving no feedback. Prospective teachers receiving feedback spent less time telling than did their counterparts who received no feedback between lessons. The type of

feedback also seemed to influence behavioral change. Feedback with video-tape did not appear to alter the prospective teachers use of telling as much as did the supervisory feedback alone.

There is a significant difference in the change of the proportion of a lesson given to pupil verbal behavior between prospective teachers receiving feedback and prospective teachers receiving no feedback. The results indicate that prospective teachers receiving feedback permit pupils to verbally participate more than pupils of prospective teachers who receive no feedback. The data suggest that the additional time allowed for the pupils comes from the teachers' reduction of time spent in telling. It is also inferred that when video-tape is included in the feedback the shift from teacher telling to pupil verbal participation is not as great.

There is a significant difference in the change of the proportion of a lesson spent in distractive nonverbal behaviors between prospective teachers receiving feedback and prospective teachers receiving no feedback. This finding was significant at the one percent level. Prospective teachers appear to be quite concerned about their actions which others might judge to be distractive. The group receiving feedback spent much less time in distractive nonverbal behavior than did their counterparts who received no feedback. Consideration of the group receiving feedback with video replay shows that they did not change their behavior to the extent that did the prospective teacher

receiving just supervisory feedback.

Within the limitations of design and execution of this study the greater behavior changes probably occur due to the critiqueing rather than the video feedback. In each of the categories in which there was a significant difference between prospective teachers receiving feedback and those who did not, a trend seems to be merging. One of the possibilities for this trend could be that feedback with videotape did not produce as great a change in behavior as supervisory feedback alone.

There is no significant difference in the change of the proportion of a lesson given to questioning, distractive verbal, constructive nonverbal, pupil nonverbal, and silence between prospective teachers receiving feedback and prospective teachers receiving no feedback.

There is no significant difference in the change of proportion of time given to verbal or nonverbal behaviors between the prospective elementary teachers receiving supervisory feedback and the prospective elementary teachers receiving supervisory feedback with a video replay.

Failure to show significant differences in certain categories may have been due to a variety of factors. The number of categories could possibly be too great causing the uninitiated teachers to be somewhat overwhelmed by the complexity of the situation. This in turn could possibly force the subjects into choosing one or two

categories for concentration at the expense of the others.

Some behavior categories may have been too broad. In this case part of a category could change one way while another part changed in the opposite way causing the measured effect for the whole category to show no change.

Recommendations for Method's Teachers

Supervisors of methods course may wish to consider the advantages and disadvantages of using microlessons. Microlessons can be used quite effectively in changing some behavioral skills of prospective teachers. Telling, pupil verbal behavior, and prospective teacher distractive behavior seem to be categories in which microlessons are quite effective. In some instances it appears that more than two microteaching sessions are required to provide behavior modification of the prospective teacher. If this is the case it may be a better practice to use full length lessons for certain behavioral development.

The use of video-tape replay as a method of additional feedback should be dealt with carefully by supervisors of methods courses. In some instances it seems possible that it may not be as effective in producing behavior modification as desired.

Recommendations for Further Study

Suggestions for further investigation are:

1. Similar studies of prospective teacher behavior at the secondary level.
2. Studies that sample the teaching behaviors of prospective teachers at several different times during their program of training.
3. Consideration of just one behavior and the effects of micro-teaching and video-tape feedback on its modification.
4. Comparison of behavior changes of prospective teachers teaching microlessons to regular elementary students and to peers playing roles.
5. Comparison of behavioral change for prospective elementary teachers teaching microlessons and full length lessons.
6. Similar studies using full size classes rather than groups of five.
7. Comparison of behavior change of prospective teachers where for one group the only source of feedback would be the video-tape.
8. Comparison of change in behavior for prospective teachers in disciplines other than mathematics.

BIBLIOGRAPHY

1. Acheson, K. A. The effects of feedback from television recordings and three types of supervisory treatment on selected teacher behaviors. Ed. D. thesis, Stanford, Stanford University, 1964. 63 numb. leaves. (Abstracted in Dissertation Abstracts 25:3886, 1964)

2. Allen, Dwight W., Kevin A. Ryan, Robert N. Bush and James M. Cooper. Teaching skills for elementary and secondary school teachers. Manhattan, New York. General Learning Corporation, 1969, p. 1-62.

3. Ashlock, Robert B. Microteaching in an elementary science methods course. School Science and Mathematics 68:52-56. 1968.

4. Aubertine, H. E. An experiment in the set induction process and its applications to teaching. Ph. D. thesis, Stanford, Stanford University, 1964. 148 numb. leaves. (Abstracted in Dissertation Abstracts 25:3987)

5. Bandura, A., D. Ross, and S. Ross. Imitation of film mediated aggressive models. Journal of Abnormal and Social Psychology 66:3-11. 1963.

6. Beyer, William H. (ed.) Handbook of tables for probability and statistics. Cleveland, Ohio, The Chemical Rubber Company, 1966. p. 97-103.

7. Borg, Walter R., Warren Kallenbach, Merva Morris, and Allen Friebel. Video-tape feedback and microteaching in a teacher training model. The Journal of Experimental Education 37:9-16. 1969.

8. Evans, Thomas P. An exploratory study of the verbal and nonverbal behaviors of biology teachers and their relationships to selected personality traits. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Pasadena, California, February 7, 1969, 19 numb. leaves.

9. Evans, Thomas P. A category system for teacher behaviors. The American Biology Teacher 31:221-225. 1969.

10. Fisher, Ronald A. and Frank Yates. Statistical tables for biological,agricultural and medical research. New York, Hafner Publishing Company, Inc., 1948. p. 104.

11. Flanders, Ned A. Interaction analysis and inservice training. The Journal of Experimental Education 37:126-133. 1968.

12. Gage, N. L. An analitical approach to research on instructional methods. Phi Delta Kappa 49:601-606. 1968.

13. Gardner, Marjorie and Rolland Bartholomew. Microteaching a medium for modifying teacher behavior. The Science Teacher 36:45-47. 1969.

14. Horn, E. Distribution of opportunity for participation among the various pupils in classroom recitations. Columbia University Teachers College Contributions to Education 67. 1914.

15. Koran, John Joseph, Jr. The relative effects of imitation versus problem solving on the acquisition of a complex teaching skill. Ph. D. thesis, Stanford, Stanford University, 1968. 135 numb. leaves (Abstracted in Dissertation Abstracts 29:500A)

16. Koran, John Joseph, Jr. A design for pre-service science teacher education. Science Education 53:47-52. 1969.

17. Koran, John J., Jr. Two paradigms for the training of science teachers using videotape technology and simulated conditions. Journal of Research in Science Teaching 6:22-28. 1969.

18. Krumboltz, J. D., B. B. Varenhorst and C. E. Thoresen. Nonverbal factors and counseling effectiveness. Journal of Counseling Psychology 14:413-414. 1967.

19. Medley, Donald M. and Harold E. Mitzler. Measuring classroom behavior by systematic observation. In: Handbook of research on teaching, ed. by N. L. Gage. Chicago, Rand McNally, 1963. p. 247-328.

20. Mowrer, O. H. Learning theory the symbolic process. New York, John Wiley and Sons, Inc. 1960. 473 p.

21. Olivero, James Lee. Video recordings as a substitute for live observations in teacher education. Ed. D. thesis, Stanford, Stanford University, 1964. 156 numb. leaves. (Abstracted in Dissertation Abstracts 25:5769)

22. Orme, Michael Edward James. The effects of modeling and feedback variables on the acquisition of a complex teaching strategy. Ph. D. thesis, Stanford, Stanford University, 1966. 149 numb. leaves. (Abstracted in Dissertation Abstracts 27: 3320)

23. Puckett, R. C. Making supervision objective. School Review 36:209-212. 1928.

24. Scott, William A. Reliability of content analysis. The case for nominal scale coding. Public Opinion Quarterly 19:321-325. 1955.

25. Steiner, Ramon Frederick. An exploratory study of the results of providing increased feedback to student teachers of mathematics. Ph. D. thesis, Ohio State University. 1966. 121 numb. leaves. (Abstracted in Dissertation Abstracts 27: 2929A)

26. Young, David B. The analysis and modification of teaching behavior using interaction analysis, micro-teaching, and videotape feedback. Presented at the National Association of Secondary School Principals, 52nd annual convention, Feb. 1968, Atlantic City, New Jersey.

27. Micro-teaching: A description. Secondary Teacher Education Program, School of Education, Stanford University, Summer, 1966.

APPENDICES

APPENDIX A

The proportional change in each behavior and the number of hours of course work in college for each member of the control group.

Total Course Work	Quest	Tell	Dist V	Pupil V	Const	Dist N	Pupil N	Silence
0	.1250	-.1667	.0000	.0147	-.2917	.2500	.0000	.0417
0	-.0440	-.1015	.1091	.0364	-.0924	.2167	-.1076	-.0167
0	-.0621	.0940	-.0159	-.0159	-.1311	-.1924	.4750	-.1515
40	.0718	-.0266	.0185	-.0637	-.2766	.1100	.1667	.0000
45	.0167	.2000	-.1333	-.0833	-.1500	.2833	-.1167	-.0167
45	-.2167	.3167	-.0167	-.0833	-.4500	.0667	.3833	.0000
47	-.0583	-.0083	.0000	.0667	.0167	.0500	-.0833	.0167
49	.1500	-.0500	.0167	-.1167	.3333	.0333	-.3666	.0000
49	.0963	-.3260	-.0370	.2667	.2093	.0167	-.2593	.0333
49	.2500	-.1167	.0000	-.1333	-.1167	.0000	.1167	.0000
50	.3000	-.0667	-.1167	-.1167	.0833	-.0667	-.0333	.0167
52	-.2833	.3333	.0000	-.0500	-.1167	.0167	.1333	-.0333
65	.2000	-.2167	-.0500	.0667	.4667	-.0333	-.4833	.0500
70	-.0258	.0258	.0000	.0000	.3042	-.3004	-.0038	.0000
70	-.1333	.1333	.0000	.0000	-.2333	.1333	.1000	.0000
74	-.1333	.1833	.1000	-.1500	-.0333	-.0667	.1333	-.0333
76	-.0667	.1500	-.0500	-.0333	-.3500	.0000	.3000	.0500
77	-.0667	.0500	.0000	.0167	-.1667	.0167	.1167	.0333
78	-.2000	.2167	.0000	-.0167	-.0500	.1000	.0000	-.0500
87	-.2833	.3667	-.0167	-.0667	-.1167	.0333	.1167	-.0333

The proportional change in each behavior and the number of hours of course work in college for each member of the experimental I group.

Total Course Work	Quest	Tell	Dist V	Pupil V	Const	Dist N	Pupil N	Silence
0	.0970	-.3268	-.0294	.2593	.1525	-.1688	-.0206	.0370
0	.0012	.0417	.0000	-.0429	.1083	-.1464	.0393	-.0012
0	.2333	-.1333	.0000	-.1000	.1500	.0333	-.1833	.0000
45	.0000	.1471	.0000	-.1471	-.1765	-.0588	.2353	.0000
47	-.3115	.3500	.0000	-.0385	-.0795	-.0385	.1179	.0000
47	-.1738	-.3762	.0000	.5500	-.1929	-.0476	.2405	.0000
48	-.0333	-.2167	.0000	.2500	.2500	-.5833	.2833	.0500
48	.0660	-.3538	.0000	.2879	-.1007	-.0909	.1916	.0000
58	-.1667	.0222	-.0278	.1722	-.2333	.0389	.1944	.0000
66	.1301	-.1243	-.0322	.0263	.5102	-.5629	.0000	.0526
69	.0646	-.0868	.0000	.0222	.0951	.0000	-.0951	.0000
87	.0635	-.1429	.0000	.0794	.0106	-.0688	.0582	.0000
90	.1833	-.2333	-.0167	.0667	-.0500	-.0500	.0333	.0667
95	.1500	-.2000	.0000	.0500	.1500	.0000	-.1500	.0000
101	.0000	.0000	.0000	.0000	.0167	-.0667	.0500	.0000
107	-.0056	.1611	-.0556	-.1000	-.0925	-.1686	.2444	.0167
107	.0333	-.2000	.0000	.1667	-.1500	-.0500	.2167	-.0167
117	.0962	-.0560	.0000	-.0403	-.1309	.0000	.0631	.0678
120	.0500	.0667	.0000	-.1167	-.4250	.0250	.4000	.0000
129	.2667	-.3000	.0000	.0333	-.0666	.0000	-.0500	.1167

The proportional change in each behavior and the number of hours of course work in college for each member of the experimental II group.

Total Course Work	Quest	Tell	Dist V	Pupil V	Const	Dist N	Pupil N	Silence
0	.0500	-.1500	.0000	.1000	.2167	.0000	-.2166	.0000
0	.0016	.0721	-.0208	-.0529	.1458	-.0785	-.0769	.0096
0	.1538	-.1794	.0000	.0256	.1575	-.2601	.0000	.1026
40	-.0682	.1167	-.0454	-.0030	-.0212	-.0348	.0909	-.0348
43	.0036	.0073	-.0400	.0291	.0982	-.0655	-.0327	.0000
43	-.1364	.0500	.0000	.0864	.0076	-.0606	.0500	.0030
45	-.2324	.1259	.0000	.1065	.0491	-.0370	.0000	-.0120
45	.1278	-.0833	.0000	-.0444	.0000	-.0889	.0889	.0000
46	.1018	-.1993	.0000	.0976	.1455	-.1682	.0227	.0000
47	-.1875	.2000	.0000	-.0125	-.2000	.0000	.2000	.0000
48	.3333	-.3157	.0000	-.0176	-.0314	-.2353	.2500	.0167
49	.0078	-.0713	.0000	.0636	.0663	-.0764	.0333	-.0233
50	.0333	-.3000	.0667	.2000	-.1667	.0500	.1667	-.0500
52	-.1655	.1318	.0000	.0337	-.0317	.0000	.0954	-.0638
64	.2000	-.2364	.0000	.0364	-.0390	-.1429	.1818	.0000
67	.1833	.2667	-.0667	-.0162	-.1222	-.0556	.1611	.0167
94	-.2621	.1894	.0000	.0727	-.3000	.2000	.1000	.0000
95	-.0848	.0576	.0000	.0273	.1152	.0545	-.2000	.0303
99	-.0829	-.0390	.0000	.1220	-.1659	-.0068	.1483	.0244
106	.1125	-.0708	.0000	-.0417	.2813	-.0938	-.2563	.0688

APPENDIX B

Data Collection Sheet

Name _____

Date _____

Group: 1 ☐ 2 ☐ 3 ☐

Experience: 1 ☐ 2 ☐