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EDUCATION FOR BEGINNING TEACHERS

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Walter Audry Cameron, B.S., M.S.

The Ohio State University
1969

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TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>VITA</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I. THE PROBLEM AND ITS SETTING</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td></td>
</tr>
<tr>
<td>Objectives of the Study</td>
<td></td>
</tr>
<tr>
<td>Theoretical Base for the Study</td>
<td></td>
</tr>
<tr>
<td>Hypotheses</td>
<td></td>
</tr>
<tr>
<td>Need for the Study</td>
<td></td>
</tr>
<tr>
<td>Procedures</td>
<td></td>
</tr>
<tr>
<td>Assumptions</td>
<td></td>
</tr>
<tr>
<td>Limitations</td>
<td></td>
</tr>
<tr>
<td>Definition of Terms</td>
<td></td>
</tr>
<tr>
<td>II. REVIEW OF RELATED RESEARCH</td>
<td>23</td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Applications of Micro-Teaching</td>
<td></td>
</tr>
<tr>
<td>Video Recordings and Other Feedback</td>
<td></td>
</tr>
<tr>
<td>Variables in Teacher Education</td>
<td></td>
</tr>
<tr>
<td>Modeling Research in Teacher Education</td>
<td></td>
</tr>
<tr>
<td>Remote Techniques of Supervision and Teacher Education</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>III. DESIGN AND CONDUCT OF THE STUDY</td>
<td>65</td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Population and Sample</td>
<td></td>
</tr>
<tr>
<td>Experimental Design</td>
<td></td>
</tr>
<tr>
<td>Description of Treatments</td>
<td></td>
</tr>
<tr>
<td>Instrumentation</td>
<td></td>
</tr>
<tr>
<td>Instructional and Illustration Models</td>
<td></td>
</tr>
</tbody>
</table>

vi
## TABLE OF CONTENTS — Continued

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>III—continued</td>
<td></td>
</tr>
<tr>
<td>Conduct of the Experiment</td>
<td></td>
</tr>
<tr>
<td>Controls Used in the Experiment</td>
<td></td>
</tr>
<tr>
<td>Panel Rating Procedures</td>
<td></td>
</tr>
<tr>
<td>Statistical Procedures</td>
<td></td>
</tr>
<tr>
<td>Analysis of Data</td>
<td></td>
</tr>
<tr>
<td>IV. FINDINGS OF THE STUDY</td>
<td>101</td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Analysis of the Effectiveness of the Three Remote Techniques in Regard to Teacher Performance</td>
<td></td>
</tr>
<tr>
<td>Analysis of the Level of Expressed Teacher Satisfaction with the Remote Techniques</td>
<td></td>
</tr>
<tr>
<td>Analysis of Data Assessing the Feasibility of Remote Techniques of Teacher Education</td>
<td></td>
</tr>
<tr>
<td>Discussion of Findings</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</td>
<td>135</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>Conclusions</td>
<td></td>
</tr>
<tr>
<td>Recommendations</td>
<td></td>
</tr>
<tr>
<td>APPENDIXES</td>
<td>149</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>230</td>
</tr>
</tbody>
</table>

vii
LIST OF TABLES

Table                                      Page
1. Average Age and Average Years of Experience on Background Characteristics of the Participants in Each Treatment Group .............. 69
2. Pretest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Introducing a Lesson .............. 79
3. Posttest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Introducing a Lesson .............. 79
4. Pretest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Questioning ....................... 80
5. Posttest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Questioning ....................... 81
6. Pretest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Demonstrating a Manipulative Skill ..................................... 82
7. Posttest Means, Standard Deviations, Variances and Reliability Coefficients of Items on the Critique Form: Demonstrating a Manipulative Skill ..................................... 83
8. Inter-Rater Reliability Correlation Coefficients ..................................... 97
9. Analysis of Covariance for Performance Differences on the Composite of Three Teaching Skills Among Teachers Receiving Video-Phone, Video-Mail and Video-Self-Evaluation Feedback 105
10. Analysis of Covariance for Teaching Performance Differences on Teaching Skill of Introducing a Lesson Among Teachers Receiving Video-Phone, Video-Mail and Video-Self-Evaluation Feedback 106
LIST OF TABLES--Continued

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Analysis of Covariance for Teaching Performance Differences on the Teaching Skill of Questioning Among Teachers Receiving Video-Phone, Video-Mail and Video-Self-Evaluation Feedback</td>
<td>107</td>
</tr>
<tr>
<td>12. Analysis of Covariance for Teaching Performances on the Teaching Skill of Demonstrating a Manipulative Skill Among Teachers Receiving Video-Phone, Video-Mail and Video-Self-Evaluation Feedback</td>
<td>108</td>
</tr>
<tr>
<td>13. Teaching Performance Criterion Variable and Covariate Means</td>
<td>110</td>
</tr>
<tr>
<td>14. Analysis of Variance for Level of Satisfaction Differences Among Teachers Receiving Video-Phone, Video-Mail, and Video-Self-Evaluation Feedback</td>
<td>111</td>
</tr>
<tr>
<td>15. Paired T-Test Showing Comparison of Pre- and Post-Test Teaching Performance Scores for Teachers Receiving Video-Phone Feedback</td>
<td>114</td>
</tr>
<tr>
<td>16. Paired T-Test Showing Comparison of Pre- and Post-Test Teaching Performance Scores for Teachers Receiving Video-Mail Feedback</td>
<td>116</td>
</tr>
<tr>
<td>17. Paired T-Test Showing Comparison of Pre- and Post-Test Teaching Performance Scores for Teachers Receiving Video-Self-Evaluation Feedback</td>
<td>118</td>
</tr>
<tr>
<td>18. Average Viewing Times for Instructional Models by Each of the Three Treatment Groups</td>
<td>120</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Schematic Diagram of the Experimental Design</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Schematic Diagram of the Experimental Design</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>Functional Operation of the Experimental Design</td>
<td>72</td>
</tr>
<tr>
<td>3</td>
<td>Operational Description of Treatments</td>
<td>76</td>
</tr>
<tr>
<td>4</td>
<td>Sequence of Events in the Experiment</td>
<td>91</td>
</tr>
<tr>
<td>5</td>
<td>The Double Blind Viewing Technique</td>
<td>96</td>
</tr>
</tbody>
</table>
CHAPTER I

THE PROBLEM AND ITS SETTING

Introduction

Vocational-technical educators have long recognized the need and value of adequate in-service education for teachers of vocational and technical education. The Smith-Hughes Act of 1917 incorporated provisions for both pre-service and in-service education of teachers. Succeeding federal legislation, including the Vocational Education Act of 1963, re-emphasized the significance of in-service education for those responsible for the programs of vocational-technical education. New technical knowledge and rapid changes in the educational structure of our nation's schools have placed expanded demands upon colleges and universities for more effective programs of in-service teacher education. Moreover, the increased cost of providing effective in-service education is compounding the problems connected with in-service programs.

In vocational and technical education, a large number of persons who have had no formal education in the profession of teaching are recruited from industry to teach
vocational and technical subjects. These new entrants to the teaching profession are usually required to attend a one or two week workshop on fundamental teaching techniques before being placed in a teaching position. Throughout their first year of teaching they are required to attend a few one-day workshops on teaching methods. For the most part, these beginning teachers are left to their own trial and error methods of learning to teach. This situation is justifiable when the problems involved in providing adequate in-service education are considered. The beginning teachers are necessarily placed in schools where they are needed most; thus, great distances usually exist between the various locations of the teachers. The expense involved and the number of teacher educators or supervisors that it would take to serve these beginning teachers prohibit the maintenance of an adequate in-service teacher education program.

Current educational methodology involving the use of micro-teaching and videotape recordings has shown promise for improving the pre-service teacher education program in general and elementary education. By combining micro-teaching and video recordings with remote in-service teacher education techniques such as telephone and mailed videotaped instructions, it seemed feasible to consider this effort as a means for providing a more effective program
of in-service education for beginning teachers of vocational and technical education.

With the above considerations in mind, the major focus of this study was to assess the use of remote teacher education techniques in in-service education on selected teaching skills for beginning vocational-technical teachers in the State of Colorado.

Statement of the Problem

The purpose of this study was to determine the effectiveness of remote techniques of teacher education for providing in-service education on selected teaching skills for beginning teachers.

Objectives of the Study

The following specific objectives were identified to give direction to the study:

1. To assess the effectiveness of the following techniques of remote teacher education in regard to teacher performance on three selected teaching skills:
   a. Treatment #1: Instructional model with video-phone feedback.
   b. Treatment #2: Instructional model with video-mail feedback.
   c. Treatment #3: Instructional model with video-self-evaluation feedback.
2. To determine from among the three treatment groups, the level of expressed teacher satisfaction for each of the remote techniques of teacher education.

3. To determine the feasibility of the use of remote techniques for in-service teacher education.

Theoretical Base for the Study

The need for a sound theoretical base for experimental studies was pointed out by Cyphert and Andrews.

A review of major currents in the use of videotape recorders in teacher education suggests that both innovative practice and research suffer from the same weaknesses, namely, the urgent need for a sound conceptual and theoretical base and more rigorously developed designs. As more institutions explore the potential for improving teacher education through the videotape recorder, it appears to be essential that a wedding between theory, practice, and research occur.¹

Vlcek reviewed important theoretical conclusions about the learning process with which researchers were in general agreement. He gleaned from these theoretical elements of learning, theories which research evidence tends to support. Five of these statements provided the theoretical framework for this study. These statements were summarized as follows:

1. Immediate knowledge of results is important in the learning process.

2. Activity of a prospective teacher through laboratory instruction contributes positively to learning.

3. Guided discovery increases retention.

4. Successful learning experiences must be meaningful and realistic.

5. A healthy concept of one's self aids learning.2

Researchers are in general agreement that feedback or knowledge of results contributes to learning. Woodworth and Scholosberg found that if students are to learn skills, they must practice skills and see the results of their practice.3 Page demonstrated how teachers' comments on examination papers can affect student performance on subsequent examinations.4 In a study which provided feedback to teachers regarding the impressions of their pupils about the real teacher and the ideal teacher, researchers were able to show significant changes in teacher behavior.5


Based upon the preceding findings, one may expect that a teacher who observes a recording to be inconsistent with his stated belief, e.g., expressing the value of having students participate actively in a lesson but observing that he did most of the talking, may be moved to change his behavior in future performances.

In summary, research evidence indicates that some means must be provided for the learner to perceive the results of his activity. The learner must receive some feedback which will enable him to realize that his performance is correct. This does not mean that the learner must always be told specifically that he is correct. Sometimes he knows he is correct merely by observing the results of his behavior or actions.

The preceding discussion on feedback supports the use of self-initiated and teacher educator feedback used in this study. In addition, the use of videotaped recordings of a teacher's performance for feedback purposes is supported.

Another area in which researchers are in agreement involved laboratory experience. The laboratory method of teaching assumes that first-hand experience and manipulation of material or events are necessary for learning certain teaching skills. McKeachie stated that from the standpoint
of theory, the activity of the student, the sensorimotor nature of the experience, and the individualization of laboratory instruction should contribute positively to learning.\(^6\)

In recent years micro-teaching has become an accepted laboratory method for instructing teachers in the use of teaching skills. As defined by Fortune, Cooper, and Allen:

Micro-teaching is a scaled-down teaching encounter that has been developed at Stanford University to serve three purposes: (1) as preliminary experience and practice in teaching, (2) as a research vehicle to explore training effects under controlled conditions, and (3) as an in-service training instrument for experienced teachers. In micro-teaching, the trainees are exposed to the variables in classroom teaching without being overwhelmed by the complexity of the situation. They are required to teach brief lessons (5 to 25 minutes) in their teaching subject to a small group of students (up to 5).\(^7\)

The micro-teaching technique has a very well-founded theoretical and scientific base.\(^8\) Many of its elements are connected directly with the theory and scientific findings


\(^8\)John H. Meier, "Rationale for and Application of Microteaching to Improve Teaching" (Greely, Colorado: Rocky Mountain Educational Laboratory, Inc., 1968). (Mimeoographed.)
of psychology and sociology.

The use of teaching models has been found to be helpful in instructing novice teachers on new teaching skills. Models help guide learners in discovering new skills. A review of the relevant literature by Bandura and Walters has shown that complex social behavior may be acquired almost entirely through imitation. They stated that the provision of face-to-face models served to accelerate the learning process and, in cases where errors were dangerous or costly, became an essential means of transmitting behavior patterns. Moreover, research has demonstrated that film-mediated models are as effective as real-life models in transmitting deviant patterns of behavior. In fact, in some cases, the amount of learning shown by the learner may match that portrayed by the model.

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10 Ibid., p. 52.


For this current study a teaching model for each teaching skill was recorded on videotape. Prompts in the form of narration explaining each film segment of teaching behavior were included as an integral part of the videotaped models. This procedure is supported by research. Wulff and Kraeling did a study based on the idea that it was not necessary for the learner to attend all features of an automotive assembly task but rather to concentrate on the key features important in performing it. It was found that attention to important cues was more useful when given in the context of, and just prior to, training than if given as a completely separate, prior procedure.

Another area of learning theory in which there is general agreement is that effectiveness in learning is highly related to the satisfaction obtained by the learner. As stated by Cassel, "Satisfaction derives from worthwhile accomplishment on the part of the learner, and not simply from perfunctory involvement in activity." It therefore follows that feedback on accomplishments will increase learner satisfaction.


In summary, the following statements were identified as being essential to the development of a theoretical base for this study.

1. Feedback on accomplishments is important in the learning process. Either feedback provided from an outside source or self-initiated feedback promotes learning but a combination of these two will further strengthen the effectiveness of feedback on learning.

2. Providing a beginning teacher with laboratory practice in the form of micro-teaching contributes positively to learning. Micro-teaching provides a teaching experience which is meaningful and realistic.

3. Teaching models on videotape contribute to the learning of new teaching skills. Models with narrative prompts guide a learner in discovering new behaviors.

4. Learner satisfaction is enhanced by feedback on the learner's accomplishments. In addition, a satisfied learner will perform more effectively.

**Hypotheses**

From the theoretical base the following research hypotheses were determined:
1. Measured performance on:
   \( (H_1) \) the composite of the following three teaching skills and the skills separately,
   \( (H_2) \) introducing a lesson
   \( (H_3) \) questioning
   \( (H_4) \) demonstrating a manipulative skill
   -- will be greater for the teachers receiving video-phone feedback than for the teachers receiving video-mail feedback, which in turn, will be greater than for the teachers receiving video-self-evaluation feedback.

2. \( (H_5) \) teachers receiving either video-phone feedback or video-mail feedback will be more satisfied with the remote in-service teacher education program than those receiving video-self-evaluation feedback.

**Need for the Study**

Due to the incalculable worth of the product of vocational-technical education—the student—every conceivable means must be employed to assure that educational methodology contributes to the development of that product. Artful teachers who employ the most modern techniques and procedures of teaching can make a definite contribution to the development of the student. But if the teacher is
to be able to use modern techniques, it becomes essential that he keep pace with new educational technology.

During recent years considerable emphasis in pre-service education has been placed on the training of prospective teachers in the use of teaching skills. Nine teaching skills have been identified and tested at Stanford University. These skills were establishing set, establishing appropriate frames of reference, achieving closure, using questions affectively, recognizing and obtaining attending behavior, control of participation, providing feedback, employing rewards and punishments, and setting a model. Other teaching skills are now in the process of being developed.

Many teacher educators believe that teachers need to develop familiarity with a broad range of teaching skills. If teachers fail to do so, they are likely to restrict their teaching behavior to a narrow band of activities with which they have had previous experience and some measure of success. Placing emphasis on teaching skills is not intended to suggest that teachers simply need a "bag of tricks" in order to function effectively. Rather, it is believed that as teachers develop familiarity with teaching skills, they will be more likely to use a broader

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A number of research studies have established the value of teaching skills in preparing prospective general education teachers. Little effort has been made to provide in-service education on the new skills for beginning vocational-technical teachers. Unlike the majority of general education teachers who obtain their subject matter competency in a college or university, many vocational-technical teachers acquire their subject matter competency through industrial experience. In addition, the teacher education pattern for vocational-technical teachers in the areas of trade and industrial education, health occupations education, and technical education has been limited typically to a pre-service workshop followed by an extensive in-service program. The pre-service workshops vary from three days to eight weeks in length and usually are given during the summer before the new teachers begin teaching in the fall. The in-service programs vary greatly from state to state and generally are from one to four years in length.

The question of how to provide in-service education on teaching skills remains an unanswered one. Allen suggested micro-teaching supplemented with videotaped recordings as a partial answer to this question.16

The significance of applying micro-teaching to in-service teacher education was reinforced by Aubertine.

In essence, bringing the training program to the teachers and their instructional environment rather than referring the teacher back to the university, seems to offer another way to promote continued growth and excellence in teaching. Furthermore, it would facilitate a deeper professional commitment toward teaching among laymen, administrators, and teachers. It would assist in dispelling the belief that the schools are solely consumers of talent. It would emphasize the need for the continued and ongoing training of teachers.17

In vocational-technical education there is a constant need for providing teacher education opportunities for the new teachers who are recruited from industry. The application of micro-teaching through in-service education shows promise for helping beginning teachers but due to the obstacles of distance and terrain in the mountainous states of the western part of the United States, teacher educators are handicapped in their efforts to provide effective in-service education. Remote techniques of teacher education show promise for spanning the obstacles of distance and terrain.

Remote teacher education techniques such as in-

structional video tapes\textsuperscript{18} and tele-supervision\textsuperscript{19} have been tried in other fields. A review of research has shown that no efforts have been made to use a combination of these remote techniques for in-service teacher education in vocational-technical education.

Cyphert and Andrews after reviewing the research studies that have been done on videotape recorder applications in teacher education pointed out some of the shortcomings of these investigations. They stated that there was a need for an experimental approach to this type of research. This idea was expressed as follows:

Much of the research associated with specific instructional media has failed to consider some of the most elementary requirements of experimental design. As a result hundreds of studies have been made with add up to little credible evidence. The time, energies, and money expended in a rash of similar studies related to videotape recording can be ill-afforded.\textsuperscript{20}

In summary, the following points illustrated the urgent need for the study:

1. It is highly important that beginning teachers,

\begin{itemize}
  \item \textsuperscript{19}Julia Dalrymple and Alice P. White, "Tele-supervision in Home Economics Teacher Preparation: An Exploratory Study" (University of Wisconsin: School of Home Economics, May, 1967). (A mimeographed progress report.)
  \item \textsuperscript{20}Cyphert and Andrews, \textit{op. cit.}
\end{itemize}
who are recruited from industry, be given effective instruction in the methodology of teaching.

2. Micro-teaching combined with remote teacher education techniques shows promise for increasing the effectiveness of the in-service teacher education program in Colorado and is not now being utilized.

3. No previous research of an experimental nature on combinations of remote teacher education techniques has been found.

Procedures

Only a brief overview of the procedures used in the investigation will be given in this section. A detailed discussion of the procedures will be given in Chapter III.

Fifty-seven beginning teachers from the service areas of health occupations education, trade and industrial education, and technical education comprised the population of this study. From this population, a sample of thirty-nine teachers was randomly selected and assigned to three treatment groups (video-phone feedback, video-mail feedback, and video-self-evaluation feedback) of thirteen teachers each.

The experimental design selected for the study was
The Pretest-Posttest Control Group Design. The pretesting of all participants was completed during the first week of April, 1969. The experiment began the following week when the instructional model on the teaching skill of introducing a lesson and nine illustration models (three on each of the three skills) were mailed to all participants. Upon receiving the instructional model each teacher was instructed by written instructions to view the model as many times as necessary to learn the skill of introducing a lesson. Then, each teacher was instructed to plan and teach a five-minute lesson to four students. This micro-teaching session was videotaped and the recording was replayed and critiqued by the teacher. Each teacher mailed his videotaped lesson and his critique form to the teacher educator.

Upon receiving the videotaped lesson of a teacher assigned to treatment number one, instructional model with video-phone feedback, the teacher educator critiqued the videotaped teaching performance on the skill of introducing a lesson. He identified an appropriate illustration model to help the teacher improve his performance and mailed the teacher's tape back. The teacher educator contacted the teacher by telephone, discussed the teaching session, and suggested an illustration model for viewing. After the
telephone conference the teacher viewed the illustration model identified for him, then planned and retaught the same lesson.

When the teacher educator received the videotaped lesson of a teacher assigned to treatment number two, instructional model with video-mail feedback, he critiqued the lesson and recorded his comments on the tape following the teacher's taped session. In addition, he identified an appropriate illustration model to help the teacher improve and returned the tape to the teacher by mail. After viewing the tape, the teacher viewed the teacher educator's comments and the illustration model, then planned and retaught the same lesson.

The teachers in treatment number three, instructional model with video-self-evaluation, presented their videotaped lessons to their local supervisors or if there was none, it was mailed to the teacher educator. The tape was returned without being critiqued; this procedure insured the teachers in this group would be held to a time schedule similar to the teachers in the other two treatments. The teacher, upon receiving his tape, reviewed his own critique and the illustration models, then planned and retaught the same lesson.

One teacher educator served as instructor for all treatment groups and the teaching-reteaching cycle as
described in the preceding paragraphs was repeated for three teaching skills, i.e., introducing a lesson, questioning, and demonstrating a manipulative skill. Two weeks of time were required for each teaching skill, but this time varied from two to three weeks because of delays in mail deliveries. At the end of the experiment which lasted eight weeks, posttests of the thirty-six participants who had completed all of the program were made. One participant of each group had failed to complete the entire program.

A panel composed of two experienced educators rated the teaching performance on all pretests and posttests. The panel was given a six-hour orientation on how to use the rating instrument to evaluate each of the three skills. This training was given to obtain high rater reliability.

A satisfaction scale was administered to each participant to attain his expressed level of satisfaction with the remote teacher education technique to which he was exposed. In addition, an open-ended questionnaire was used to obtain the reactions of the participants in regard to the strengths and weaknesses of the remote techniques.

Assumptions

The following basic assumptions were accepted by the investigator as fundamental to the study:
1. As a teacher's performance on specific teaching skills becomes more effective, student learning is increased.

2. A panel of selected teacher educators can evaluate teaching performance by viewing a videotaped session of the teacher's performance.

3. Satisfaction with the various types of remote teacher education techniques can be obtained on a nine-point satisfaction rating scale.

Limitations

The investigator was cognizant of the following limitations:

1. The study was limited to the population of beginning teachers with less than three years of teaching experience who had access to either one-half inch Sony videotape recording equipment or one-inch Ampex videotape recording equipment.

2. No distinction was made between high school and post-high school teachers in the analysis of data.

Definitions of Terms

The teaching skill of introducing a lesson is the skill, consisting of nine teacher behaviors, which a teacher
carries out in order to set the stage for student participation and to inspire students to learn what is to be taught.

The teaching skill of questioning is the skill consisting of eleven teacher behaviors, by which a teacher uses questions to promote mental activity on the part of the learner by providing him an opportunity to become actively involved in the lesson.

The teaching skill of demonstrating a manipulative skill is the skill consisting of seven teacher behaviors by which a teacher informs students how to perform a manipulative skill safely and in a step-by-step manner.

An instructional model is videotaped instructions on a specific teaching skill which consists of descriptive narrations and filmed illustrations of specific behaviors of a teaching skill being performed by several different teachers.

An illustration model is a videotaped session approximately three minutes in length which shows one teacher performing the specific teaching behaviors of one teaching skill.

Video-phone feedback is the combination of knowledge of performance on a teaching skill that a teacher receives from viewing his own videotaped lesson and from listening to the comments in regard to his performance from the teacher educator via telephone.
Video-mail feedback is the combination of knowledge of performance on a teaching skill that a teacher receives from viewing his own videotaped lesson and from viewing the videotaped comments in regard to the performance sent by the teacher educator via mail.

Video-self-evaluation feedback is the combination of knowledge of performance on a teaching skill that a teacher receives from viewing his own videotaped lesson and from making a self-critique of the performance with the aid of a teaching skill critique form.

A teacher educator is the person at the university who is responsible for providing in-service training on teaching skills to the teachers in the field and who critiques the teachers' performances.

A beginning teacher is a vocational or technical teacher with less than three years of teaching experience who does not have a college degree.

A pretest is an evaluated videotaped performance of a teacher teaching a five-minute lesson prior to instruction on specific teaching skills.

A posttest is an evaluated videotaped performance of a teacher teaching a five-minute lesson after completing an in-service education program on three teaching skills.

Micro-teaching is a scaled-down teaching session in which a teacher teaches a five-minute lesson to four students.
CHAPTER II

REVIEW OF RELATED RESEARCH

Introduction

Reported research findings on the application of micro-teaching and remote teacher education techniques to in-service vocational-technical education were meager. Most of the research that was reported was concerned with the application of micro-teaching to the pre-service education of teachers of general education. However, on-going research at The Center for Research and Leadership Development in Vocational and Technical Education, The Ohio State University, Columbus, Ohio, was concerned with both micro-teaching and remote supervisory techniques and their application to vocational and technical education. All the reports on the results of these studies were not available at this writing.

Research studies were divided into the following topics for discussion of their significance to this study; (1) applications of micro-teaching, (2) video recordings and other feedback variables in teacher education, (3) modeling research in teacher education, and (4) remote techniques of supervision and teacher education.
Applications of Micro-Teaching

The micro-teaching technique was developed at Stanford University by Dwight W. Allen. This technique of laboratory training in teacher education was tested in a teacher education program for preparing secondary school teachers in general education. In 1965 Allen and Fortune\textsuperscript{1} reported a summary of the findings of the first two years of experimentation with micro-teaching. The following findings were given:

1. Candidates trained through micro-teaching techniques over an eight week period and spending less than ten hours a week in training performed at a higher level of competence than a similar group of candidates receiving separate instruction and theory with an associated teacher aid experience involving twenty and twenty-five hours per week.

2. Performance in the micro-teaching situation accurately predicted subsequent classroom performance. In the study, grades made on practice teaching courses participated in by the subjects

after being rated in micro-teaching sessions were taken as criteria measures for teaching success.

3. Candidates receiving student feedback improved significantly more in their teaching performance than candidates not having access to such feedback.

4. Student acceptance of the value of micro-teaching was very high.

5. Six specific skills subjected to experimental treatment produced significant changes in the performance of intern teachers during instruction in micro-teaching.

The report of the Stanford University Study illustrated the usefulness of micro-teaching in teacher education. Therefore, the reported findings provided a strong defense for using the micro-teaching technique in this study.

Another pertinent study on the application of micro-teaching was conducted at Brigham Young University. This study involved the use of micro-teaching in in-service training for experienced teachers of general education in

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several Utah School districts. The following tentative conclusions were summarized from the brief report:

1. A taped micro-teaching session conducted in the public school setting was found to be more threatening to experienced teachers than to college students.

2. Most experienced teachers overcame the fear and threat of micro-teaching. This situation occurred after the first or second micro-teaching session.

3. After the initial threat of micro-teaching had passed, experienced teachers improved rapidly in achieving a discriminable skill or competency.

4. Experienced teachers who taught micro-lessons and then observed the videotaped playback of their performance privately, using an observation guide sheet to direct them, made significant changes in their teaching behavior.

The above findings provided a strong defense for the procedures used in this study.

In 1967 Kallenback\(^3\) conducted an investigation on the application of micro-teaching for preparing elementary teachers.

\(^3\)Warren Kallenback, "The Effectiveness of Micro-Teaching in the Preparation of Elementary Intern Teachers" (paper presented at the annual meeting of the American Educational Association in Chicago, February, 1968).
intern teachers. The subjects for the experiment included all of the forty teaching candidates enrolled in the 1967 San Jose State College summer elementary intern teaching program. The teaching candidates were randomly divided into two groups: (1) the micro-teaching group which participated in a micro-teaching program on campus with no off-campus contacts with students, and (2) the student teaching group which participated in a limited summer observation and student teaching program. Both groups otherwise had the same summer program.

Pre and post-summer lessons excerpts of five minutes each were recorded on videotape for each of the candidates and these were independently judged by each member of two teams of trained evaluators. In addition, a field follow-up by two independent teams of trained evaluators made both a fall and a spring assessment of each intern teacher. No significant differences in teaching skill appeared between the two groups at the end of the summer programs or developed in the assessments during the school year. The major finding of this experiment was that the micro-teaching group who spent eighty per cent less time in teaching activities, reached comparable levels of teaching with the more able candidates in the summer program. Moreover, these levels were maintained at an equivalent or higher level of competence throughout the school year.
The major implication that the Kallenback study had for this present study was that the micro-teaching technique provides a means through which teaching competencies can be obtained in less time.

Another investigation on the application of micro-teaching to teacher education for elementary school teachers was conducted by Goodkind. The three general objectives of Goodkind's study were to develop and field test the micro-teaching technique for the on-the-job training of student teachers, to determine the value of the small, portable videotape recorder in the training process, and to obtain some quantifiable data to evaluate the micro-teaching concept in teacher training programs.

Forty prospective teachers of elementary education were selected for the experiment. Twenty of the students were assigned to a group that did micro-teaching with videotape playback and the other twenty did micro-teaching without videotape playback. Students in each group taught two short lessons of four to eight minutes and two long lessons of ten to twenty minutes to the elementary children in their student teaching classes. All students received evaluations of their performances from the University.

supervisors and all had the opportunity of reteaching the same lesson after the evaluation session.

The Medley-Mitzel Observation Scale and Record was used as the principal evaluation instrument for critiquing the trainee's classroom performance. Anecdotal information and informal observations as well as student comments provided additional sources of data.

Preliminary evaluation of the data indicated that the students involved in micro-teaching with videotape feedback displayed greater awareness of specific personal habits, greater awareness of specific teaching acts, greater insight into the activity and interrelationships of children within the classroom and greater awareness of the problems of pacing in their instructional program.

Goodkind's study, although not strong from the experimental standpoint, did further reinforce the idea that micro-teaching was beneficial for prospective elementary teachers. His study had implications for this present study, namely, videotape feedback does strengthen the effectiveness of the micro-teaching technique.

Another study which demonstrated the implications of micro-teaching as a teacher education laboratory tech-
nique was conducted by Davis and Smoot. This study was designed to assess the effects of a Teaching Laboratory (TL) component on the verbal teaching behaviors of beginning secondary teacher candidates of general education. The TL, based on micro-teaching procedures, was introduced as an integral part of the regular introductory course in secondary school teaching. In the TL, candidates taught scaled-down lessons which focused on specific pedagogical tasks in a teaching-reteaching cycle. Systematic feedback from the peer group, the instructor, and audio-recordings was provided for each candidate.

Subjects for the study were 140 beginning teaching candidates enrolled in six sections of the first course in teaching in the professional sequence at The University of Texas at Austin. Subjects in the TL group consisted of fifty-five students. During the experimental period, subjects in the TL group taught four TL lessons whereas subjects in the group not receiving the TL treatment taught none. All subjects taught a ten-minute pretest and following the seven week experimental period, all taught a ten-minute posttest. The instrument used to measure

teaching performance was the Laboratory Observation Schedule and Record, a modification of OScaR 5V developed by Medley and others.

Twenty-two variables, consisting of the thirteen LOScaR category scores, were analyzed in order to obtain the results of the study. On eighteen of the variables the students in the TL group performed significantly better than the group not undergoing the TL training.

Davis and Smoot's study reinforced the idea that micro-teaching training is beneficial for prospective teachers. Their study showed that teachers gain more from involvement in micro-teaching than from classroom training alone.

Of all the studies reviewed, the most effective one for demonstrating the effectiveness of micro-teaching training was conducted by Young and Young. The main purpose of their study was to assess the effectiveness of individually prescribed micro-teaching training modules in the acquisition of selected teaching behaviors (pre-internship) and subsequent implementation of these behaviors in classroom teaching (internship).

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The investigation involved two groups with twenty general education interns in each. The control group did their intern training without the pre-internship micro-teaching training. The experimental group taught a diagnostic lesson at the beginning of the semester preceding their internship. The diagnostic lessons were analyzed, and based upon these analyses, a sequence of approximately four micro-teaching training modules was individually prescribed for acquiring specified behaviors. Midway in the same semester, another analysis of performance was made and another sequence of micro-teaching modules were prescribed.

The data for the study were collected by administering the Oscar and Hough Observation System for Instructional Analysis on each intern's classroom teaching performance. Data were collected during the fourth or fifth week and again the ninth or tenth week of internship. Preliminary evaluation of the data indicated that the interns undergoing the micro-teaching training acquired a greater number of specific teacher behaviors and teaching patterns.

The above described study as well as the previous five studies that were reviewed gave strong implications that the micro-teaching technique would be applicable for this present study. Therefore, the micro-teaching technique was selected for use in this in-service teacher education experiment.
A review of literature in teacher education has shown that much effort has been made to provide more and better feedback to prospective and experienced teachers on their performance on pedagogical skills. One of the first experimentations involving feedback by means of audio and video recordings was conducted by Tintera.\(^7\)

Tintera's experiment was designed to determine the effectiveness of the following three student teaching critique methods in teacher education for elementary teachers: (1) the conventional supervisor observation and conference, (2) supervisor observation supplemented by three voice tape recordings which were used in conferences, and (3) supervisor observation with three kinescopes, e.g., films made from videotaped sessions of student teacher performance, which were used in conferences.

One of the critique methods described above was used for each of the three participating groups. Twenty-two elementary school practice teachers were assigned to each group. Twenty-two supervisory teachers were selected from the public schools and served in rotation for each situation.

\(^7\)James B. Tintera, "Student Teaching: Analysis of Methods in Which Application of New Communications Media May Improve Teacher Preparation in Language, Science, and Mathematics," Wayne State University, not dated. (Mimeographed.)
Measures of performance used before, immediately after, and after six months of teaching experience included the Minnesota Teacher Attitude Inventory, the Ryan Observation Scale, the Student Attitude Scale of Teaching Problems, Teacher Self-Describer, and Supervisory Rating.

The entire experiment was carried out three times during 1960. Each time, it was carried out with a new group of twenty-two student teachers who were in turn divided into three groups. The same twenty-two supervising teachers participated in the whole experiment.

Results at the end of the experiment indicated there were no significant differences between the teaching performances of the students who had audio and video recordings available to them and those who received only the conventional critique. After six months of professional training, the teachers trained with the aid of kinescope and audio tape recordings showed no significant differences between themselves; however, both performed significantly better than the control groups as indicated by the measuring instruments.

The study by Tintera which was reviewed above was one of the first studies to have implications for this present study. It established the idea that videotaped sessions could be used as feedback to prospective teachers. Another
study of a similar nature was conducted by Schueler and Gold. The purpose of this experiment was to compare the effectiveness of three supervisory methods for supervising student teachers in general education. The three methods used were (1) supervision via personal visitation, (2) supervision via the use of kinescope recordings along, and (3) supervision via a combination of in-person visitation and kinescope recordings. The first method of supervision served as the control condition and the second and third methods represented experimental conditions.

More than 240 half-hour kinescopes, pre- and post-training interviews with sixty student teachers, and the subjective reaction of student supervisors were employed in order to arrive at the conclusions for the project. The two main conclusions were (1) the students who viewed the kinescopes felt that they got more attention and help and (2) the supervisors felt that a combination of both forms, kinescope recordings as well as observation provided the best assistance.

Olivero conducted an experiment in 1964 that involved

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the direct use of video recordings. This technique pro-
vided for the immediate use of video feedback which was
not possible in the experiments using kinescopes of video
recordings. The purpose of Olivero's study was to deter-
mine if video recordings could be substituted for live
observations in teacher education. In the experiment each
trainee taught five students for five minutes, received
feedback from supervisors, except the control group, and
taught the same lesson to a different group of five stu-
dents for a five minute period. This format was duplicated
one week later. The data were analyzed in terms of the
change which took place in the trainee's performance be-
tween the first teaching attempt and the fourth teaching
attempt.

The results of this experiment involving prospective
teachers of general education in secondary school education
were as follows:

1. Trainees who received supervisor feedback
changed the behaviors defined as "development
of aims" more than trainees who received no
feedback.

2. Trainees who had the opportunity to view video
recordings of their performance an to receive
verbal feedback from supervisors made
greater changes in all behaviors analyzed.
3. The condition of observation of teaching performances from pre-recorded videotapes was not significantly superior to the live observation of teaching performance with the supervisor present in the classroom.

The above study provided the basis upon which the justifications for using videotaped teaching performance in this present study were derived. Since this present study was to be conducted in a remote in-service education situation, only videotaped sessions could be obtained in a practical manner.

Acheson\(^{10}\) conducted an experiment which further supported the use of video recordings for evaluating teaching performance. The purpose of this study was twofold: (1) to demonstrate the feasibility of making video recordings in regular high school classrooms, and (2) to test the effects on selected behaviors of teachers in training associated with observing their own teaching via audio-visual recordings during supervisory conferences.

Subjects for the experiment were teacher-interns, all who were graduate students with undergraduate majors in their teaching fields. All subjects were trained as teachers of secondary general education. Two variables

\(^{10}\)Keith Alan Acheson, "The Effects of Feedback from Television Recordings and Three Types of Supervisory Treatment on Selected Teacher Behaviors" (unpublished Ed.D. dissertation, Stanford University, 1964).
were manipulated: First, the type of observational feedback used (one-half of the subjects viewed a television tape of their initial performance before the next recording was made; one-half did not); second, the type of supervisory method used in the conference between performances, i.e., direct, indirect, none.

In the direct conferences, the supervisor suggested specific changes in behavior which he believed would improve the performance. A major part of the supervisor's time was devoted to recommending, decreasing the amount of teacher monologue, and increasing the amount of student participation. In the indirect conferences, the supervisor gave no direct advice; instead, he elicited from the subject intentions for change which the subject believed would improve performance. Those subjects who received no supervisory treatment between the two recorded performances did not discuss the initial performance with either supervisor until after the second recording.

Results of the experiment indicated that the combination of video recordings with supervisory conferences produced significantly greater effects on decreasing teacher monologue time than did supervisory conference without television feedback. Differences due to direct or indirect styles of supervision were not significant.
McGraw conducted an experiment using a different feedback variable than was used in the preceding reviewed studies. McGraw's experiment in which 35mm time lapse photography of teaching performance was used to provide feedback to teachers indicated that visual images of a teacher's performance can aid in changing teaching behavior. Thus, this experiment had implication for this present study, in that it showed visual feedback is better than no feedback.

McGraw's study explored the usefulness of 35mm time lapse photography as an instrument for providing feedback to teachers on student interest and work orientation. Forty-five intern teachers in the area of secondary general education were involved. Fifteen interns were assigned to each of the following treatment groups: (1) feedback by photographic means, (2) feedback by graphed materials, and (3) no feedback. The results of the experiment demonstrated that feedback based on 35 mm. photographs can effect change in teacher behavior. In addition, providing intern teachers with feedback based upon a photographic record of student attending behavior resulted in a general improvement of student interest and work orientation.

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Most of the research involving the use of video recordings and other similar feedback variables has been concerned with using these feedback mechanisms in addition to other forms of feedback. King\textsuperscript{12} conducted an experiment in which he attempted to determine if student teachers could identify the same lesson weaknesses which an expert would see. The objective of the research was to compare two groups of students in which each individual attempted to identify weaknesses in his first lesson. Student teachers in Group A were given personal critiques of their lessons by an expert before they saw playbacks of video recordings, but students in Group B were given no suggestions whatever before watching playbacks.

The findings of this study which was conducted in the United States Air Force indicated that students' judgements of their own lessons agreed with the experts' judgements very nearly as well as two experts could agree. Between the two groups of students (those having an expert's critique before the playback and those having no critique), there was practically no difference in agreement with the experts.

Two tentative conclusions of importance drawn from this study were (1) with the use of video recordings it

\textsuperscript{12}Robert P. King, "The Use of an Expert's Critique Before a Student Teacher Watches a Video Recording of His Practice Teaching Lesson," \textit{Educational Broadcasting Review, II} (February, 1968), 60-61.
may be that adult college graduates can judge their own novice teaching efforts without expert help, at least, after they have had some instruction in how to teach, and (2) from the interview conducted after lesson playbacks, the conclusion was drawn that the television environment was not a significant distraction.

The results of King's study provided the basic idea of having all teachers use self-evaluation forms in this present study. In addition, it provided a defense for using a simulated control group of teachers who would receive only self-evaluation feedback.

Voth\textsuperscript{13} conducted a research study which added to the implications for using video recordings in providing teachers feedback on their teaching performance. The purpose of his study was to determine if feedback from viewing one's video recordings of classroom instructional activities resulted in changed teaching behavior as measured by (1) verbal interaction between teacher and pupil, (2) types of cognitive response elicitations, and (3) group discussion roles.

The subjects for the experiment consisted of twenty-

\textsuperscript{13}John A. Voth, "Effect of Video Tape Recording Feedback on Teaching Behavior of Student Teachers," University of Missouri, no date. (Mimeographed.)
six secondary English, social studies, and science student teachers. The subjects were divided into two equal size groups. The thirteen experimental as well as the thirteen control group members were assigned in pairs, one experimental and one control per half day each, to thirteen cooperating public school teachers. Each student teacher was videotaped on three occasions with one month intervals during the winter semester of 1967. Each recording consisted of forty-five to sixty minutes of instructional activities selected from two to three consecutive school periods. The recording took place in the student teacher's regular classroom, and two cameras were used to obtain a split screen image which showed the teacher and the pupils.

Within a few days of the recording, each experimental group member viewed his videotape recording with a specialist in methods who assisted the student teacher in analyzing the instructional activities. The control group members were not given this feedback opportunity until after the post-measurement sessions.

The experimental group increased in variability of verbal interaction significantly more than the control group. Where at least three or four hours of structured feedback per hour of recording was obtained, there was a significant increase in "thoughtful answers" by pupils, in "indirect teacher influence," and in two general categories
of unclassifiable verbal interaction. No significant increase in cognitive response elicitations or group discussion roles was found. In addition, questionnaire responses from both student teachers and cooperating teachers indicated video recording feedback was very helpful in improving teaching performance.

Another experiment on the application of video recording in teacher education was conducted by McDonald, Allen and Orme. The following modes of reinforcement were used in this study: (1) subjects evaluated their own behavior by viewing their videotaped teaching performance, (2) an experimenter reinforced verbally each enactment of the desired behavior as both viewed the videotaped performance, and (3) the experimenter, both reinforced the desired behavior and pointed out its effects on pupil behavior.

The dependent variables identified for the study were as follows: (1) the number of reinforcements given by the teacher each time a student participated verbally in class discussion, and (2) the number of student participatory responses. Both variables were quantified by counting the number of teacher reinforcements and the

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number of student responses. It was predicted that providing both reinforcement and discrimination training would produce the greatest change in teacher behavior, and that student behavior would vary directly with the number of reinforcements given by the teacher.

Teaching interns from the area of secondary general education were randomly assigned to the three treatment groups and to a control group in which subjects rated their own teaching performance on a variety of characteristics. Three experimental sessions were conducted between the pre- and post-tests.

The results indicated that the interns receiving both reinforcement and discrimination training by the experimenter changed their behavior the most. Both reinforcement conditions produced significantly more change than the other conditions. In addition, it was found that an increase of fifteen per cent in number of reinforcements given by the teacher doubled the number of student responses.

Allen, McDonald, and Orme conducted another experiment in which the effects of immediate feedback and

distributed practice on the acquisition of a teaching behavior was studied. Two independent variables were manipulated: (1) kind of feedback and (2) conditions of practice. The two kinds of feedback were immediate, given immediately after the teaching performance and delayed, given one week after the teaching performance. The amount of practice between feedback sessions varied from none to two weeks.

The dependent variable for the experiment was a questioning technique which took a variety of specific forms. The purpose of the technique was to elicit extended student thinking about his answers to questions. Teaching interns from the area of secondary general education were randomly assigned to four conditions in a two-by-two design. Three experimental sessions and a pre- and post-test were videotaped. During the experimental sessions, an experimenter viewed the tape with the intern. He reinforced instances of the desired behavior and made suggestions about variations in the form of the desired behavior. The dependent variable was quantified by counting instances of it from the video tapes.

Immediate feedback was found to be significantly more effective than delayed feedback. The best condition for practice was not easily assessed due to the fact that
the conditions for practice interacted with the kind of feedback. However, it was found that immediate feedback and massed practice was more effective than other combinations.

Most of the research on the application of video recordings in teacher education have been conducted in the area of elementary or secondary general teacher education. Perlberg, Tinkham, and Nelson\textsuperscript{16} conducted one of the first studies in the area of vocational and technical teacher education. This study was reported as a two-part study and consisted of both student teacher training and in-service training. The major purpose of this study was to determine the feasibility of using video recordings in both a pre-service and an in-service setting in Illinois. The researchers concerned themselves only with the gathering of qualitative data on the results of the study, and only a small number of student teachers and experienced teachers were involved. The student teachers and the experienced teachers in the study taped short sessions of their own class presentations and these tapes were analyzed by the teacher and a project staff member.

The results of the study consisted of surveyed reactions of the participants and, therefore, were limited in explaining the effectiveness of the study. However, the study did illustrate that it was possible for both student teachers and experienced teachers in vocational and technical education to gain some benefits from taping their classroom performances.

From the ten studies reviewed in this section the following conclusions were drawn in regard to their implications for this present study:

1. Video recordings provide an effective and efficient means for analyzing teaching performance.

2. Used alone or as a supplement to supervisory verbal feedback, video recordings aid teachers in improving their teaching behaviors.

3. The application of video recordings provides a new dimension for improving both pre-service and in-service teacher education programs.

Modeling Research in Teacher Education

The concept of using teaching models probably originated with the practice of assigning prospective teachers to "master teachers" for the purpose of learning how to teach. With the development and refinement of various teaching skills that are now studied by prospective
teachers, new approaches are being identified for providing effective teaching models for prospective teachers to observe. In this section the reported research on the applications of the new media, e.g., video recordings, in providing teaching models will be discussed.

A review of pertinent research has indicated that studies have been conducted to answer the following questions:

1. What is the relative effectiveness of various methods of focusing an individual's attention on the specific teaching behaviors modeled?

2. What is the relative effectiveness of symbolic models (transmitting desired behaviors to the learner by means of written or verbal instructions) and perceptual models (transmitting desired behaviors to the learner by means of a filmed model who portrays the desired behavior)?

3. What is the relative effectiveness of viewing a model alone, viewing a model in the company of a supervisor who provides reinforcement only, and viewing a model in the company of a supervisor who provides discrimination training with reinforcement?

4. Is there any difference in the effectiveness of models demonstrated in the context of a lesson
and those demonstrated out of context?

Johnson\textsuperscript{17} conducted a study which provided some insight into the relative effectiveness of various methods of focusing an individual's attention on the specific teaching behaviors modeled. This study did not involve the use of a specific teaching model, but it was concerned with the use of a programmed videotape which was designed to train beginning teachers in the area of secondary general education to observe and report intended pupil performances in the classroom. It was predicted that a videotape's effectiveness would be attributable to three programming variables, i.e., intermittent prompting, overt practice, and immediate feedback.

Eighty-four beginning teachers were randomly distributed to four equal-sized groups. The first group received programmed training for observation of twenty-one videotaped scenes. Teachers in this group were given clues to on-coming scenes, practice in answering multiple-choice items describing the scenes and knowledge of the correct response. The second group watched the same scenes without taking the program. They were asked to "think about" each scene and write their thoughts. The third group heard a

tape-recorded lecture on how to be skillful observers of pupil performance in the classroom. The fourth group, as controls, were shown how to produce overhead projection materials.

Results of the study indicated that the group given prompts, opportunity to practice, and knowledge of how they were doing, performed significantly better than any other group. In spite of instructions to the contrary, students viewing the videotape without the program were focusing on the behavior of the teacher rather than the pupil and judging the event rather than describing it. The significant difference found between the third group, who listened to a recorded lecture of instruction on how to observe a classroom, and the control group indicated that this treatment was better than no training at all.

Johnson's study provided the basis upon which the three teaching models used in this present study were developed. In these videotaped models, narration was recorded on the videotape to alert the teacher viewing the model of the behavior that was to be presented.

A study by Orme provided additional information on the relative effectiveness of different methods of

focusing attention on specific teaching behaviors being modeled. In addition, this study demonstrated the relative effectiveness of symbolic and perceptual models and the following techniques: (1) viewing a model alone, (2) viewing a model in the company of a supervisor who provides reinforcement only, and (3) viewing a model in the company of a supervisor who provides discrimination training with reinforcement.

In the experiment conducted by Orme, six modeling protocols using a micro-teaching format with interns in the Stanford Secondary Teacher Education program were investigated. The interns taught three five minute lessons, each one to a different group of five pupils. Between teaching sessions, the interns received training on a specific teaching behavior via a different modeling protocol. The six modeling protocols investigated were

1. Studying written materials (symbolic modeling) and viewing one's own performance alone.

2. Studying written materials and viewing one's own performance with a supervisor who reinforced the desired behavior, indentified salient ones to which the desired behavior should be attached, and suggested alternative forms of the desired behaviors.
3. Viewing a videotaped model of the specific teaching behavior (perceptual modeling) and viewing one's own performance alone.

4. Receiving discrimination training and reinforcement as described above while viewing one's own performance and viewing the model alone.

5. Viewing one's own performance alone and a perceptual model with a supervisor who provided discrimination training based on the salient cues in the modeled performance.

6. Viewing both one's own performance and the modeled performance with the supervisor providing discrimination training as described above.

The results of the study revealed that the latter training protocol was more effective than any of the others in producing the desired teacher behavior. In addition, it was found that protocol five was more effective than protocol two or one and that protocol three was more effective than protocol one.

Young19 conducted an experiment for the purpose of appraising the relative effectiveness of various modes of training intern-teachers in specific skills without direct

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supervisor-teacher conference. In this experiment the application of three modeling protocols and focusing techniques and two self-feedback procedures were investigated. The modeling protocols consisted of a "specific illustration" model (a teacher standing before a camera without a class and giving discrete examples of a teaching skill) and a "complete" model (models of a skill in a lesson context) presented with either a contingent or noncontingent focus. The self-feedback procedures consisted of subjects viewing their own performance with a contingent focus or noncontingent focus on the videotape. The contingent focus was provided by the experimenter who reviewed the videotaped session and recorded comments contingent to the behavior on the second sound track before the training session.

The results of the experiment indicated that the most effective modeling protocol was a combination of the "specific illustration" model and a "complete" model with a contingent focus. However, each modeling protocol appeared to be more effective for training for a specific variable than for all variables in general.

Young also found that presenting a brief example of a specific teaching behavior taken out of context of the lesson was more effective than demonstrating the same skill in a complete lesson context. The combination of
brief examples and a complete lesson was more effective for certain behaviors. These findings provided the basis for developing and using the instructional models and illustration models in sequence in this present study.

Another study by Young\(^{20}\) assessed the effectiveness of combinations of two different perceptual models and a symbolic model on the acquisition of a repertoire of alternative techniques for maintaining a student's orientation to a task and/or controlling his deviant behavior. Three groups of interns taught three five-minute lessons to a group of five students who role-played six different non-task-oriented behaviors. Between the teaching sessions, interns were presented one of three modeling protocols.

The lecturing skill, repetition, was modeled on videotape with two variations: (1) subjects were focused contingently (comments and visual prompts recorded on the second sound track parallel to the behaviors to be learned) and (2) subjects were prompted non-contingently by a written guide.

Two modeling protocols for maintaining pupil-task orientation were used. The first was a sixteen millimeter

film presenting eleven "disciplinary" incidents with three alternative teaching responses to each. This film emphasized verbal and nonverbal expressions of disapproval. The second was a videotape model (with contingent focus) emphasizing control techniques in prompted reward and withheld sanctions categories (reinforcing instructional responses and ignoring deviant behavior) and a symbolic model emphasizing all three categories.

The study by Young revealed the following findings:

1. Subjects viewing a combination of models acquired a larger repertoire of alternative control techniques on certain variables.

2. Subjects viewing the videotape model and studying the symbolic model used a greater number of different techniques on certain variables and tended to use more alternative responses on each successive teaching episode.

3. Subjects exhibited limited improvement on both lecturing and discipline variables but failed to reach significant levels.

During the spring of 1968, Kallenback\textsuperscript{21} conducted an experiment in which many of the findings of the previously

\textsuperscript{21}Warren Kallenback, "Results of Preservice Field Tests of Minicourse 1" (paper presented at the annual meeting of the American Educational Research Association in Los Angeles, February, 1969).
reviewed studies were utilized. The primary goals of this experiment were to determine the extent to which the use of micro-teaching practice and a "minicourse" program (programmed videotapes on film which illustrated how to perform certain teaching skills) could be used in changing the behavior of student teachers in the area of elementary education.

Studies were conducted on three college campuses. However, these studies were considered exploratory in nature due to the size of the groups and levels of control obtained.

Campus A was a large western state college with a large student enrollment in teacher education. Campus B was a western state university with a moderate number of elementary student teachers enrolled each semester. Campus C was a small western state college with a small teacher education program.

At campus A seventeen student teachers received the regular minicourse with micro-teaching practice. Another group of sixteen student teachers received all of the minicourse except the micro-teaching and the videotape feedback. Both groups viewed the instructional and model films together on campus.

The student teachers at campus B were divided into two groups. One group of fifteen participated in the minicourse as regularly administered. The other group, con-
aining seventeen student teachers, participated in the same program but conducted their micro-teaching sessions without videotape recorder feedback.

Campus C was to have compared a group taking the minicourse with another taking regular student teaching. Due to difficulties in student teaching assignments, it was decided to treat campus C student teachers as a control group for the other two campuses.

The finding of the three studies indicated that the students who completed the entire minicourse did not consistently make more or greater changes in behavior than the groups for which some elements of the course were omitted. However, the differences in performances between the two groups that completed the entire course in the minicourse program and the one that did not take it were fairly large and favored the student teachers who completed the minicourse.

The descriptions of the procedures given in the five studies reviewed in this section were very helpful in adapting the use of instructional and illustration models for this present study. The Kallenback study was especially helpful since it paved the way for using self-instructional models under conditions where teachers could work alone.
Remote Techniques of Supervision and Teacher Education

One of the first pilot studies to involve the use of remote supervisory techniques was conducted in Wisconsin during the 1964-1965 academic year. This feasibility experiment by Dalrymple and White involved tele-supervision, i.e., supervision of student teachers by telephone supplemented with audio-recording and amplifying equipment. The experiment was conducted in home economics education and the effectiveness of university-directed supervision via tele-supervision was studied.

Two graduate interns served as the student teacher subjects for this experiment. Each graduate student interned for a semester with the same cooperating teacher who was located in a school eight miles from the university. Classroom teaching by the student teacher was recorded on audiotape and the tape was sent to the university. The teacher educator in charge of supervising student teachers listened to the tape and made written notes on the student teacher's performance. After this review, the teacher educator contacted the cooperating teacher and the student teacher by telephone. The taped teaching session was discussed during the telephone conference.

22Julia I. Dalrymple and Alice P. White, "Tele-Supervision Pilot Study" (University of Wisconsin: School of Home Economics, June, 1965). (Mimeographed progress report.)
The above study was limited in design and scope and consequently it provided little evidence of the effectiveness of student teacher supervision by telephone. The subjective evidence gathered did, however, point to the need for further study.

Dalrymple and White later conducted another experiment which involved student teachers in four experimental and four controlled school situations. This investigation was conducted during the 1965-1966 academic year. The four student teachers in the experimental group were supervised via telephone and the four student teachers in the control group were supervised by the traditional face-to-face method. The student teaching experience was confined to a seven week block of time. Since the participating groups contained only four student teachers each, this study merely demonstrated the feasibility of tele-supervision and suggested some alternations for improving the technique of tele-supervision.

Meier and Brudenell conducted a descriptive study

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23 Julia I. Dalrymple and Alice P. White, "Tele-Supervision in Home Economics Teacher Preparation: An Exploratory Study" (University of Wisconsin: School of Home Economics, May, 1967). (Mimeographed progress report.)

in which a combination of remote teacher education techniques was used. This study, conducted in the 1967-1968 academic year, involved ninety-two early childhood educators from seven states. Written instructions, 16mm sound and color films, and videotape recordings were used. Teachers were instructed to read the instructions, view the 16mm film, and then to videotape one of their own teaching sessions demonstrating the behaviors illustrated in the film. Teachers critiqued their own videotapes and then mailed some of the videotaped sessions to the Institute for Child Study to be critiqued by the staff. Phone conferences, tele-lectures, videotaped talks, on-site visits, and personal letters were used to keep in contact with the teachers.

Three attitudinal scales (This I Believe Test, Bringing Up Children, and the I-E Scales) were administered during fall and spring on-site visits. Since some of the participants refused to complete instruments and others either entered the study late or withdrew from the program, statistical pre- and post-training data comparisons were not performed. In the opinion of the staff, trainees who completed the entire course were more amenable to change, more highly motivated to improve their classroom practices, and more receptive to the responsive environment notions that the trainees who dropped out.
In addition to the preceding three studies, three laboratory studies were conducted on the feasibility of using different techniques of remote supervision at The Center for Vocational and Technical Education. The complete reports of these studies were not available at this time, but the techniques field tested in this present study resulted from the efforts of these laboratory studies. This present study is an actual field application of the techniques devised in the laboratory experiments.

The three research experiments reviewed in this section provided immense aid in planning the procedures to be used in this present study. These three studies were weak in regard to experimental design, but they provided evidence of the effectiveness of various remote supervision and teacher education techniques.

Summary

Six pertinent studies in the areas of teacher education for elementary teachers and teacher education for teachers of secondary general education indicated that micro-teaching with or without videotape recordings could be used effectively in preparing prospective teachers in these areas. The results of the six studies further indicated that prospective teachers receiving micro-teaching performed as well or better than those not
receiving micro-teaching training. However, the performances of the micro-teaching groups were not significantly better than those not undergoing the training. The most significant finding extrapolated from the studies was that micro-teaching training reduced the time required for student teachers to learn new teaching skills.

From the ten studies reviewed in the section on the applications of videotape recordings and other feedback variables, the following findings were identified:

1. Videotape recordings provide effective and efficient means for analyzing teaching performance.

2. Used alone or as a supplement to supervisory verbal feedback, video recordings aid teachers in improving their teaching behaviors.

3. The application of videotape recordings provides a new dimension for improving both pre-service and in-service teacher education programs.

A review of the pertinent modeling research in teacher education revealed that only a few limited experiments had been conducted. However, from the five research reports reviewed, the following significant findings were extrapolated:

1. Prompting and providing practice proved to be
the most effective way of focusing an individual's attention on the specific teaching behaviors being modeled.

2. Perceptual models (transmitting desired behaviors to the teacher by means of a filmed or videotaped model which portrayed the desired behavior) proved to be more effective for instructing teachers on a teaching skill than symbolic models (transmitting desired behaviors to a teacher by means of written or verbal instructions).

3. Viewing both one's own performance and a recorded modeled performance on film or videotape in the presence of a supervisor who provides discrimination training on what to look for was more effective than viewing the modeled performance alone.

4. Presenting a brief example of a specific teaching behavior taken out of context of a lesson was found to be more effective for instructing teachers in a teaching skill than presenting the behaviors in a lesson context. However, the combination of brief examples and a complete lesson demonstration was more effective for some behaviors.
5. Combinations of modeling protocols which provided teachers with both reinforcement and discrimination training proved to be the most effective types of models used.

The use of remote techniques of supervision and teacher education was regarded as a recent concept in education since very little research was found in this area. The three studies that were reviewed were exploratory in nature. They only provided evidence of the workability of using telephones, audiotapes, and videotapes under conditions where personal visits were not made by the supervisors of teacher educators. However, favorable evidence produced by these three studies did point out the urgent need for this present study. In addition, the laboratory studies on remote supervisory techniques at The Center provided valuable information on the workability of the techniques used in this study.
CHAPTER III

DESIGN AND CONDUCT OF THE STUDY

Introduction

This study was conducted as one phase of Project 44: Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education which was being conducted by The Center for Research and Leadership Development in Vocational and Technical Education, The Ohio State University, Columbus, Ohio. The purpose identified for the project was to develop and test selected teacher education technique variables involving video recordings and/or micro-teaching. This study was conducted as the phase which was concerned with the application of remote techniques of teacher education to in-service education. The writer served as phase coordinator and this task included writing the phase proposal, preparing the materials used, and coordinating the planning and conducting of the experiment.

During the fall of 1968 contacts were made with several state leaders of vocational and technical education to determine the availability of videotape recording equipment within their respective states. In addition, the
interest of vocational-technical educators in field testing the application of micro-teaching and remote techniques of in-service teacher education was determined. From the list of states that expressed interest in the study, the State of Colorado was selected. In Colorado videotape recording equipment was readily available in many of the high schools and junior colleges which had vocational and technical programs. Moreover, the State of Colorado had a unique problem of distance and mountainous terrain which limited the teacher educator's ability to make regular visits to help beginning teachers. Therefore, this situation provided the opportunity to test remote teacher education techniques under ideal conditions.

Since this study was a cooperative venture by The Center and Colorado State University, Ft. Collins, Colorado, Dr. Ronald E. Glenn, Head Teacher Trainer of Trade and Industrial Education at Colorado State University, agreed to serve as teacher educator for the experiment. Dr. Glenn met with the Principal Investigator, Dr. Calvin J. Cotrell and the Associate Investigator, Dr. Charles R. Doty of Project 44 at The Center and the writer once in February, 1969 and again in March, 1969 for the purpose of reviewing the proposal and preparing materials for the study. At these meetings the proposal was revised and the narrations for the instructional models were recorded. Final plans for conducting the experiment were completed in March, 1969.
Population and Sample

During February, 1969, Dr. Glenn surveyed the beginning vocational-technical teachers (vocational-technical teachers with less than three years of teaching experience) in Colorado to determine their accessibility to videotape recording equipment. From the survey teachers were selected who reported that they had access to either one-half inch Sony or one inch Ampex video recording equipment. This procedure was followed since the equipment available at Colorado State University was limited to one-half inch Sony and one inch Ampex. The survey indicated that fifty-seven teachers with less than three years of teaching experience had access to recording equipment that was compatible with the equipment at the university. Therefore, these fifty-seven teachers comprised the population of the study.

The fifty-seven vocational-technical teachers were from the areas of health occupations education, trade and industrial education, and technical education. From this population of fifty-seven, a sample of thirty-nine teachers was randomly selected and assigned to one of three treatment groups (video-phone feedback, video-mail feedback, and video-self-evaluation feedback) of thirteen teachers each. A table of random numbers was used to make the
selection and assignment of participants.

The average age, the years of vocational, industrial, military, and other teaching experience, years of occupational experience, and the level of education of the participants in each treatment group are given in Table 1 on page 69. The average years of other teaching experience refers to experience in teaching hobby courses, general education courses, and elementary or junior high school courses.

**Experimental Design**

The experimental design selected for this study was defined by Campbell and Stanley as the Pretest-Posttest Control Group Design.¹ This design required the subjects to be randomly selected and assigned to treatments and that a pretest and a posttest be made of all subjects. A diagrammatic illustration of the design is shown in Figure 1.

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Age</th>
<th>Vocational Teaching Experience</th>
<th>Industrial Teaching Experience</th>
<th>Military Teaching Experience</th>
<th>Other Occupational Teaching or Work Experience</th>
<th>Occupational or Work Experience</th>
<th>Level of Formal Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Video-Phone</td>
<td>41.2</td>
<td>2.6</td>
<td>0.3</td>
<td>0.1</td>
<td>2.0</td>
<td>17.0</td>
<td>14.5</td>
</tr>
<tr>
<td>II Video-Mail</td>
<td>44.9</td>
<td>2.4</td>
<td>0.2</td>
<td>2.0</td>
<td>5.7</td>
<td>21.2</td>
<td>13.6</td>
</tr>
<tr>
<td>III Video-Self Evaluation</td>
<td>36.3</td>
<td>2.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>14.8</td>
<td>14.0</td>
</tr>
</tbody>
</table>
Figure 1.—Schematic Diagram of the Experimental Design

As can be seen from the diagram above, the pretest-posttest control design used in this study did not include a true control group. Since this experiment was conducted within the framework of an on-going in-service training program the design had to be modified to provide some
instruction to all participants. Therefore, the simulated control group received the same instructions as the other groups except teacher educator feedback. In addition, it should be noted that the design for the analysis of teacher satisfaction constituted a posttest-only design.

An illustration showing the functional operation of the experimental design is given in Figure 2 on page 72. This illustration gives a brief summary of how the design was put into operation.

Description of Treatments

Three different experimental treatments were used in this study. The treatments were similar in that they involved the use of videotaped instructional models, these videotaped models consisted of narration and videotaped illustrations of specific behaviors of a teaching skill; illustration models, these videotaped models were taken from a portion of a five-minute lesson which showed one teacher performing a specific teaching skill, micro-teaching, videotaping of micro-lessons, and self-evaluation of teaching performance. The treatments differed in the type of feedback received from the teacher educator.

Treatment number one, instructional model with video-phone feedback, involved thirteen teachers who received feedback on their videotaped lessons via tele-
<table>
<thead>
<tr>
<th>Sample</th>
<th>Assignment</th>
<th>Co-variable</th>
<th>Treatment Group</th>
<th>Treatment</th>
<th>Teaching Skills</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirty-nine Teachers Selected at Random from a Population of Fifty-seven</td>
<td>Participants Were Assigned Randomly to Treatment Groups</td>
<td>Pretest Scores to the Three Teaching Skills</td>
<td>I Video-Phone Feedback</td>
<td>View Instructional Model, Critique Self, Receive Feedback from Teacher Educator via Telephone</td>
<td>The Three Skills were Introducing A Lesson,</td>
<td>Posttest Scores on the Three Teaching Skills and Satisfaction Scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>II Video-Mail Feedback</td>
<td>View Instructional Model, Critique Self, Receive Feedback from Teacher Educator via Mailed Videotaped Comments</td>
<td>Questioning And</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>III Video-Self-Evaluation Feedback</td>
<td>View Instructional Model and Critique Self</td>
<td>Demonstrating a Manipulative Skill</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.—Functional Operation of the Experimental Design
phone conferences with the teacher educator. The teacher educator first mailed videotaped instructional models and illustration models of a teaching skill and written instructions for their use to each teacher. Each teacher viewed the instructional model as many times as he believed necessary to learn the behaviors of a particular teaching skill. Next, each teacher planned a five-minute lesson and taught it to four students. In this lesson which was videotaped, the teaching skill being studied was emphasized. Each teacher replayed his videotaped lesson and critiqued his own performance with the aid of a critique form that was provided by the teacher educator. The critique form and the videotape were mailed to the teacher educator. The teacher educator reviewed the videotape and critiqued the lesson. The videotape was then mailed back to the teacher.

As soon as the teacher received his videotape, a telephone conference was scheduled with the teacher educator. During the conference, the weaknesses and strengths of the teacher's performance were discussed. In addition, the teacher educator identified an appropriate illustration model for the teacher to observe. After the conference, the teacher viewed the illustration model, reviewed the teacher educator's comments, then planned and
retaught the same lesson. This teaching-reteaching procedure was repeated for three different teaching skills.

Treatment number two, *instructional model with video-mail feedback*, involved thirteen teachers who received feedback from the teacher educator via videotaped comments which were mailed to each teacher. Each teacher in this treatment group went through the same process as the teachers in the first treatment group except each received feedback on his performance via videotape. After critiquing a teacher's videotaped lesson, the teacher educator recorded his comments onto the teacher's videotape and mailed it to the teacher. Upon receiving the returned videotape, each teacher viewed the teacher educator's comments on his performance and the selected illustration model; then, he planned and retaught the same lesson to a group of four students. This teaching-reteaching procedure was repeated for three different teaching skills.

Treatment number three, *instructional model with video-self-evaluation feedback*, involved thirteen teachers who critiqued their own lessons but received no feedback from the teacher educator. Teachers in this treatment group followed the same procedures as the teachers in the other two treatment groups except for the feedback aspect. After videotaping a teaching session and critiquing it, each teacher was required to present the videotape to his
local supervisor who kept it for one week. The supervisor did not view the tape. This procedure of having the supervisor hold the videotape was followed in order to maintain a rigid time schedule with this group as was done with the other two treatment groups. In situations where there was no local supervisor, the tapes were mailed to the teacher educator.

After one week, the supervisor or teacher educator returned the videotaped lesson to the teacher. Then, the teacher reviewed his own critique, viewed any or all of the illustration models for the skill, planned and retaught the same lesson to four students. This teaching-reteaching procedure was repeated for three different teaching skills.

Figure 3 on page 76 shows a comparison of the three treatment groups.

**Instrumentation**

Before the start of the experiment, Dr. Ronald E. Glenn, selected three teaching skills which he believed would be of maximum benefit to the beginning teachers in his in-service teacher education program at Colorado State University. These teaching skills were introducing a lesson, questioning, and demonstrating a manipulative skill. The instruments used for evaluating teaching performance on these three skills were adapted from instruments
### Instructional Model with Video-Phone Feedback

| Teacher Views Instructional Model | Teacher Plans, Teaches, & Videotapes a Five-Minute Lesson Demonstrating the Teaching Skill | Videotaped Lesson is Critiqued by Teacher, Then is Mailed to the Teacher Educator | Teacher Educator Critiques the Tape and Then Returns it to the Teacher | Teacher Educator watch, records his comments on the Tape and Returns it to the Teacher | Teacher Views Illustration Models, then plans and re-teaches the same lesson (cycle is repeated) |

### Instructional Model with Video-Mail Feedback

| Teacher Views Instructional Model | Teacher Plans, Teaches, & Videotapes a Five-Minute Lesson Demonstrating the Teaching Skill | Videotaped Lesson is Critiqued by Teacher, Then is Mailed to the Teacher Educator | Teacher Educator Critiques the Tape, Records his comments onto the Tape and Returns it to the Teacher | Teacher Views Teacher Educator's Comments and the Illustration Models, then he plans and re-teaches the same lesson (cycle is repeated) |

### Instructional Model with Video-Self-Evaluation Feedback

| Teacher Views Instructional Model | Teacher Plans, Teaches, & Videotapes a Five-Minute Lesson Demonstrating the Teaching Skill | Videotaped Lesson is Critiqued by Teacher, Then is given to the Local Supervisor | One Week Later the Local Supervisor Returns the Tape to the Teacher | Teacher Reviews His Own Critique, then he plans and re-teaches the same lesson (cycle is repeated) |

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**Figure 3.** Operational Description of Treatments
developed during the laboratory experiments on micro-teaching and videotape recording at The Center for Research and Leadership Development in Vocational and Technical Education, The Ohio State University, Columbus, Ohio.

For evaluating teacher performance on the skill of introducing a lesson, an instrument containing nine items was used. Teacher performance on the skill of questioning was rated on an eleven item critique form. For evaluating teacher performance on the teaching skill of demonstrating a manipulative skill, a seven item critique form was used. A six-point rating scale, i.e., 0-did not accomplish, 1-very poor, 2-poor, 3-average, 4-good, 5-excellent, was used for rating teacher performance on each item of the three instruments.

The three critique forms were checked for content validity by members of the Project 44 staff at The Center for Vocational and Technical Education and by Dr. Glenn of Colorado State University. Attempts were made to make the wording simple enough that the statements of behavior for each item could be easily understood by teachers with little or no background in pedagogy.

In previous laboratory experiments at The Center, rater reliability checks were made on each of the critique forms used in this study. Inter-rater reliability correlation coefficients of at least .90 were obtained on all the
instruments. Winer's formula\(^2\) for using an analysis of variance to estimate rater reliability was used.

For this present study an item analysis was run on each of the critique forms and a rater reliability check was made on each. The "Simple Item Analysis" computer program by Goode\(^3\) was used to test the reliability of each of the critique forms as well as each item on the critique forms. The rater reliability check for each critique form was made by using Winer's analysis of variance formula for calculating rater reliability correlation coefficients.

An item analysis was run on both the pretest and posttest scores for the critique form on introducing a lesson. The pretest means, standard deviations, variances and reliability coefficients for each item as well as the reliability correlation coefficient for the total instrument are shown in Table 2. As a total instrument, the reliability coefficient computed from the mean scores of the two-panel members' ratings for all participants' pretest scores was .90.


\(^3\)Omar Goode, "Simple Item Analysis," Data Center, College of Administrative Science, The Ohio State University, Document B, November, 1967. (Mimeographed.)
### TABLE 2

**PRETEST MEANS, STANDARD DEVIATIONS, VARIANCE AND RELIABILITY COEFFICIENTS OF ITEMS ON THE CRITIQUE FORM: INTRODUCING A LESSON**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.54</td>
<td>1.08</td>
<td>1.16</td>
<td>0.82</td>
</tr>
<tr>
<td>2</td>
<td>0.38</td>
<td>0.92</td>
<td>0.85</td>
<td>0.83</td>
</tr>
<tr>
<td>3</td>
<td>0.36</td>
<td>0.96</td>
<td>0.92</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>0.65</td>
<td>1.17</td>
<td>1.37</td>
<td>0.84</td>
</tr>
<tr>
<td>5</td>
<td>0.36</td>
<td>0.95</td>
<td>0.90</td>
<td>0.82</td>
</tr>
<tr>
<td>6</td>
<td>0.40</td>
<td>0.94</td>
<td>0.83</td>
<td>0.82</td>
</tr>
<tr>
<td>7</td>
<td>0.47</td>
<td>1.12</td>
<td>1.25</td>
<td>0.88</td>
</tr>
<tr>
<td>8</td>
<td>1.38</td>
<td>1.48</td>
<td>2.18</td>
<td>0.45</td>
</tr>
<tr>
<td>9</td>
<td>1.53</td>
<td>1.41</td>
<td>2.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.90</strong></td>
</tr>
</tbody>
</table>

As shown in Table 3, the reliability coefficient for the posttest scores was .70.

### TABLE 3

**POSTTEST MEANS, STANDARD DEVIATIONS, VARIANCES AND RELIABILITY COEFFICIENTS OF ITEMS ON THE CRITIQUE FORM: INTRODUCING A LESSON**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.83</td>
<td>1.34</td>
<td>1.81</td>
<td>0.31</td>
</tr>
<tr>
<td>2</td>
<td>0.57</td>
<td>1.12</td>
<td>1.24</td>
<td>0.43</td>
</tr>
<tr>
<td>3</td>
<td>0.39</td>
<td>0.89</td>
<td>0.79</td>
<td>0.39</td>
</tr>
<tr>
<td>4</td>
<td>1.43</td>
<td>1.46</td>
<td>2.13</td>
<td>0.48</td>
</tr>
<tr>
<td>5</td>
<td>0.74</td>
<td>1.33</td>
<td>1.78</td>
<td>0.48</td>
</tr>
<tr>
<td>6</td>
<td>0.71</td>
<td>1.26</td>
<td>1.60</td>
<td>0.48</td>
</tr>
<tr>
<td>7</td>
<td>0.40</td>
<td>1.14</td>
<td>1.30</td>
<td>0.32</td>
</tr>
<tr>
<td>8</td>
<td>2.97</td>
<td>0.67</td>
<td>0.44</td>
<td>0.46</td>
</tr>
<tr>
<td>9</td>
<td>1.82</td>
<td>1.33</td>
<td>1.76</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.70</strong></td>
</tr>
</tbody>
</table>
Item analysis data for the pretest scores on the critique form for questioning are presented in Table 4. The reliability coefficient computed for the total instrument on the basis of pretest scores was .92.

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.15</td>
<td>1.40</td>
<td>1.96</td>
<td>0.81</td>
</tr>
<tr>
<td>2</td>
<td>1.03</td>
<td>1.46</td>
<td>2.14</td>
<td>0.83</td>
</tr>
<tr>
<td>3</td>
<td>0.82</td>
<td>1.41</td>
<td>1.98</td>
<td>0.83</td>
</tr>
<tr>
<td>4</td>
<td>0.92</td>
<td>1.41</td>
<td>1.99</td>
<td>0.79</td>
</tr>
<tr>
<td>5</td>
<td>0.88</td>
<td>1.54</td>
<td>2.39</td>
<td>0.86</td>
</tr>
<tr>
<td>6</td>
<td>0.88</td>
<td>1.47</td>
<td>2.16</td>
<td>0.81</td>
</tr>
<tr>
<td>7</td>
<td>1.06</td>
<td>1.65</td>
<td>2.72</td>
<td>0.83</td>
</tr>
<tr>
<td>8</td>
<td>1.50</td>
<td>1.31</td>
<td>1.72</td>
<td>0.52</td>
</tr>
<tr>
<td>9</td>
<td>0.71</td>
<td>1.23</td>
<td>1.51</td>
<td>0.22</td>
</tr>
<tr>
<td>10</td>
<td>0.47</td>
<td>1.00</td>
<td>1.00</td>
<td>0.38</td>
</tr>
<tr>
<td>11</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>0.92</td>
</tr>
</tbody>
</table>

The posttest means, standard deviations, variances and reliability coefficients for each item as well as the reliability coefficient for the total instrument on questioning are shown in Table 5. The reliability coefficient computed for the total instrument on the basis of posttest scores was .96.
TABLE 5
POSTTEST MEANS, STANDARD DEVIATIONS, VARIANCES
AND RELIABILITY COEFFICIENTS OF ITEMS ON THE
CRITIQUE FORM: QUESTIONING

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.40</td>
<td>1.21</td>
<td>1.46</td>
<td>0.79</td>
</tr>
<tr>
<td>2</td>
<td>1.74</td>
<td>1.38</td>
<td>1.92</td>
<td>0.85</td>
</tr>
<tr>
<td>3</td>
<td>1.58</td>
<td>1.39</td>
<td>1.94</td>
<td>0.75</td>
</tr>
<tr>
<td>4</td>
<td>1.85</td>
<td>1.67</td>
<td>2.80</td>
<td>0.90</td>
</tr>
<tr>
<td>5</td>
<td>1.58</td>
<td>1.51</td>
<td>2.27</td>
<td>0.82</td>
</tr>
<tr>
<td>6</td>
<td>2.06</td>
<td>1.39</td>
<td>1.94</td>
<td>0.86</td>
</tr>
<tr>
<td>7</td>
<td>2.31</td>
<td>1.44</td>
<td>2.07</td>
<td>0.83</td>
</tr>
<tr>
<td>8</td>
<td>1.89</td>
<td>1.50</td>
<td>2.24</td>
<td>0.94</td>
</tr>
<tr>
<td>9</td>
<td>1.42</td>
<td>1.44</td>
<td>2.08</td>
<td>0.78</td>
</tr>
<tr>
<td>10</td>
<td>1.97</td>
<td>1.41</td>
<td>2.00</td>
<td>0.92</td>
</tr>
<tr>
<td>11</td>
<td>0.53</td>
<td>1.07</td>
<td>1.14</td>
<td>0.42</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>0.96</td>
</tr>
</tbody>
</table>

An item analysis was run on both the pretest and posttest scores for the critique form on demonstrating a manipulative skill. The means, standard deviations, variances and reliability coefficients for each item as well as the reliability coefficient for the total instrument on the pretest scores are shown in Table 6. For the total instrument, the reliability coefficient was .97 as computed from the mean scores of the two panel members' ratings for participants' pretest scores.
TABLE 6
PRETEST MEANS, STANDARD DEVIATIONS, VARIANCES AND RELIABILITY COEFFICIENTS OF ITEMS ON THE CRITIQUE FORM: DEMONSTRATING A MANIPULATIVE SKILL

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.54</td>
<td>1.01</td>
<td>1.03</td>
<td>0.83</td>
</tr>
<tr>
<td>2</td>
<td>0.40</td>
<td>1.05</td>
<td>1.10</td>
<td>0.96</td>
</tr>
<tr>
<td>3</td>
<td>0.46</td>
<td>1.12</td>
<td>1.25</td>
<td>0.97</td>
</tr>
<tr>
<td>4</td>
<td>0.64</td>
<td>1.08</td>
<td>1.18</td>
<td>0.81</td>
</tr>
<tr>
<td>5</td>
<td>0.40</td>
<td>1.02</td>
<td>1.05</td>
<td>0.96</td>
</tr>
<tr>
<td>6</td>
<td>0.54</td>
<td>1.14</td>
<td>1.30</td>
<td>0.91</td>
</tr>
<tr>
<td>7</td>
<td>0.43</td>
<td>1.09</td>
<td>1.19</td>
<td>0.91</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>0.972</td>
</tr>
</tbody>
</table>

The means, standard deviations, variances and reliability coefficients for each item as well as the reliability coefficient for the total instrument on the posttest scores are shown in Table 7 on page 83. For the total instrument, the reliability coefficient was .98 as computed from the mean scores of the two panel members' ratings for all posttest scores.

In summary, the reliability correlation coefficients for the three critique forms were .90 or above except for the reliability correlation coefficient on the posttest scores for introducing a lesson. However, it was decided that .70 reliability correlation coefficient would be acceptable for the use for which the critique form was designed.
TABLE 7
POSTTEST MEANS, STANDARD DEVIATIONS, VARIANCES AND RELIABILITY COEFFICIENTS OF ITEMS ON THE CRITIQUE FORM: DEMONSTRATING A MANIPULATIVE SKILL

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.14</td>
<td>1.61</td>
<td>2.59</td>
<td>0.96</td>
</tr>
<tr>
<td>2</td>
<td>2.90</td>
<td>1.57</td>
<td>2.48</td>
<td>0.89</td>
</tr>
<tr>
<td>3</td>
<td>3.06</td>
<td>1.62</td>
<td>2.61</td>
<td>0.95</td>
</tr>
<tr>
<td>4</td>
<td>2.56</td>
<td>1.39</td>
<td>1.94</td>
<td>0.94</td>
</tr>
<tr>
<td>5</td>
<td>3.18</td>
<td>1.68</td>
<td>2.82</td>
<td>0.96</td>
</tr>
<tr>
<td>6</td>
<td>3.33</td>
<td>1.77</td>
<td>3.14</td>
<td>0.95</td>
</tr>
<tr>
<td>7</td>
<td>3.49</td>
<td>1.84</td>
<td>3.39</td>
<td>0.96</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>0.98</td>
</tr>
</tbody>
</table>

Examples of the three critique forms used in the study are shown in Appendix A. A slight variation of these instruments was given to each participating teacher in the three treatment groups to be used as self-critiquing instruments. These modified instruments were written in terms of "you" instead of "the teacher."

The critique form on introducing a lesson contained eleven items on the modified version used by the participating teachers as a self-critiquing instrument. Two of the items on this form were concerned with pupil behavior which could not be evaluated effectively from viewing a videotaped teaching session. Therefore, the version used by the panel for evaluating teacher performance on the skill of introducing
a lesson contained nine items.

The satisfaction scale used for obtaining expressed teacher satisfaction with the remote teacher education techniques was adapted from a satisfaction scale used in a previous experiment at The Center. Thirty-two statements made up of sixteen positive and sixteen negative statements were written to obtain the degree of teacher satisfaction with the remote teacher education techniques used. The content validity of the statements was obtained by getting reactions from several teacher educators in regard to clearness of statement and pertinence to this study. In addition, six teachers of vocational-technical education representing six trade areas read and reacted to the wording of the statements. After changes were made, the negative and positive items were assigned a number from one to thirty-two and were placed in a random order for recording on the satisfaction scale.

A nine-point scale was used for rating each statement on the satisfaction scale. The nine points provided a scale starting with 1 (strongly disagree) to 9 (strongly agree). A copy of the satisfaction instrument is shown in Appendix B.

An open-ended questionnaire was used to obtain the reactions of the participating teachers in regard to the number of times each of the models was viewed and to assess
the strengths and weaknesses of the three techniques of teacher education as seen through the eyes of the participants. In addition, information on the characteristics of the participants in each treatment group was obtained. A copy of this instrument is shown in Appendix C.

**Instructional and Illustration Models**

One videotaped instructional model for each of the three teaching skills used in this experiment was developed. The following procedures were followed in developing each of the instructional models:

1. Videotaped teaching performances from previous experiments completed at The Center were analyzed to identify videotape segments of teacher performance which illustrated each of the behaviors identified for a teaching skill.

2. A narrative script which identified the skill and introduced each illustrative film segment for the specific behaviors was written. Examples of the narrative scripts for each skill are shown in Appendix D.

3. Dr. Ronald E. Glenn acted as narrator and was videotaped reading the script which described the skill and the individual teaching behaviors included in the skill.
4. The narrator's comments and the selected illustrative videotape segments were dubbed onto one tape; thus, integrating them into one concise instructional tape.

5. To make the instructional model complete, an illustration model was added to provide practice on rating the specific teaching skill. Narration of ratings given the illustration model was added to provide for comparison of viewer ratings against a standard.

6. The completed instructional model, consisting of narration, illustrative film segments of teaching behaviors, and an illustration model, was dubbed onto both one-half inch videotapes and one-inch videotapes for distribution to the participants.

Illustration models were selected from videotaped teaching performances that had been recorded during previous experiments at The Center. Two members of the project staff reviewed the tapes and selected three representative teaching performances for each of the teaching skills. These illustration models were dubbed onto one videotape and ratings of the models were written to serve as guides to teachers viewing them. This videotape with nine illustration models served as a source from which the teacher educator could select an illustration model that would be
Conduct of the Experiment

The thirty-nine participants were pretested during the first week of April, 1969. Dr. Ronald E. Glenn traveled to the school of each participating teacher and videotaped the teacher at the school. Pre-orientation instructions via videotape was presented to the teachers to insure that each teacher received the same instructions before he was pretested. The instructions consisted of a brief explanation of microteaching, an example of a videotaped five-minute lesson, and instructions telling them they would be given one hour to plan a five-minute lesson in which they were to demonstrate their ability to introduce a lesson, question students, and demonstrate a manipulative skill. All pretest teaching sessions were recorded on one-half inch videotape using a one-half inch Sony videotape recorder. After the pretest, all participants were given a brief handout which explained what the experiment would include. Examples of the handouts given each group are shown in Appendix E.

The experiment began the second week of April, 1969. A videotape containing the nine illustration models (three models for each skill) and a videotape containing the first instructional model on introducing a lesson were sent to
each high school or junior college that had teachers who participated in the study. In addition, each teacher was sent a new videotape for recording his teaching sessions, written instructions on how to use the model, a schedule of events for the entire experiment, and three copies of the critique form on introducing a lesson. Examples of the schedules sent to the teachers are shown in Appendix F. Examples of the written instructions sent with each instructional model are shown in Appendix G.

As was explained in the section on treatment descriptions, each teacher studied the instructional model, videotaped a micro-teaching session in which the teaching skill of introducing a lesson was practiced, and critiqued his own lesson. The videotaped lesson was sent to the teacher educator and he administered one of the three remote feedback techniques, i.e., video-phone feedback, video-mail feedback, or video-self-evaluation feedback. The teacher then planned and retaught the lesson; again, practicing the skill of introducing a lesson. The teaching-reteaching cycle was repeated for two other skills: (1) questioning and (2) demonstrating a manipulative skill.

Dr. Glenn served as teacher educator for all of the treatment groups. Two weeks were required for presenting each teaching skill, but this time varied from two to three weeks because of mailing distances and problems in
scheduling video recording equipment. As a result, the experiment lasted eight weeks instead of the planned six weeks.

During the first week of June, 1969, all participants who remained in the program throughout the experiment were posttested. One teacher from each treatment group failed to complete all phases of the experiment; therefore, thirty-six teachers (twelve in each treatment group) were finally posttested.

Dr. Glenn visited each school and videotaped the posttest teaching sessions. As in the pretest, each teacher was given one hour to plan a five-minute lesson demonstrating the three teaching skills that had been studied. All but six of the posttest teaching sessions were recorded on a one-half inch Sony videotape recorder. Six participants were recorded on a one inch Ampex videotape recorder when the Sony recorder failed to record properly because of a malfunction.

Immediately after being posttested each teacher was asked to indicate his level of satisfaction with the remote teacher education technique to which he was exposed. A satisfaction scale containing thirty-two statements was used. In addition, a reaction questionnaire was used to obtain the reactions of the participants in regard to the number of times each of the models was viewed and to assess
the strengths and weaknesses of the three remote techniques of teacher education as seen through the eyes of the participants.

Figure 4 on page 91 shows a breakdown of the sequence of events in the experiment.

**Controls Used in the Experiment**

In addition to the controls for internal validity which were provided by the experimental design, several physical controls were incorporated by the investigator. These controls were as follows.

1. All participants were given orientation instructions via a videotape recording prior to being pretested. The orientation instruction consisted of a brief explanation of microteaching, an example of a videotaped five-minute lesson, and instructions telling the participants that they would be given one hour to plan a five-minute lesson in which they were to demonstrate their ability to introduce a lesson, question students, and demonstrate a manipulative skill.

2. All participants were given the opportunity to view the instructional and illustration models as many times as they believed necessary to learn the teaching skills.
Figure 4.--Sequence of Events in the Experiment
3. All participants taught six five-minute lessons (two lessons for each teaching skill) and critiqued their own lesson.

4. The two treatment groups that received feedback, received it from the same teacher educator. In addition, the critique sessions were of approximately the same time limit of five minutes each.

5. Efforts were made to keep all participants on a rigid schedule. Due to equipment failures and delays in mail deliveries from different parts of the state, the time schedule for certain individuals in all treatment groups varied during the experiment.

6. The pretest and posttest teaching sessions were rated by two panel members who had had no contacts with the participants.

7. Pretest and posttest videotaped teaching sessions were viewed in a random order using the "double-blind" technique so that no individual teacher would be rated on his pretest and posttest in sequence.
Panel Rating Procedures

After the posttest teaching sessions had been videotaped, two panel members were selected for rating the pretests and posttests. The qualifications established for selection of each panel member were a minimum of a master's degree in education, both supervision and teacher education experience in vocational education, and current employment in the area of vocational education. Two educators who met these qualifications were found and scheduled for an orientation session on June 11, 1969.

The two-member panel was given a six-hour orientation on how to use the rating instruments for the three teaching skills. The orientation for the panel consisted of the following procedures:

1. The panel members reviewed the items on each of the three critique forms.

2. The instructional model for introducing a lesson was viewed by the panel. As the panel members viewed the instructional model, they discussed each item on the critique form.

3. Two teaching sessions from another experiment at The Center were viewed and rated to give each member of the panel an opportunity to gain expertise in rating teachers on the teaching skill of introducing a lesson.
4. After viewing each teaching session and rating them independently the panel members discussed the ratings given each item on the critique form and defended the ratings that they had given.

5. Procedures two, three and four were repeated for the teaching skill of questioning and demonstrating a manipulative skill.

6. After the panel members had become familiar with the three instruments, they rated one teaching session on all three teaching skills. Again, the panel members discussed their ratings on each item of the three critique forms.

7. At this time a rater reliability check was made on the panel's ratings of a teaching session which was viewed and rated independently without discussion. A rater reliability correlation coefficient of .85 on all three instruments was obtained, therefore, it was decided to continue the orientation until a correlation of .90 was obtained.

8. After rating and discussing two more videotaped teaching sessions, the panel members were asked to rate another teaching session and not to discuss their ratings. The rater reliability correlation coefficient for the three instruments on this teaching session was .91 and the orienta-
tion was terminated at this point.

Before the panel began rating the pretests and posttests, the teaching sessions recorded on a one-half inch Sony recorder were dubbed onto a one-inch Ampex recorder. This procedure provided a means for maintaining the same level of playback quality on all recorded teaching sessions.

In order to prevent the possibility of panel members being able to identify pretest and posttest teaching sessions, the "double blind" technique of presenting videotapes for viewing was used. This technique was set up in the following manner. (See Figure 5 on page 96.)

1. The pretest videotaped sessions were paired with the posttest videotaped sessions so that no teacher's pretest and posttest would be rated in sequence or during the same rating session.

2. The pairs of pretest and posttest teaching sessions were divided into four blocks of nine pairs each (there were thirty-six pretests and thirty-six posttests). This procedure provided for the inclusion of eighteen teaching sessions in each of the four blocks.

3. The nine pairs of pre- and post-tests in each block were assigned a number from one to nine and these numbers were used for selecting a
random order for viewing the tapes. When an odd numbered pair was selected the pretest was viewed first. When an even numbered pair was selected the posttest was viewed first.

<table>
<thead>
<tr>
<th>Pretest Teacher Number</th>
<th>Posttest Teacher Number</th>
<th>Blocks</th>
<th>Rating Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pair 1</td>
<td>36</td>
<td>(1) R 1,3,2,8,9,4,5,6,7</td>
</tr>
<tr>
<td>through 9</td>
<td>through through through</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pair 1</td>
<td>27</td>
<td>(2) R 4,6,9,1,3,7,5,2,8</td>
</tr>
<tr>
<td>through 18</td>
<td>through through through</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Pair 1</td>
<td>18</td>
<td>(3) R 2,6,3,1,4,5,9,8,7</td>
</tr>
<tr>
<td>through 27</td>
<td>through through through</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Pair 1</td>
<td>9</td>
<td>(4) R 7,4,8,5,2,9,1,3,6</td>
</tr>
<tr>
<td>through 36</td>
<td>through through through</td>
<td>IV</td>
<td></td>
</tr>
</tbody>
</table>

R - Pairs 1-9 in each block were viewed in random order as identified by a table of random numbers. When an odd-numbered pair (1,3,5,7,9) was selected the pretest was viewed first; when on even-numbered pair (2,4,6,8) was selected the posttest was viewed first.

Figure 5.—The Double Blind Viewing Technique

One block of nine pairs of pre- and post-test teaching sessions was viewed and rated during each of the four rating sessions. The rating sessions were four hours in duration and panel members took a break every two hours.
Inter-rater reliability correlation coefficients for the panel members were calculated for both the pretests and the posttests for each of the three critique forms used. Winer's formula for using the analysis of variance to test the reliability of raters was used. The inter-rater reliability coefficients for the pretest and the posttest of each critique form is shown below in Table 8.

**TABLE 8**

INTER-RATER RELIABILITY CORRELATION COEFFICIENTS

<table>
<thead>
<tr>
<th>Critique Form</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a Lesson</td>
<td>0.91</td>
<td>0.96</td>
</tr>
<tr>
<td>Questioning</td>
<td>0.97</td>
<td>0.98</td>
</tr>
<tr>
<td>Demonstrating a Manipulative Skill</td>
<td>1.00</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Since the rater reliability measurements for all instruments were .91 or above, it can be seen that the reliability of the two raters was consistently high.

Statistical Procedures

Campbell and Stanley in discussing their Pretest-Posttest Control Group Design stated that "Good experimental
design is separable from the use of statistical tests of significance."^4 They followed up this statement by pointing out that the design supplies the defense for the comparability of the comparison groups but that if the comparison is to be interpretable, "then statistical tests of significance come in for the decision as to whether or not the obtained difference rises above the fluctuations to be expected in cases of no true difference for samples of that size."^5

Campbell and Stanley stated that although the pretest-posttest control group design is used often, the statistical tests used are not always appropriate. They explained this phenomena as follows:

In applying the common "critical ratio" or t test to this standard experimental design, many researchers have computed two ts, one for the pretest-posttest difference in the experimental group, one for the pretest-posttest gain in the control group. If the former be "statistically significant" and the latter "not," then they have concluded that the X had an effect, without any direct statistical comparison of the experimental and control groups. Often the conditions have been such that, had a more appropriate test been made, the difference would not have been significant (as in the case where the significance values are borderline, with the control group showing a gain almost reaching significance).^6

With the above considerations in mind, it was deter-

^4Campbell and Stanley, op. cit., p. 22.

^5Ibid.

^6Ibid., p. 23.
mined that the data for this study met the assumptions of analysis of covariance and that a one-way analysis of covariance would be the appropriate statistical test to use for analyzing the teaching performance data. In addition, it was determined that since the data collected from the satisfaction scale were posttest-only scores that an analysis of variance would be an appropriate test to use.

All of the data collected in this study, except for the questionnaire data, was analyzed by the use of a computer. The Biomedical Computer Program (BMD04V) as adapted for the IBM 360 computer was selected for the one-way analysis of covariance run on the teaching performance data. The BMD04V program provided the following output: (1) an analysis-of-covariance table with degrees of freedom, sums of squares, mean squares, and F ratio, (2) tables of regression coefficients, their standard errors and computed t-values with and without adjustment for groups, and (3) a table of adjusted means and their standard errors.\(^7\)

For the analysis of variance on the satisfaction data, the BMD01V program for the IBM 360 computer was used. This program provided an output of a complete analysis-of-variance table with an F ratio.\(^8\)

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7 W. J. Dixon, ed., BMD: Biomedical Computer Programs (Los Angeles: University of California, School of Medicine, 1965), p. 525.

8 Ibid., p. 486.
The .05 level of significance was selected for rejecting the null hypotheses tested by the analysis of covariance and the analysis of variance computer programs.

In addition to the use of the computer described in the preceding discussion, the item analysis for each critique form and the analysis of variance for the rater reliability measurements were obtained from computer output. For the item analysis, the IBM 1620 computer was used and for the rater reliability measurement, an analysis of variance using the BMD02V program for the IBM 7094 computer was used.
CHAPTER IV

FINDINGS OF THE STUDY

Introduction

The major purpose of this study was to determine the effectiveness of three remote techniques of teacher education for providing in-service education on three selected teaching skills. The specific objectives of the study were (1) to assess the effectiveness of video-phone feedback, video-mail feedback and video-self-evaluation feedback in regard to improvement in teaching performance on three selected teaching skills, (2) to determine from among the three treatment groups, the level of expressed teacher satisfaction for each of the remote techniques of teacher education, and (3) to determine the feasibility of the use of remote techniques of teacher education for in-service education. To determine the extent to which these objectives were accomplished, five hypotheses to be tested were extrapolated from the theoretical framework of the study. The first four hypotheses were designed to accomplish objective number one. The fifth hypothesis was formulated to meet the second objective. The extent
to which objective three was reached was determined by summarizing the reactions of the participants to a questionnaire and by running a paired t-test between the pretest and posttest scores on each critique form within each treatment group.

The following topics based on the objectives of the study were developed to present the analyses of the results of the study in a logical sequence: (1) analysis of the effectiveness of the three remote techniques in regard to teacher performance, (2) analysis of the level of expressed teacher satisfaction with the remote techniques and (3) analysis of data assessing the feasibility of remote techniques of teacher education. In addition, the following two topics will be included to finalize the chapter: (1) discussion of the findings and (2) summary.

Analysis of the Effectiveness of the Three Remote Techniques in Regard to Teacher Performance

To assess the effectiveness of video-phone, videomail and video-self-evaluation feedback on teaching performance on the teaching skills of introducing a lesson, questioning, and demonstrating a manipulative skill, the following research hypotheses were developed from the theoretical framework of the study:

Measured performance on:

\[(H_1)\] the composite of the following three
teaching skills and the skills separately,

(H_2) introducing a lesson,

(H_3) questioning,

(H_4) demonstrating a manipulative skill

--will be greater for the teachers receiving video-phone feedback than for the teachers receiving video-mail feedback, which in turn, will be greater than for the teachers receiving video-self-evaluation feedback.

The preceding hypotheses were formulated to determine if there were statistically significant differences in the teaching performance scores on the teaching skills as the result of using three different types of feedback on performance. A one-way analysis of covariance was used to test the null forms of the hypotheses at the .05 level of significance for the composite scores on the three teaching skills as well as on each individual skill. The pretest performance scores served as the covariates for the analysis of covariance computations. The raw performance score for each teacher was obtained by calculating the mean scores from the two panel members' individual scores for each teaching skill. The total maximum raw score that an individual teacher could obtain on the composite of the three skills was 135. The maximum score for the skill of
introducing a lesson was 45, and the maximum scores for the skills of questioning and demonstrating a manipulative skill were 55 and 35 respectively.

**Total Performance**

The null hypothesis tested for the first research hypothesis (H₁) was "There is no significant difference in the total teaching performance on three teaching skills among the video-phone; video-mail, and video-self-evaluation feedback groups when differences have been adjusted with respect to initial teaching performance." An examination of the data presented in Table 9 revealed that there was no statistically significant difference in total teaching skills among the three treatment groups. The resulting F ratio of .32 with 2 and 32 degrees of freedom was interpreted to mean there was no greater variation between groups than within groups. On the basis of the calculated F ratio, the null hypothesis was accepted; hence the data did not support the research hypothesis (H₁).
TABLE 9

ANALYSIS OF COVARIANCE FOR PERFORMANCE DIFFERENCES ON THE COMPOSITE OF THREE TEACHING SKILLS AMONG TEACHERS RECEIVING VIDEO-PHONE, VIDEO-MAIL AND VIDEO-SELF-EVALUATION FEEDBACK

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>247.70</td>
<td>123.85</td>
<td>0.32</td>
</tr>
<tr>
<td>Within Groups</td>
<td>32</td>
<td>12324.57</td>
<td>385.14</td>
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</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>12572.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P.05 > 3.30 (with 2 and 32 degrees of freedom)

Performance on the Teaching Skill of Introducing a Lesson

The first teaching skill presented to each teacher in the three treatment groups was introducing a lesson. The null hypothesis used to test the difference in performances on this skill was "There is no significant difference in the measured teaching performance on the skill of introducing a lesson among the video-phone, video-mail, and video-self-evaluation feedback groups when differences have been adjusted with respect to initial teaching performance." An analysis of the data revealed that there was no statistically significant difference in teaching performance on the skill of introducing a lesson among the three treatment groups. The F ratio of .14 with 2 and 32 degrees of
freedom shown in Table 10 indicated that differences within the groups was as great as the differences between the groups. On the basis of the analysis, the null hypothesis was accepted; hence, the data did not support the research hypothesis (H2).

TABLE 10

ANALYSIS OF COVARIANCE FOR TEACHING PERFORMANCE DIFFERENCES ON THE TEACHING SKILL OF INTRODUCING A LESSON AMONG TEACHERS RECEIVING VIDEO-PHONE, VIDEO-MAIL AND VIDEO-SELF-EVALUATION FEEDBACK

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>10.45</td>
<td>5.23</td>
<td>0.14</td>
</tr>
<tr>
<td>Within Groups</td>
<td>32</td>
<td>1151.58</td>
<td>35.99</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>1162.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P.05 ≥ 3.30 (with 2 and 32 degrees of freedom)

Performance on the Teaching Skill of Questioning

The second teaching skill studied by each teacher in the three treatment groups was questioning. The null hypothesis used to test the differences in performances on this skill was "There is no significant difference in the measured teaching performance on the skill of questioning among the video-phone, video-mail, and video-self-evaluation feedback groups when differences with respect
to initial teaching performance have been adjusted." An analysis of the data obtained from a one-way analysis of covariance revealed a non-significant F ratio of .46 with 2 and 32 degrees of freedom. The null hypothesis was accepted since the data failed to support the research hypothesis \( H_3 \). The calculated F ratio is shown in Table 11.

**TABLE 11**

**ANALYSIS OF COVARIANCE FOR TEACHING PERFORMANCE DIFFERENCES ON THE TEACHING SKILL OF QUESTIONING AMONG TEACHERS RECEIVING VIDEO-PHONE, VIDEO-MAIL AND VIDEO-SELF-EVALUATION FEEDBACK**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>169.88</td>
<td>88.94</td>
<td>0.46</td>
</tr>
<tr>
<td>Within Groups</td>
<td>32</td>
<td>5850.38</td>
<td>182.82</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>6020.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( P.05 > 3.30 \) (with 2 and 32 degrees of freedom)

**Performance on the Teaching Skill of Demonstrating a Manipulative Skill**

The third and final teaching skill studied by each teacher in the three treatment groups was demonstrating a manipulative skill. The null hypothesis used to test the differences in performances on this skill was "There is no significant difference in the measured teaching performance on the teaching skill of demonstrating a manipula-
tive skill among the three treatment groups when differences have been adjusted with respect to initial teaching performance." The F ratio of 1.60 with 2 and 32 degrees of freedom shown in Table 12 was not significant, therefore, the null hypothesis was accepted. Hence, the data did support the research hypothesis ($H_4$).

**TABLE 12**

**ANALYSIS OF COVARIANCE FOR TEACHING PERFORMANCE DIFFERENCES ON THE TEACHING SKILL OF DEMONSTRATING A MANIPULATIVE SKILL AMONG TEACHERS RECEIVING VIDEO-PHONE, VIDEO-MAIL AND VIDEO-SELF-EVALUATION FEEDBACK**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>371.03</td>
<td>185.52</td>
<td>1.60</td>
</tr>
<tr>
<td>Within Groups</td>
<td>32</td>
<td>3706.24</td>
<td>115.82</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>4077.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$P.05 > 3.30$ (with 2 and 32 degrees of freedom)

**Adjusted Means**

No statistically significant difference were found among the video-phone feedback group, the video-mail feedback group and the video-self-evaluation group in regard to teaching performance on the composite of the three teaching skills or on any of the skills tested separately. Because of this fact it was felt by the writer that the
reader should be given an idea of how the three groups' scores were affected by the adjustment due to initial teaching performances. The adjusted means for each group on the composite of the three skills as well as on each skill separately are presented in Table 13 on page 110.

Analysis of the Level of Expressed Teacher Satisfaction with the Remote Techniques

To accomplish the second objective—to determine from among the three treatment groups, the level of expressed teacher satisfaction for each of the remote techniques of teacher education, the following research hypothesis was formulated: "Teachers receiving either video-phone feedback or video-mail feedback will be more satisfied with the remote in-service program than those receiving video-self-evaluation feedback on their teaching performances" ($H_5$). An analysis of variance on the satisfaction data was used to test the null form of the preceding hypothesis at the .05 level of significance. The raw score for each teacher was obtained by adding the item scores from the thirty-two item instrument. The maximum raw score an individual teacher could obtain on the Satisfaction Scale was 288.

The null hypothesis used to test for differences in expressed satisfaction was "There is no significant difference in the total satisfaction scores (as measured by
<table>
<thead>
<tr>
<th>Skill</th>
<th>Treatment</th>
<th>n</th>
<th>Criterion Post-Performance</th>
<th>Covariate Pretest Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite of Three Skills</td>
<td>Video-Phone</td>
<td>12</td>
<td>50.71</td>
<td>16.62</td>
</tr>
<tr>
<td></td>
<td>Video-Mail</td>
<td>12</td>
<td>53.17</td>
<td>29.25</td>
</tr>
<tr>
<td>Skill of Introducing a Lesson</td>
<td>Video-Self-</td>
<td>12</td>
<td>48.46</td>
<td>15.54</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill of Questioning</td>
<td>Video-Phone</td>
<td>12</td>
<td>9.29</td>
<td>5.08</td>
</tr>
<tr>
<td></td>
<td>Video-Mail</td>
<td>12</td>
<td>10.96</td>
<td>7.38</td>
</tr>
<tr>
<td></td>
<td>Video-Self-</td>
<td>12</td>
<td>9.38</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill of Demonstrating a Manipulative Skill</td>
<td>Video-Phone</td>
<td>12</td>
<td>18.71</td>
<td>11.54</td>
</tr>
<tr>
<td></td>
<td>Video-Mail</td>
<td>12</td>
<td>16.83</td>
<td>8.75</td>
</tr>
<tr>
<td></td>
<td>Video-Self-</td>
<td>12</td>
<td>22.21</td>
<td>7.46</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill of Questioning</td>
<td>Video-Phone</td>
<td>12</td>
<td>22.71</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Video-Mail</td>
<td>12</td>
<td>25.38</td>
<td>10.17</td>
</tr>
<tr>
<td></td>
<td>Video-Self-</td>
<td>12</td>
<td>16.88</td>
<td>3.58</td>
</tr>
<tr>
<td></td>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
a satisfaction rating scale) for teachers receiving either video-phone or video-mail feedback and those receiving video-self-evaluation feedback." An examination of the data presented in Table 14 revealed that there was no statistically significant difference among the three treatment groups on the expressed level of satisfaction with the technique used by each group. The resulting F ratio of .94 with 2 and 33 degrees of freedom was interpreted to mean there was no greater variation between groups than within groups. On the basis of the calculated F ratio, the null hypothesis was accepted; therefore, the data did not support the research hypothesis (H₅).

TABLE 14

ANALYSIS OF VARIANCE FOR LEVEL OF SATISFACTION DIFFERENCES AMONG TEACHERS RECEIVING VIDEO-PHONE, VIDEO-MAIL AND VIDEO-SELF-EVALUATION FEEDBACK

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>2</td>
<td>1177.56</td>
<td>588.78</td>
<td>0.94</td>
</tr>
<tr>
<td>Within Groups</td>
<td>33</td>
<td>20593.41</td>
<td>624.04</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>21770.96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P.05 > 3.29 (with 2 and 33 degrees of freedom)
Analysis of Data Assessing the Feasibility of Remote Techniques of Teacher Education

To assess the feasibility of each of three types of remote techniques used in this study, a paired t-test was run between the pretest and posttest scores for each teaching skill within each treatment group. This procedure was followed to determine if each group was able to make significant changes in teaching performance from pretest to posttest. However, it should be pointed out that significant gains computed in this manner are limited to the validity that one would get from using a one-group pretest-posttest design. In addition, the reactions of the teachers to the remote technique to which they were exposed was obtained by use of a questionnaire. The comments made by the teachers provided valuable information for assessing the feasibility of each remote technique.

Results of the Paired t-tests

Video-phone. A paired t-test between pretest and posttest scores for the video-phone group's teaching performance on the composite of the three teaching skills revealed a t value of 3.95. This t value indicated that teachers within the video-phone feedback group significantly improved their posttest scores over their pretest.
scores beyond the .01 level of significance. On the skill of introducing a lesson, the teachers improved their teaching performance significantly beyond the .05 level of significance as shown by a calculated t value of 2.25. On the skill of questioning, a t value of 1.18 was revealed. The teachers did not significantly improve their posttest scores over their pretest scores for this skill. On the teaching skill of demonstrating a manipulative skill, the calculated t value of 7.17 can not be considered since the pretest score was zero and, therefore, would not correlate with the posttest score. The calculated t values are shown in Table 15 on page 114.

Video-mail. A comparison was made between the pretest and posttest scores of the video-mail feedback group's teaching performances using the paired t test. For this group a t value of 3.62 was obtained by comparing the pretest and posttest scores for the composite of the three teaching skills. This t value indicated that teachers within the video-mail feedback group significantly improved their posttest scores over their pretest scores beyond the .01 level of significance for all skills. For the skill of introducing a lesson the teachers receiving video-mail feedback did not significantly improve their posttest scores over their pretest scores. A non-
<table>
<thead>
<tr>
<th>Teaching Skill</th>
<th>Source of Scores</th>
<th>Number of Subjects</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite of Three Skills</td>
<td>Pretest</td>
<td>12</td>
<td>13.29</td>
<td>16.62</td>
<td>3.95**</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>22.44</td>
<td>50.71</td>
<td></td>
</tr>
<tr>
<td>Introducing a Lesson</td>
<td>Pretest</td>
<td>12</td>
<td>2.47</td>
<td>5.08</td>
<td>2.25*</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>5.97</td>
<td>9.29</td>
<td></td>
</tr>
<tr>
<td>Skill of Questioning</td>
<td>Pretest</td>
<td>12</td>
<td>12.94</td>
<td>11.54</td>
<td>1.18</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>13.83</td>
<td>18.71</td>
<td></td>
</tr>
<tr>
<td>Demonstrating a Manipulative Skill</td>
<td>Pretest</td>
<td>12</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>10.50</td>
<td>22.71</td>
<td></td>
</tr>
</tbody>
</table>

P.05 > 2.20 (with 11 degrees of freedom)
P.01 > 3.11 (with 11 degrees of freedom)

*Significant at .05 level of significance
**Significant at .01 level of significance
significant t value of 1.69 was obtained for this skill. In addition, a non-significant t value of 1.68 was revealed for the teaching skill of questioning. On the skill of demonstrating a manipulative skill, a calculated t value of 3.66 indicated an improvement of posttest scores over the pretest scores beyond the .01 level of significance. The calculated t values for the video-mail group's teaching performance are shown in Table 16 on page 116.

**Video-self-evaluation.** The paired t-test was used to determine the t values for the pretest and posttest differences on the video-self-evaluation feedback group's teaching performances. A paired t-test between pretest and posttest scores for the video-self-evaluation group's teaching performance on the composite of the three teaching skills revealed a t value of 4.10. This t value indicated that teachers within the video-self-evaluation group significantly improved their posttest scores over their pretest scores beyond the .01 level of significance. On the skill of introducing a lesson, the teachers improved their teaching performance significantly beyond the .05 level of significance as shown by a calculated t value of 2.64. A comparison of the pretest and posttest scores on the skill of questioning revealed a t value of 3.20. This t value indicated an improvement of posttest
TABLE 16

PAIRED T-TEST SHOWING COMPARISON OF PRE- AND POST-TEST TEACHING PERFORMANCE SCORES FOR TEACHERS RECEIVING VIDEO-MAIL FEEDBACK

<table>
<thead>
<tr>
<th>Teaching Skill</th>
<th>Source of Scores</th>
<th>Number of Subjects</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite of Three Skills</td>
<td>Pretest</td>
<td>12</td>
<td>17.98</td>
<td>29.25</td>
<td>3.62**</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>16.41</td>
<td>53.17</td>
<td></td>
</tr>
<tr>
<td>Introducing Lesson</td>
<td>Pretest</td>
<td>12</td>
<td>5.79</td>
<td>7.38</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>5.62</td>
<td>10.96</td>
<td></td>
</tr>
<tr>
<td>Skill of Questioning</td>
<td>Pretest</td>
<td>12</td>
<td>8.07</td>
<td>8.75</td>
<td>1.68</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>12.67</td>
<td>16.83</td>
<td></td>
</tr>
<tr>
<td>Demonstrating a Manipulative Skill</td>
<td>Pretest</td>
<td>12</td>
<td>12.72</td>
<td>10.17</td>
<td>3.66**</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>12</td>
<td>8.04</td>
<td>25.38</td>
<td></td>
</tr>
</tbody>
</table>

P.01 >3.11 (with 11 degrees of freedom)

**Significant at .01 level of significance
scores over pretest scores beyond the .01 level of significance. On the teaching skill of demonstrating a manipulative skill, a calculated t value of 3.66 indicated an improvement in teaching performance beyond the .01 level of significance. The calculated t values are shown in Table 17 on page 118.

A summary of the paired t-tests showed the following results:

1. For the total in-service program all three treatment groups improved their posttest performance over their pretest performance on the composite of the three teaching skills beyond the .01 level of significance.

2. On the skill of introducing a lesson, the video-phone feedback group and the video-self-evaluation feedback group improved their teaching performance beyond the .05 level of significance but the video-mail feedback group failed to improve their teaching performance significantly.

3. On the skill of questioning, the video-self-evaluation feedback group improved their teaching performance beyond the .01 level of significance but neither the video-phone group nor the video-mail group improved their performance significantly.
TABLE 17

PAIRED T-TEST SHOWING COMPARISON OF PRE- AND POST-TEST TEACHING PERFORMANCE SCORES FOR TEACHERS RECEIVING VIDEO-SELF-EVALUATION FEEDBACK

<table>
<thead>
<tr>
<th>Teaching Skill</th>
<th>Source of Scores</th>
<th>Number of Subjects</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite of Three Skills Pretest</td>
<td>12</td>
<td>15.53</td>
<td>15.54</td>
<td>4.10**</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>12</td>
<td>16.47</td>
<td>48.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introducing a Lesson Pretest</td>
<td>12</td>
<td>1.85</td>
<td>4.50</td>
<td>2.64*</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>12</td>
<td>5.47</td>
<td>9.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill of Questioning Pretest</td>
<td>12</td>
<td>11.18</td>
<td>7.46</td>
<td>3.20**</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>12</td>
<td>11.71</td>
<td>22.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrating a Manipulative Skill Pretest</td>
<td>12</td>
<td>8.05</td>
<td>3.58</td>
<td>3.66**</td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>12</td>
<td>12.05</td>
<td>16.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p.05 ≥ 2.20 (with 11 degrees of freedom)
p.01 ≥ 3.11 (with 11 degrees of freedom)

*Significant at .05 level of significance
**Significant at .01 level of significance
4. On the teaching skill of demonstrating a manipulative skill, the group receiving video-phone feedback improved but the significance could not be calculated. The group receiving video-mail feedback improved significantly at the .01 level of significance and the video-self-evaluation group improved their performance at the .05 level of significance.

Teachers' Reactions to the Three Remote Techniques

All participants were asked to complete a seven question instrument about the procedures and techniques used in the in-service education program. Each of the questions on the questionnaire will be stated and a summary and examples of the answers given will be presented in this section.

Item # 1: How many times did you view the following instructional models?

<table>
<thead>
<tr>
<th>Instructional Model</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How to introduce a lesson</td>
<td></td>
</tr>
<tr>
<td>b. How to use questioning</td>
<td></td>
</tr>
<tr>
<td>c. How to demonstrate a manipulative</td>
<td></td>
</tr>
</tbody>
</table>

The average times each of the instructional models were viewed by the three treatment groups are shown in Table 18. Both the video-mail feedback group and the video-self-evaluation feedback group viewed the models more times on the average than the video-phone feedback
TABLE 18
AVERAGE VIEWING TIMES FOR THE INSTRUCTIONAL MODELS
BY EACH OF THE THREE TREATMENT GROUPS

<table>
<thead>
<tr>
<th>Instructional Model</th>
<th>Times Viewed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Video-</td>
</tr>
<tr>
<td></td>
<td>Phone Group</td>
</tr>
<tr>
<td>Introducing a Lesson</td>
<td>1.4</td>
</tr>
<tr>
<td>Questioning</td>
<td>1.6</td>
</tr>
<tr>
<td>Demonstrating a Manipulative Skill</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Item # 2: Did you feel that the instructional models helped you to learn the following teaching skills? (Circle yes or no and comment)

a. Introduce a lesson yes no Why or Why Not?
   b. Questioning yes no Why or Why Not?
   c. Demonstrating a Manipulative Skill yes no Why or Why Not?

All thirty-six of the participants indicated that the instructional model on introducing a lesson helped them to learn the skill. Thirty-three indicated that the instructional model on questioning helped them. Three participants felt the questioning model was of no help to them. Thirty-two of the participants indicated that the instructional model on demonstrating a manipulative skill helped them to learn the skill. Four indicated that the demonstration
model was of no benefit in helping them to learn this skill.

The comments given by the participants in regard to why the models were helpful were very similar. Most of the participants indicated that the models provided a means by which they could see and hear how to perform each of the teaching skills. From the participants who indicated that the models had not helped them, the main complaint was that the videotape playback quality was poor.

Representative examples of the comments made in respect to the helpfulness of the instructional models are as follows.

1. Instructional model on introducing a lesson
   "Showed me what to do."
   "The condensation of points to look for is helpful."
   "Seeing examples help."
   "Helped me to evaluate my teaching habits."

2. Instructional model on questioning
   "I learned some techniques for stimulating students' interest."
   "Showed how to do it."
   "It showed me the importance of getting the students to take part in the lesson."
   "Gave some good tips."

3. Instructional model on demonstrating a manipulative skill
"It's easy to copy a model"

"Taught me to explain what I was doing."

"Showed a logical step by step method of demonstrating."

"Made it easier for me to critique myself."

Representative examples of the negative comments were as follows.

"I was confused by the model."

"Film was bad."

**Item # 3: Did the illustration models (illustrations of one teacher demonstrating the teaching skill) help you to improve your performance on the reteach sessions? (Circle yes or no by each skill and comment)**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Yes</th>
<th>No</th>
<th>Why or Why Not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Introduce a lesson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Questioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Demonstrating a Manipulative Skill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thirty-two participants indicated that the illustration models on introducing a lesson were helpful. Four participants felt that the models were not helpful. Thirty-one participants indicated that the illustration models for the skill of questioning and demonstrating a manipulative skill were helpful. Five participants indicated that illustration models for these two skills were not helpful.

The majority of the participants indicated that the illustration models helped them by providing further reinforcement. The participants that indicated the models were not helpful emphasized the idea that the models were
repetitious and that the recording quality was poor. Some representative examples of the positive comments given by the participants are shown below:

"I was able to compare my teaching to the model."

"It always helps to see examples of points in question."

"They helped me because sometimes I didn't understand the explanation, but when I saw it in the actual situation I could readily see what you were after."

"Made me more aware of the things I was doing wrong."

"They served as a review."

Some representative examples of the comments given by the participants who indicated that the illustration models were not helpful are given below.

"Most of these were poor quality."

"I was helped more by the critique."

"They were too repetitious."

Item # 4: Did you feel that this in-service teacher education program helped you to improve your classroom teaching performance? (yes or no)

____________________ if yes, what teaching skill(s) was/were improved?

Thirty-five of the thirty-six participants indicated that the in-service program had helped them to improve their classroom teaching performance. The one negative response given was from a participant who felt that the theory of teaching was emphasized too much.
The reactions of teachers from the three different treatment groups were similar. Most of the teachers felt that they had improved their teaching performance on the three skills studied and that their ability to prepare and organize a lesson had been improved.

Representative examples of the comments made by teachers who received video-phone feedback are

"All phases of my teaching was improved. I did not have knowledge of what was expected, now I hope to give much better lessons."

"Introducing a lesson seemed to help me more than the other two."

"My entire lesson plans -- preparation and especially my presentation was improved."

Representative examples of comments from the teachers who received video-mail feedback are

"My abilities to prepare a lesson were greatly increased because I could re-evaluate my lesson each time I viewed it."

"I feel I was benefited by each skill studied."

"Made me aware of the need for more student involvement and brought mannerisms to my attention."

Representative examples from the teachers who received video-self-evaluation feedback are

"I learned how to speak more clearly to students and to demonstrate better."

"It showed me where I was not too clear on my presentation and questioning."

"All three skills studied were improved and I had a feeling of improved student learning at the completion of the program."
Item #5: What do you consider the main advantages and disadvantages of the method of remote teacher education in which you were involved?

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<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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In summarizing the reactions of the participants to this item, examples of the comments received from each treatment group will be given. Next, a summary of the advantages and disadvantages as indicated by each treatment group will be presented.

Some comments given by the teachers in the video-phone feedback group in regard to the advantages of having video-phone feedback on their teaching performances were

"I could get expert reaction to my teaching."

"Being able to explain and comment to the teacher educator and grow from verbal interchange."

"Allows you to see yourself as others see you."

Some of the disadvantages given by teachers in the video-phone feedback group were

"Personal contact with the teacher educator is lost."

"Sometimes had to wait a long time between sessions."

Some of the advantages given by the teachers receiving video-mail feedback were

"Convenience. I would not have had time to drive 100 miles to take the course."

"Scheduling. A lot of the work in the course was on flexible scheduling which helped."
"Chance to reteach and correct errors. Also an opportunity to see yourself as others see you."

Some of the disadvantages given by the teachers in the video-mail feedback group were:

"The main disadvantage was the personal question-answer discussion of the classroom was absent."

"Time lapse in finding out teacher-trainer's reply."

The teachers who received video-self-evaluation feedback gave advantages such as the following for their method of remote teacher education:

"You can see what you are doing and also where you can make improvements."

"Opportunity to practice self-improvement in my own classroom at my convenience."

"Could take it at opportune moments, could review if necessary and I didn't have to travel."

Some of the disadvantages of the video-self-evaluation technique were identified as:

"I couldn't ask questions."

"I didn't know during the course if I was doing it right or wrong."

"At times I didn't know exactly what I was suppose to be doing."

In summary the main advantages given by the teachers for the remote techniques used were:

1. The teachers who received video-phone feedback emphasized the advantage of having the opportunity to discuss their teaching performances with the teacher educator.
2. The teachers who received video-mail feedback emphasized the advantages of being able to work out a flexible schedule for completing the teaching sessions and also being able to get some feedback from the teacher educator.

3. The teachers who received video-self-evaluation feedback indicated that the main advantage of their remote technique was being able to work on self-improvement at a time convenient to them.

A summary of the disadvantages given by the participants indicated the following:

1. The video-phone technique had the disadvantage of teachers not being able to make personal, face to face contacts with the teacher educator.

2. The video-mail technique lacked immediate feedback from the teacher educator and required more use of the videotape equipment.

3. The video-self-evaluation technique failed to provide any means for teachers to ask questions and get answers.

Item # 6: If you were involved in this type of program again, what would be your suggestions for improving the method of remote teacher education in which you were involved?

Some of the suggestions given by the teachers who received video-phone feedback were
"More and longer critique sessions are needed."

"More sessions to help with formed habits that are not visible to a teacher as he or she is teaching."

"The program worked well only small details of little importance could be changed."

The teachers who received video-mail feedback gave such suggestions as:

"I believe I would improve this course by trying to get a critique to my students in person after every lesson. I would do this because I found myself sometimes shooting in the dark or wondering what I had done wrong and how I should correct it."

"None of it. I feel I received more from this class than any other educational class I have taken."

"Make lesson a little longer."

Some of the suggestions given by the teachers who received video-self-evaluation feedback were:

"I was on self-critique and I think that at least one time during the class the instructor should let the student know if he was being too critical of himself or too lenient with himself.

"Need more contact with the supervisor of the program."

"This program would be very nice, providing we had just a little more time."

A summary of the suggestions given by each treatment group is as follows:

1. The teachers who received video-phone feedback indicated that more training sessions and more detailed critiques by the teacher educator were needed.
2. The teachers who received video-mail feedback indicated that the time limit on the length of the lesson should be increased and that the teacher educator's critiques should be sent out faster.

3. The teachers who received video-self-evaluation feedback indicated that they needed feedback from the teacher educator to verify if their self-critiques were accurate.

Item # 7: Would you be willing to participate in another similar in-service training program on additional teaching skills:
(Please circle yes or no)

All thirty-six of the participants indicated that they would be willing to participate in another similar in-service program.

Discussion of the Findings

All of the five research hypotheses developed for this experiment were rejected as indicated by the findings in this chapter. Because of this result, it seems appropriate for the investigator to inject his ideas of why the data did not support the research hypotheses.

In considering why there were no statistically significant differences among the three groups on teaching performance, the following points should be noted.
1. Teachers in all treatment groups had an opportunity to view instructional and illustration models on each teaching skill.

2. All participants had the opportunity to critique themselves using a self-critique form.

3. A comparison of the average number of viewing times on the instructional models (see Table 18) showed that the video-self-evaluation group viewed the model slightly more than the other two treatment groups.

4. Although teachers in each group increased their posttest scores over their pretest scores, no group was able to score over one-half the maximum possible score on any skill. Means for each treatment group were shown in Tables 15, 16, and 17.

5. Teachers only taught two teaching sessions for each skill.

When the above five points are considered, it can be rationalized that in a short in-service training program such as was the case in this study, teacher education feedback would not have had much effect. Since the teachers only had an opportunity to teach two lessons the feedback on these two lessons would have done little more than confirm what the teachers could tell from their own
critiques. This idea is supported by the finding of King\(^1\) who found that on a student's first lesson, the student could identify his own weaknesses as well as an expert.

Another important point is the fact that the video-self-evaluation group viewed the instructional models on the average more than the other two groups. This factor could possibly have offset the advantage of the other two groups having teacher educator feedback on their lessons.

In considering why there were no statistically significant differences in the levels of expressed satisfaction with the technique used, the following points should be analyzed:

1. The teachers enrolled in this in-service program had had little opportunity to learn what was expected of them in regard to effective teaching. Therefore, they were impressed with the videotaped instructional and illustration model which demonstrated some effective teaching behaviors.

2. The summary of the comments of the teachers from all treatment groups indicated that for the first time they felt that they were given some idea of how to evaluate their teaching.

\(^1\)Robert P. King, "The Use of an Expert's Critique Before a Student Teacher Watches a Video Recording of His Practice Teaching Lesson," Educational Broadcasting Review, II (February, 1968), 60-61.
Because of the above two points, it is understandable that the mean satisfaction ratings for each group were similar. Although the teachers in the video-self-evaluation group did not express as high a level as the ones in the other two groups; they indicated that they were satisfied with the improvement in their teaching performance.

**Summary**

The null forms of the five research hypotheses identified for this study were tested at the .05 level of significance. For the first four hypotheses which were used to assess the accomplishment of the first objective of the study, one-way analysis of covariance tests were run on the teaching skill performance scores. A single classification analysis of variance was used to test the fifth hypothesis which was designed to determine the accomplishment of objective two. In addition to the testing of the five hypotheses, a paired t-test was run to assess the significant difference in the pretest and posttest teaching performance scores for each treatment group. The participants' reactions to the remote techniques were also collected to assess the feasibility of the use of each remote technique.

The major findings were
1. No statistically significant differences were found among the video-phone feedback group, the video-mail feedback group, and the video-self-evaluation group in regard to teaching performance on the composite of the three teaching skills or on any single teaching skill.

2. No statistically significant differences were found among the three treatment groups on the participants’ expressed level of satisfaction with the technique used.

3. The paired t-tests between the pretest and posttest scores for the teaching performance on the composite of the three teaching skills revealed that all three treatment groups made improvement of posttest scores over pretest beyond the .01 level of significance.

4. When the pair t-tests were run between the pretest and posttest scores for each teaching skill, it was found that the teachers who received video-phone feedback significantly improved their performance on the skills of introducing a lesson and on demonstrating a manipulative skill. The teachers in the video-mail feedback group
significantly improved on only the skill of demonstrating a manipulative skill while the video-self-evaluation group improved their performance significantly on all three skills.

5. The reactions of the participants to a questionnaire indicated that the majority believed that the instructional and illustration models were helpful in directing their learning experiences. In addition, the video-self-evaluation group viewed the instructional models more on the average than the other two groups.

6. The teachers from each treatment group identified specific advantages and disadvantages of the remote technique they had used.

Since no statistically significant differences were shown, a discussion of why these results had occurred was given. It appeared that since all groups had had the opportunity to view instructional and illustration models and to critique themselves, in the short time period of the in-service program, the feedback given by the teacher educator had little effect on what the teachers learned.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In this chapter, a summary of the study is presented and conclusions based on the findings are given. In addition, recommendations for further research and for improvements in the remote techniques are presented.

Summary

In this section a review of the purpose, objectives, and the research hypotheses developed for the study are presented. In addition, a brief review of the need for the study and a discussion of the methodology used are presented. The major findings of the study are reviewed also.

Purpose of the Study

The purpose of this study was to assess the use of remote techniques of in-service teacher education on selected teaching skills for beginning vocational-technical teachers in the State of Colorado.

Objectives

The following specific objectives were identified to give directions to the study.
1. To assess the effectiveness of the video-phone feedback, video-mail feedback, and video-self-evaluation techniques of remote teacher education in regard to improvement in teaching performance on three selected teaching skills.

2. To determine from among the three treatment groups, the level of expressed teacher satisfaction for each of the remote techniques of teacher education.

3. To determine the feasibility of the use of remote techniques for in-service teacher education.

Research Hypotheses

From the theoretical base developed for this study the following research hypotheses were determined:

1. Measured performance on:
   \((H_1)\) the composite of the following three teaching skills--and the skills separately,
   \((H_2)\) introducing a lesson,
   \((H_3)\) questioning,
   \((H_4)\) demonstrating a manipulative skill--will be greater for the teachers receiving video-phone feedback than for the teachers receiving video-mail feedback, which in turn,
will be greater than for the teachers receiving video-self-evaluation feedback.

2. \(H_5\) Teachers receiving either video-phone feedback or video-mail feedback will be more satisfied with the remote in-service teacher education program than those receiving video-self-evaluation feedback.

**Need for the Study**

Because of the incalculable worth of the product of vocational-technical education—the student—every conceivable means must be utilized to insure that educational methodology contributes to the development of that product. It is believed that artful teachers who employ the most modern techniques and procedures of teaching can make a definite contribution to the development of the student. But if the teacher is to be able to use modern techniques, it becomes essential that he receive an adequate program of teacher education.

Unlike the majority of general education teachers who obtain their subject matter competency through formal education, many teachers of vocational and technical education acquire their subject matter competency through industrial experience. In addition, the teacher education pattern for vocational-technical teachers from the areas
of trade and industrial education, health occupations education, and technical education has been limited typically to a pre-service workshop followed by an in-service education program. The pre-service workshops vary from three days to eight weeks in length and usually are given during the summer before the new teachers begin teaching in the fall. The in-service programs vary greatly from state to state and generally are provided for the first four years after a new teacher is hired.

Because of the uniqueness of the background preparation of the vocational-technical teacher that was discussed above, it is apparent that many difficulties are experienced in providing effective teacher education for the beginning teacher. The beginning teachers are necessarily placed in schools where they are needed most, thus, great distances usually exist between the various locations of the teachers. Therefore, it is difficult to maintain an in-service teacher education program which can serve these teachers effectively.

The application of micro-teaching through in-service education shows promise for helping beginning vocational-technical teachers learn pedagogical skills, but because of the obstacles of distance and terrain in the mountainous states of the western part of the United States, teacher
educators are handicapped in their efforts to provide effective in-service education programs. Remote techniques of teacher education show promise for spanning the obstacles of distance and terrain but very little research has been conducted to assess the feasibility of these techniques. Remote techniques such as instructional videotapes and tele-supervision have been tried but no experimental research has been conducted on the combination of these techniques.

In summary, the following points illustrated the urgent need for this study:

1. It is highly important that beginning vocational-technical teachers be given effective instruction in the methodology of teaching.

2. Micro-teaching combined with remote techniques of teacher education shows promise for increasing the effectiveness of the in-service teacher education program in Colorado and is not now being utilized.

3. No evidence of previous experimental research on the use of combinations of remote teacher education techniques has been found.

Methodology

Fifty-seven beginning teachers from the service
areas of health occupations education, trade and industrial education and technical education in Colorado comprised the population of this study. From this population, a sample of thirty-nine teachers were randomly selected and assigned to one of three treatment groups (video-phone feedback, video-mail feedback, and video-self-evaluation feedback) of thirteen teachers each.

The experimental design selected for the study was The Pretest-Posttest Control Group Design. The pretesting of all participants was completed during the first week of April, 1969. The experiment began the following week when the instructional model on the teaching skill of introducing a lesson and nine illustration models (three on each of the three skills) were mailed to all participants. Upon receiving the instructional model each teacher was instructed by written instructions to view the model, as many times as necessary to learn the skill of introducing a lesson. Then, each teacher was instructed to plan and teach a five-minute lesson to four students. This micro-teaching session was videotaped and the recording was replayed and critiqued by the teacher. Each teacher mailed his videotaped lesson and his critique form to the teacher educator.
Upon receiving the videotaped lesson of a teacher assigned to treatment number one, instructional model with video-phone feedback, the teacher educator critiqued the videotaped teaching performance on the skill of introducing a lesson. He identified an appropriate illustration model to help the teacher improve and mailed the teacher's tape back. The teacher educator contacted the teacher by telephone and discussed the teaching session. After the telephone conference the teacher viewed the illustration model identified for him, then planned and retaught the same lesson.

When the teacher educator received the videotaped lesson of a teacher assigned to treatment number two, instructional model with video-mail feedback, he critiqued the lesson and recorded his comments on the tape following the teacher's taped session. In addition, he identified an appropriate illustration model to help the teacher improve and returned the tape to the teacher by mail. After receiving the tape the teacher viewed the teacher educator's comments and the illustration model, then planned and retaught the same lesson.

The teachers in treatment number three, instructional model with video-self-evaluation, presented their videotaped lessons to their local supervisors or if there
were no local supervisor at the school, it was mailed to the teacher educator. It was returned without being critiqued; this procedure insured the teachers in this group would also be held to a rigid time schedule. The teacher, upon receiving his tape, reviewed his own critique and the illustration models, then planned and retaught the same lesson.

One teacher educator served as instructor for all treatment groups and the teaching-reteaching cycle, as described in the preceding paragraphs, was repeated for three teaching skills, i.e., introducing a lesson, questioning, and demonstrating a manipulative skill. Two weeks of time were required for each teaching skill, but this time varied from three to five days because of delays in mail deliveries. At the end of the experiment which lasted eight weeks, posttests were made of the thirty-six participants who had completed the program. One participant from each treatment group had failed to complete the entire program.

A panel composed of two experienced educators was used for rating the teaching performance on all pretests and posttests. The panel was given a six-hour orientation on how to use the rating instrument to evaluate each of the three skills. This training was given to obtain high rater reliability.
A satisfaction scale was administered to each participant to attain his expressed level of satisfaction with the remote teacher education technique to which he was exposed. In addition, a reaction questionnaire was used to obtain the reactions of the participants in regard to the strengths and weaknesses of the remote techniques.

Findings

The null forms of the five research hypotheses identified for this study were tested at the .05 level of significance. For the first four hypotheses which were concerned with testing the effectiveness of the three remote techniques in regard to teacher performance, one-way analysis of covariance tests were computed. The teaching performance pretest scores were used as the covariate in all four tests. A single-classification analysis of variance was used to test the hypothesis which was concerned with differences in the level of expressed teacher satisfaction among the treatment groups. In addition to the testing of the five hypotheses, a paired t-test was computed to assess the significant difference in the pretest and posttest teaching performance scores for each treatment group. The reactions of participants to the remote techniques were also collected to assess the
feasibility of the use of each remote technique.

The major findings were:

1. No statistically significant differences were found among the video-phone feedback group, the video-mail feedback group, and the video-self-evaluation group in regard to teaching performance on the composite of the three teaching skills or on any single teaching skill.

2. No statistically significant differences were found among the three treatment groups on the participants' expressed level of satisfaction with the technique used.

3. The paired t-tests between the pretest and posttest scores for the teaching performance on the composite of the three teaching skills revealed that all three treatment groups made improvement of posttest scores over pretest beyond the .01 level of significance.

4. When the paired t-tests were computed between the pretest and posttest scores for each teaching skill, it was found that the teachers who received video-phone feedback significantly improved their performance on the skills of introducing a lesson and on demonstrating a
manipulative skill. The teachers in the video-mail group significantly improved on the skill of demonstrating a manipulative skill while the video-self-evaluation group improved their performance significantly on all three skills.

5. The reactions of the participants to a questionnaire indicated that the majority believed the instructional and the illustration models were helpful in directing their learning experiences.

Conclusions

The following conclusions were drawn from the findings of the study:

1. Remote feedback on teaching performance from the teacher educator via mailed videotaped comments or via telephone has no more effect on improving a teacher's performance on selected teaching skills than the feedback a teacher gets from viewing models, and viewing and critiquing his own videotaped lesson.

2. Teacher satisfaction with the remote techniques consisting of: (1) instructional model with video-phone feedback, (2) instructional model with video-mail feedback, and (3) instructional
model with video-self-evaluation feedback is not dependent upon the type of feedback each group receives.

3. The use of remote techniques in an in-service program on teaching skills is feasible and does help beginning teachers analyze and change their teaching behavior during teaching performances.

Since the investigator is unaware of any other research study which utilized the combination of remote techniques used in this one, the conclusions cannot be compared with others. In summary, there were no statistically significant differences in teacher performances or in teacher satisfaction with the different techniques; however, the majority of the teachers in the three treatment groups did improve their teaching performances significantly and they also felt that the program was helpful.

**Recommendations**

The main recommendation that can be made based on the conclusions of this study is for a continuation of the use of the remote techniques in the in-service program in Colorado. In continuing to use the remote techniques the teacher educator should select the techniques he
believes to be most appropriate for a given application. In addition to this main recommendation, two other types of recommendations were considered for inclusion in this section. They are recommendations for additional research and recommendations for improving the remote techniques used.

Further Research

In regard to further research it is recommended that:

1. Six months after the completion of the experiment, a follow-up study should be conducted to determine if there are any differences in the ability of the teachers in the three treatment groups to retain their posttest level of teaching performance on the three teaching skills.

2. A research study similar to the current study should be conducted over a period of at least six months, include a larger sample from a larger population, at least four teaching sessions per skill and compare the treatment groups' performances to a true control group. Since this present study was conducted over a short time period and the teachers had the opportunity to teach only two sessions for each skill there is a need to see if the findings of this study
will hold up over a longer period of time with a larger sample. Moreover, there is a need to compare the treatments to a true control group which receives only the traditional workshop experience.

3. Research should be conducted to measure the transfer of the use of the teaching skills to the normal classroom situation.

Needed Improvements in the Remote Techniques

Two basic types of improvements should be made in the remote techniques used in this study. Both of these improvements are concerned with the preparation of the materials used. The quality of the reproduced videotapes used for instructional models should be improved by using correctly adjusted videotape recording equipment. In addition, to maintaining quality reproduction of instructional model tapes, complete instructional booklets for the use of the instructional models should be prepared and sent to each participant. The mimeographed materials used in this study were not as useful as they could have been since the teachers did not always receive them in an organized form.
The introduction phase of a lesson "sets the stage" for student participation in the activity which is to follow. The introduction should help inspire the student to want to accomplish the objective of the lesson.

The following items will be used to evaluate the teacher's introduction. If the teacher did not accomplish an item, only mark "Did Not Accomplish." If he did accomplish the item, mark the box which describes how well he "Accomplished" the item.

1. State specifically what the objective/s of the lesson were in terms of student behavior? (For example: Did the teacher tell the student that he would be able to do things, such as bend, adjust, etc.?)

2. State why the objective/s were important in terms of student needs? (For example: Did the teacher state that the objective was important for the student to learn because of safety reasons, a future job, etc.?)
3. State how the student would proceed in accomplishing the objective/s of the lesson? (For example: Did the teacher state what the student was to do in order to learn the objectives of the lesson? Examples are: Read certain material, practice using certain tools, etc.)

4. Relate the lesson to student's prior knowledge of experience? (For example: Did the teacher motivate the student by examples, illustrations, questions, or stories related to his background?)

5. React favorably toward student questions, answers, and comments? (For example: Did the teacher listen, pay attention, respond agreeably, etc.?)

6. Provide opportunity for student response and participation? (For example: Did the teacher allow the student to ask questions, make comments, or enter into class activities?)
7. State how the student would know when he had achieved the objective/s of the lesson?  

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8. Express enthusiasm in the lesson?  
(For example: Did the teacher use speech and physical gestures to enthuse students?)  

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9. Use instructional aids?  
(For example: Did the teacher use real items, models, chalkboard, charts, etc.?)  

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Form developed by the Staff of Project 44, Assessment of Microteaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio and adapted for use by (Department of Vocational Education, Colorado State University, Fort Collins, Colorado.)
CRITIQUE FORM

QUESTIONING

A question is an act or instance of asking. Questioning by the teacher promotes directed mental activity on the part of the student by providing opportunity for the student to be actively involved in the lesson. The question may be stated in words or may be simply an inquisitive facial expression or gesture. It requires some type of response on the part of the student: stating a fact; recalling a selected thought; making a comparison of two things; making a judgement; analyzing an attitude or appreciation; or, directing thought.

The effective use of questioning by the teacher increases student freedom of action, affords him more opportunities to express ideas, and makes him less dependent on the teacher.

The following items will be used to evaluate the teacher's questioning. If the teacher did not accomplish the item, only mark "Did Not Accomplish." If he did accomplish the item, mark the box which describes how well he "Accomplished" the item.

Did the teacher in the Lesson:

1. Use questions to draw information from the students?

2. Ask a question, pause to give the students time to think about the question, and then call on a student?

3. After calling on a student, provide an opportunity for that student to think about the question before requiring his response? (Before answering the question himself or calling on someone else.)
4. Present the questions in an orderly sequence?

5. Control himself from repeating student responses? (For example: Did the teacher have the student repeat and clarify his response rather than repeating it himself?)

6. Direct his questions so that each student was able to participate?

7. React favorably toward the students' answers to questions? (For example: Did the teacher give attention and consideration to the students' answers?)

8. Ask questions which required more than "yes" and "no" answers? (For example: Did the teacher ask questions which required the student to apply ideas, principles, or facts to new situations?)

9. Ask questions which the student could answer from past experience?

10. Ask questions which were clear and short enough to remember?

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11. Require the student to go beyond his first answers? (For example: Did the teacher encourage the student to expand on idea, or back-up ideas with facts and illustrations.)

Form developed by the Staff of Project 44, Assessment of Microteaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio and adapted for use by (Department of Vocational Education, Colorado State University, Fort Collins, Colorado.)
CRITIQUE FORM
DEMONSTRATING A MANIPULATIVE SKILL

In helping the student learn an occupation, the teacher will be presenting new manipulative skills through a method of teaching known as the demonstration. If the teacher has given a good demonstration and the student has been a good observer and listener, the student should be ready to attempt to perform the manipulative skill safely and step-by-step.

The following items will be used to evaluate the teacher's demonstration. If the teacher did not accomplish the item, only mark "Did Not Accomplish." If the teacher did accomplish the item, mark the column which describes how well he "Accomplished" the item.

Did the Teacher in the Demonstration:

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<th>Item Description</th>
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<td>1. Have all equipment, tools and materials ready for use?</td>
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<td>2. Talk to the students and not to the tools or materials?</td>
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<td>3. Present each step of the procedure, task, skill or operation in the proper sequence?</td>
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<td>4. Briefly state what step is to be performed, how and why it is performed, then perform it?</td>
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<td>Did Not Accomplish</td>
<td>0</td>
<td>Very Poor</td>
<td>1</td>
<td>Poor</td>
<td>2</td>
<td>Average</td>
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5. Position himself and the students so that each step was easily seen (using visual aids to make clear any step that could not be clearly demonstrated)? □ □ □ □ □ □

6. Present only one method of doing the operation giving only key points of information necessary to complete the task safely and efficiently? (or did the teacher present two or more methods.) □ □ □ □ □ □

7. Perform the manipulative skill with ease? □ □ □ □ □ □

Form developed by the Staff of Project 44, Assessment of Microteaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio and adapted for use by (Department of Vocational Education, Colorado State University, Fort Collins, Colorado.)
APPENDIX B
The purpose of this Satisfaction Scale is to allow you to rate statements which best describe your feelings of satisfaction and/or dissatisfaction with the method of remote teacher education in which you were involved.

**DIRECTIONS**

When completing the Satisfaction Scale, think in terms of the method of remote teacher education in which you were involved. You are to rate the statements on a nine (9) point scale; circle the number 9 for those statements with which you strongly agree with respect to the method of remote teacher education in which you were involved; circle 1 for those statements with which you strongly disagree with respect to the method, or any number in between which you think describes your degree of agreement.

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<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Relatively Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
<td></td>
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Circle the number which best describes your rating for each statement in the column on the right as shown in the example below.

**EXAMPLE:** The method of remote teacher education in which I was involved:

helped me get a salary increase.  

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<tr>
<th>1</th>
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<th>6</th>
<th>7</th>
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<th>9</th>
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</table>
SATISFACTION SCALE

1. The method of remote teacher education in which I was involved: helped me to look at my classroom teaching as others see my teaching. 1 2 3 4 5 6 7 8 9

2. The method of remote teacher education in which I was involved: caused me to be unsure during the first few weeks. 1 2 3 4 5 6 7 8 9

3. The method of remote teacher education in which I was involved: encouraged me to do my best work. 1 2 3 4 5 6 7 8 9

4. The method of remote teacher education in which I was involved: helped me to use approved methods in my classroom teaching. 1 2 3 4 5 6 7 8 9

5. The method of remote teacher education in which I was involved: provided enough instruction from the teacher educator. 1 2 3 4 5 6 7 8 9

6. The method of remote teacher education in which I was involved: was an unsatisfactory method of teacher education for my particular situation. 1 2 3 4 5 6 7 8 9

7. The method of remote teacher education in which I was involved: was directed toward identifying my weaknesses. 1 2 3 4 5 6 7 8 9

8. The method of remote teacher education in which I was involved: developed a friendly working relationship between the teacher educator and myself. 1 2 3 4 5 6 7 8 9

9. The method of remote teacher education in which I was involved: encouraged me to work on self-improvement of my teaching. 1 2 3 4 5 6 7 8 9
10. The method of remote teacher education in which I was involved: left me in doubt about what was expected of me.

11. The method of remote teacher education in which I was involved: allowed for private communication between myself and the teacher educator.

12. The method of remote teacher education in which I was involved: left me unsure even during the last few weeks.

13. The method of remote teacher education in which I was involved: allowed me to receive instructions at a time convenient to me.

14. The method of remote teacher education in which I was involved: helped me to see my teaching problems more clearly.

15. The method of remote teacher education in which I was involved: helped me to feel more successful with each teaching session.

16. The method of remote teacher education in which I was involved: limited the teacher educator from seeing my real ability to teach.

17. The method of remote teacher education in which I was involved: included information with which I did not agree.

18. The method of remote teacher education in which I was involved: required too much preparation for the benefits I received.
19. The method of remote teacher education in which I was involved: required more of my time than was necessary.

20. The method of remote teacher education in which I was involved: helped me to identify the good and bad points of my teaching.

21. The method of remote teacher education in which I was involved: needed more communication between the teacher educator and myself.

22. The method of remote teacher education in which I was involved: did not make maximum use of my own contribution for improving my teaching performance.

23. The method of remote teacher education in which I was involved: was a frustrating procedure for me.

24. The method of remote teacher education in which I was involved: made me more aware of the variety of help that I can obtain from the university.

25. The method of remote teacher education in which I was involved: limited my use of the various approaches to teaching.

26. The method of remote teacher education in which I was involved: helped me to improve other parts of my teaching performance.

27. The method of remote teacher education in which I was involved: resulted in a superficial evaluation of my teaching performance.
28. The method of remote teacher education in which I was involved; was highly satisfying once working relations and procedures were established.

29. The method of remote teacher education in which I was involved: creates a tense atmosphere between my students and myself.

30. The method of remote teacher education in which I was involved: helped me to improve my teaching.

31. The method of remote teacher education in which I was involved: improved my relationship with my fellow teachers.

32. The method of remote teacher education in which I was involved: created problems between my immediate supervisor and myself.

Instrument developed by the Staff of Project 44, Assessment of Microteaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio and adapted for use by (Department of Vocational Education, Colorado State University, Ft. Collins, Colorado.)
APPENDIX C
TEACHER INFORMATION

The purpose of this information sheet is to obtain a profile of characteristics of teachers involved in the remote in-service education program. Your individual characteristics will not be connected with your name or your school. They will be used only as data for a group profile.

1. Indicate your AGE: (to nearest year) ______

2. Indicate your TEACHING EXPERIENCE: (to nearest year)
   ______ Vocational Teaching experience in public or private school or college.
   ______ Industrial teaching experience.
   ______ Military teaching experience.
   ______ Other teaching experience (specify) ______

3. Indicate your total years of OCCUPATIONAL EXPERIENCE:
   ______ (to nearest year)

4. Circle the number indicating your completed number of years of FORMAL EDUCATION:
   8 9 10 11 12 13 14 15 16 17+

5. Indicate approximate number of college credit hours of TEACHER TRAINING you have received:
   ______ Quarter hours
   ______ Semester hours
REACTION QUESTIONNAIRE

Your help is needed in revising the procedures and materials used in this in-service teacher education program. Please answer the following questions.

1. How many times did you view the following instructional models?
   a. How to introduce a lesson Times
   b. How to use questioning
   c. How to demonstrate a manipulative skill

2. Did you feel that the instructional models helped you to learn the following teaching skills? (Circle yes or no and comment.)
   a. Introduce a lesson yes no
      Why or Why Not?
   b. Questioning yes no
   c. Demonstrate a manipulative skill

3. Did the illustration models (illustrations of one teacher demonstrating the teaching skill) help you to improve your performance on the reteach sessions? (Circle yes or no by each)
   a. Introduce a lesson yes no
      Why or Why not?
b. Questioning  

__________________________  yes  no  

__________________________

c. Demonstrate a manipulative skill  

__________________________  yes  no  

__________________________

4. Did you feel that this in-service teacher education program helped you to improve your classroom teaching performance?  

__________________________ (yes or no)  

If yes, what teaching skill(s) was/were improved?

5. What do you consider the main advantages and disadvantages of the method of remote teacher education in which you were involved?

Advantages

a.  

b.  

c.  

d.  

e.  

Disadvantages

a.  

b.  

c.  

d.  

e.  

6. If you were involved in this type of program again, what would be your suggestions for improving the method of remote teacher education in which you were involved?
7. Would you be willing to participate in another similar in-service training program on additional teaching skills? Please circle:
Yes   No
INSTRUCTIONAL MODEL: INTRODUCTION

This presentation is designed to help you learn the teaching skill of how to introduce a lesson. The skill of introducing a lesson consists of the pre-instructional procedures that a teacher carries out prior to actual instruction. The introduction sets the stage for student participation in the activities that are to follow and it should help inspire the students to want to accomplish the objectives of the lesson.

At this time, look at the green introduction critique form that you have been given. You will observe that eleven teacher behaviors have been identified. When you plan and teach a lesson you will be expected to include as many of these as possible to properly introduce your lesson.

In order for you to understand how to introduce a lesson, I will explain each of the items on the critique form and show you an illustration of how each can be accomplished.

Item number one: Did you state specifically what the objective/s of the lesson were in terms of the student's behavior? For example: Did you tell the student that the objective/s of this lesson was for him to be able to bend, adjust, shape, test, solve, construct, contrast, or, etc.?

Let's look at a film. Notice how this teacher
accomplishes this first item.

(Show videotape segment #1)

Let's next consider both items two and three. Item number two: Did you state why the objective/s were important in terms of the students' needs? For example: Did you state that the objectives were important for the student to learn because of safety reasons, a future job, greater skill development, etc.?

Item number three: Did you state how the student would proceed in accomplishing the objective/s of the lesson? For example: Did you state what the student was to do in order to learn the objectives of the lesson? Examples are: read certain material, practice using certain tools, solve certain problems, etc.?

In the next film segment items two and three are illustrated. Observe the teacher involving the students by having them explain the importance of learning the skill and then telling them how they should proceed in accomplishing the objective.

(Videotape segment #2)

Item number four: Did you give the students sufficient information concerning the lesson so that he could interpret the objectives in his own terms? For example: Did the student indicate that he understood the purpose of the lesson?
Let's take a look at an illustration of a teacher demonstrating this item.

(Videotape segment #3)

Item number five: Did you relate the lesson to the student's prior knowledge or experience? For example: Did you motivate the students by examples, illustrations, questions, or stories related to his background?

Let's see how one teacher relates the lesson to the student's prior experience.

(Videotape segment #4)

Now let's consider items six and seven. Item number six: Did you react favorably to the students questions, answers, or comments? For example: Did you listen, pay attention, respond agreeably, etc.?

Item number seven: Did you provide opportunity for the student's response and participation? For example: Did you allow students to ask questions, make comments, or enter into class activities?

In the film segment illustrating items six and seven you will be able to observe how one teacher reacts favorably to his students questions. Also observe the participation of each student.

(Videotape segment #5)

Item number eight: Did you state how the student would know when he had achieved the objective/s of the
In the following film segment, the teacher verifies that the students know what they should be able to do when they have achieved the objectives of the lesson.

(Videotape segment #6)

Item number nine: Did you help the student to acquire an interest in the lesson? For example: Did the student show an interest in learning what was presented?

The following film segment will show one effective technique for stimulating student interest in a lesson.

(Videotape segment #7)

Item number ten: Did you express enthusiasm? For example: Did you use speech and physical gestures to enthuse the students?

Item number eleven: Did you use instructional aids to introduce the lesson? For example: Did you use the real items, models, chalkboard, charts, etc.?

The following film segment will show an enthusiastic teacher using both the chalkboard and actual examples of the items to promote interest in the lesson.

(Videotape segment #8)

You have now looked at an example showing how each item on the critique form could be performed. At this time, let's take a closer look at the critique form you are going to use to evaluate your own teaching.
When using this form, if you do not accomplish the item, you will check "Did Not Accomplish" in the first column opposite the item being evaluated. If you did accomplish the item, you will check the column which describes how well you "Accomplished" the item - Very Poor, Poor, Average, Good, or Excellent.

Now you will be shown an illustration of a complete introduction to a lesson which has been taken from a five minute lesson. After viewing this film you will be asked to evaluate each item on the critique form.

(Illustration model film)

At this time, would you please use the critique form to evaluate the introduction that you have just viewed. Then you will be able to compare your rating with the rating of a panel of teacher educators which will be presented next. Please stop the recorder while you evaluate the introduction you have just seen. "Don't cheat, Turn it off."

Critique

Compare your ratings with those of a panel of teacher educators.

Item number one was rated "Did Not Accomplish." The teacher did not state what the students were to learn.

Item number two was rated "Good." The teacher only emphasized the economics of learning the skill.
Item number three was rated "Good." The teacher indicated that the students were to learn a skill by practicing but she did not make this as clear as she could have.

Item number four was rated "Did Not Accomplish." The teacher did not give the student information in regard to the objectives of the lesson.

Item number five was rated "Excellent." The teacher did an excellent job of relating the lesson to the prior knowledge of the students.

Item number six was rated "Very Poor." The teacher did very little to involve the students and made only a small attempt to react to the one answer given.

Item number seven was rated "Very Poor." The teacher did not give the students sufficient opportunity to ask questions.

Item number eight was rated "Did Not Accomplish." The teacher failed to inform the students how they would know when they had achieved the objectives of the lesson.

Item number nine was rated "Good."

Item number ten was rated "Good." For most of the introduction the teacher was enthusiastic.

Item number eleven was rated "Excellent." The teacher made effective use of charts and of the students' hands.
Now it's your turn to perform. I want you to plan and teach a five minute lesson in which the introduction is emphasized. Do not plan your lesson to follow the sequence given on the critique form. The critique form is to be used as a rating instrument, not as a teaching guide.

You will be putting heavy emphasis on the skill of introduction in only two taped teaching sessions; however, you will be using it in the other four sessions. In addition, I encourage you to practice this skill continuously in your regular classroom teaching.

Remember, this instructional tape will not self-destruct in five seconds, so you may view it as many times as you wish.
NARRATION

INSTRUCTIONAL MODEL: QUESTIONING

This presentation is designed to help you learn the teaching skill of questioning. The skill of questioning allows a teacher to promote mental activity on the part of the student by providing the student an opportunity to be actively involved in the lesson. The effective use of questioning increases the student's freedom of action, gives the student an opportunity to express his ideas, and makes the student less dependent on the teacher.

At this time, look at the yellow questioning critique form that has been provided for you. You will observe that eleven teacher behaviors have been identified for the skill of questioning. When you plan and teach a lesson you will be expected to incorporate as many of these teacher behaviors as you think necessary to properly question your students concerning the subject that you are teaching.

In order for you to understand how to use the skill of questioning, I will explain each of the items on the critique form and will show you an illustration of how each can be accomplished.

Item number one: Did you use questions to draw information from the student?

You will now be shown a film segment which illustrates
how one teacher has accomplished this item.

(Show videotape segment #1)

Item number two: Did you ask a question, pause to
give the student time to think about the question, and
then call on a student?

Notice how the following teacher accomplishes this
item.

(Videotape segment #2)

Item number three: Did you, after calling on a
student, provide an opportunity for him to think about
the question before requiring a response? Did you do the
above before answering the question yourself or calling
on someone else?

Notice how the teacher in the following film seg­
ment gives the student an opportunity to think before
going on to another student.

(Videotape segment #3)

Item number four: Did you present the questions
in an order that made sense to the student? For example:
Did the student follow the line of thought without
getting lost?

In the following film segment notice how the teacher
asked the questions in a logical order.

(Videotape segment #4)
Item number five: Did you control yourself from repeating student responses? Did you have the student repeat and clarify his response rather than you repeating it?

When a teacher continuously repeats a student's answers, it can become annoying to students. Notice how the teacher in the following film segment emphasizes the student's answers without repeating them.

(Videotape segment #5)

Item number six: Did you direct your questions so that each student was able to participate?

In the film segment illustrating item six, you will observe how one teacher maintained balance of participation among his students.

(Videotape segment #6)

Item number seven: Did you react favorably toward the student's answers to questions? For example: Did you give attention and consideration to the student's answers?

An illustration of how one teacher accomplished this item will now be shown.

(Videotape segment #7)

Item number eight: Did you ask questions which required more than "yes" and "no" answers? For example: Did you ask questions which required the student to apply ideas,
principles, or facts to new situations?

In the following film segment you will observe how the teacher has carefully worded his questions so that students will be required to think before answering.

(Videotape segment #8)

Item number nine: Did you ask questions which the student could answer from past experience?

Item number ten: Did you ask questions which were clear and short enough to remember?

Observe how the following two teachers ask clear questions which are easily understood by students and can be answered from past experience.

(Videotape segment #9)

Item number eleven: Did you require the student to go beyond his first answers? For example: Did you encourage him to expand an idea, back up ideas with facts and illustrations or bring other students into the discussion by getting them to respond to the first student's answers?

(Videotape segment #10)

You have now looked at an example of how each item on the questioning critique form could be performed.

The questioning critique form will be used in the same manner as the introduction critique form was used.

At this time you will be shown an illustration of
the skill of questioning which has been taken from a five minute lesson. After viewing this film you will be asked to evaluate each item on the critique form.

(Illustration model)

At this time I would like for you to use the critique form in evaluating the questioning skill that you have just viewed. Then you will be able to compare your ratings with the ratings of a panel of teacher educators which will be presented next. Please stop the recorder at this time.

**Critique**

Compare your individual item ratings with the following ratings. Circle the answers that I give you.

Item number one was rated "Excellent." The teacher made effective use of questions in obtaining information from students.

Item number two was rated "Excellent." The teacher paused briefly after each question to give the students an opportunity to think.

Item number three was rated "Average." The teacher gave each student little opportunity to think before calling on another student.

Item number four was rated "Excellent." The teacher presented the questions in a logical order.
Item number five was rated "Average." The teacher did have a tendency to repeat student answers when there was no need for it.

Item number six was rated "Good." The teacher was successful in maintaining reasonable balance of participation among students.

Item number seven was rated "Average." The teacher attempted to give attention and consideration to each answer and was fairly successful in this endeavor.

Item number eight was rated "Good." The teacher used questions in almost all cases which required the students to apply ideas to new situations.

Item number nine was rated "Excellent." The teacher did an excellent job of asking questions which could be answered from the students' past experience.

Item number ten was rated "Good." The teacher asked questions that were clear and short most of the time.

Item number eleven was rated "Average." In a few instances the teacher asked questions that required the student to go beyond the first answer.

At this time would you please plan and teach a five minute lesson in which the questioning skill is emphasized.

You will be emphasizing this skill in only two videotaped teaching sessions to be sent to me but I
encourage you to practice this skill continuously in your regular classroom teaching.

Remember this tape will not self-destruct in five seconds, so you may review it as many times as you feel necessary to learn the skill. This is a learning situation for you, so practice your questioning skill at every opportunity.
This presentation is designed to aid you in learning the teaching skill of how to demonstrate a manipulative skill. A properly presented demonstration will aid you in informing students how to perform a manipulative skill safely and in a step by step manner.

At this time look at the blue demonstration critique form that you have been given. You will observe that seven teacher behaviors have been identified for this skill.

In order for you to understand how to demonstrate a manipulative skill, I will explain each of the items on the critique form and will show you an illustration of how each item can be accomplished.

Item number one: Did the teacher in the demonstration have all equipment, tools and materials ready for use?

You will now be shown a film segment which will show how one teacher accomplished this item.

(Show videotape segment #1)

Item number two: Did you talk to the students and not to the tools or materials? For example: Where you have a machine running, you must keep your attention on the machine, but you also can make the student feel he is receiving your attention.
Notice how the teacher in the following film segment demonstrates how this can be done.

(Videotape segment #2)

Item number three: Did you present each step of the procedure, task, skill, or operation in the proper sequence?

In the following illustration notice how orderly the steps are presented.

(Videotape segment #3)

Item number four: Did you briefly state what step is to be performed, how and why it is performed, then perform it?

The following illustration shows how a teacher has explained the step to be performed, then has proceeded to perform it.

(Videotape segment #4)

Item number five: Did you position yourself and the students so that each step was easily seen (using visual aids to make clear any step that could not be clearly demonstrated)?

Two methods will be shown for making arrangements so all students will be able to see the demonstration.

(Videotape segment #5)

Item number six: Did you present only one method of doing the operation giving only key points of information necessary to complete the task safely and efficiently?
(Or did you present two or more methods of giving additional information which confused the student?)

In the following illustration notice how the teacher emphasized only the correct method.

(Videotape segment #6)

Item number seven: Did you perform the manipulative skill with ease?

Notice how the following teacher accomplishes this item.

(Videotape segment #7)

You have now looked at an example of how each item on the demonstration critique form could be performed.

At this time you will be shown an illustration of the skill of demonstrating a manipulative skill which has been taken from a five minute lesson. After viewing this film you will be asked to evaluate each item on the critique form.

(Show illustration model)

At this time would you please evaluate the demonstration that you have just observed. You then will compare your ratings with the ratings of a panel of teacher educators which will be presented next. Please stop the recorder at this time.
Critique

Compare your individual item ratings with the following ratings.

Item number one was rated "Excellent." The teacher had all the materials ready for use when the demonstration started.

Item number two was rated "Poor." The teacher directed her attention mainly to her work; occasionally she looked over her shoulder at two students.

Item number three was rated "Good." The teacher presented each step in the proper sequence but the sequence was not completely clear.

Item number four was rated "Good." The teacher did an excellent job on this item except at one time she did complete the performance of the skill before she told the students what she was doing.

Item number five was rated "Excellent." The teacher did group the students so that they could see and follow her performance easily.

Item number six was rated "Excellent." The teacher used only one method of demonstrating the skill.

Item number seven was rated "Excellent." The teacher did an excellent job of performing the skill.

At this time would you please plan, teach and record on videotape, a five minute lesson in which the demonstra-
tion skill is emphasized.

You will be emphasizing the demonstration skill in only two videotaped sessions to be sent to me. However, I encourage you to practice this skill continuously in your regular classroom teaching.

Remember this tape will not self-destruct in five seconds, so you may review it as many times as you think necessary to learn the skill.
You have been selected to receive in-service teacher education using the Video-Phone Supervision Technique. In this technique the teacher educator (Dr. Ronald E. Glenn) will have conferences with you by phone and will observe your teaching by means of videotape playback.

In the next six weeks you will be practicing to improve your performance on the following teaching skills:

1. Introducing a Lesson
2. Questioning
3. Demonstrating a Manipulative Skill.

Now that you have been pretested you will be making six videotape recordings of lessons five minutes in length. In the first two of these lessons you will be working on the skill of Introducing a Lesson. In the next two lessons you will practice Questioning and during the two remaining lessons you will emphasize Demonstrating a Manipulative Skill. At the end of the six week period you will be tested on the three teaching skills. The pre-test and post-test lessons should be lessons on a manipulative skill. You will select the subject content to be taught.

You will receive an instructional tape and written instructions which will aid you in developing each of the teaching skills. Upon receiving the instructional tape
for a skill you will view the tape in order to learn the behaviors necessary to achieve the skill and to be able to evaluate the skill. After studying the instructional tape, you will plan and teach a complete five minute lesson in which you will devote a part to the specified skill. You will videotape the lesson. If you have questions or comments you can record them on the videotape following the lesson. You can then view your teach session and rate it using the critique form for the skill being practiced. You will then mail the critique form and the videotape to the teacher educator.

Upon receiving your videotape and critique form, the teacher educator will view the teach session and complete a critique form on your performance. Your tape and critique form will be mailed back to you. After you receive the videotape and critique form, the teacher educator will phone you for a conference. During the phone conference you and the teacher educator will discuss the strengths and weaknesses of your lesson in regard to the teaching skill being studied.

After the phone conference you will view an illustration model, which illustrates certain behaviors of a teaching skill. Then you will replan your lesson, incorporating the teacher educator's suggestions, and reteach the same lesson. For each teaching skill this teaching-
reteaching cycle will be repeated (see diagrams Video-Phone Supervision and Teaching-Reteaching Cycle).

TAPES

Videotapes for your use will be provided. You also will be reimbursed for the mailing costs of the tapes. You must, therefore, keep records of your expenses.

ADDITIONAL INFORMATION

With your first instructional tape, How To Introduce a Lesson, you will receive a packet of materials which will give you detailed procedures that are to be followed.
VIDEO-PHONE SUPERVISION

Pretest Teach #1 Teach #2 Teach #3 Teach #4 Teach #5 Teach #6
You will You will You will You will You will You will be Post-
make your re-teach re-teach re-teach re-teach re-teach re-tested
first tape teach a teach a teach a teach a
teaching lesson lesson lesson lesson
emphasizing which which which which
Introduc-
tion Skill

View Introduction Model View Questioning Model View Demonstration Model

TEACHING-RETEACHING CYCLE

You will view You will plan You will Teacher Educator Teacher Educator You will
the Instruc-
tional Model and teach a evaluate your will critique will critique view the
of the skill five minute teaching your lesson your lesson suggested
you are to session and then and mail the Illustration
perform evaluate your and mail the your lesson Illustration
the Instruc-
tional Model and mail the your lesson
of the skill Illustration
(lesson is and then Illustration
videotaped).
mail the tape
(lesson is
Include your
videotaped).
tape back to
Critique Form.)
tape back to
to the Teacher
you. Educator.

TEACH

RETEACH
You have been selected to receive in-service teacher education using the Video-Mail Supervision Technique. In this supervision arrangement the teacher educator (Dr. Ronald E. Glenn) will be conferring with you by mailed-video tape instructions and will be observing your teaching by means of videotape playback.

In the next six weeks you will be practicing to improve your performance on the following teaching skills:

1. Introducing a Lesson
2. Questioning
3. Demonstrating a Manipulative Skill

Now that you have been pretested, you will be making six videotape recordings of lessons five minutes in length. In the first two of these lessons you will be working on the skill of Introducing a Lesson. In the next two lessons you will practice Questioning and during the two remaining lessons you will emphasize Demonstrating a Manipulative Skill. At the end of the six week period you will be tested on the three teaching skills. The pre-test and post-test lessons should be lessons on a manipulative skill. You will select the subject content to be taught.

You will receive an instructional tape and written
instructions which will aid you in developing each of the teaching skills. Upon receiving the instructional tape for a skill you will view the tape in order to learn the behaviors necessary to achieve the skill and to be able to evaluate the skill. After studying the instructional tape, you will plan and teach a complete five minute lesson in which you will devote a part to the specified skill. The lesson will be videotaped. If you have questions or comments you can record them on the videotape following your lesson. You can then view your teach session and rate it using the critique form for the skill being practiced. You will then mail the critique form and the videotape to the teacher educator.

Upon receiving your videotape and critique form, the teacher educator will view the teach session and complete a critique form for it. He will record his comments on your tape and will return your tape and critique form by mail.

After viewing the teacher educator's comments, you will replan and reteach the same lesson. For each teaching skill this teaching-reteaching cycle will be repeated. (See diagrams on following page.)

TAPES

Videotapes for your use will be provided. You also
will be reimbursed for the mailing costs of the tapes. You must, therefore, keep records of your expenses.

ADDITIONAL INFORMATION

With your first instructional tape How to Introduce a Lesson you will receive a packet of materials which will give you detailed procedures that are to be followed.
VIDEO-MAIL SUPERVISION

Pretest Teach #1 Teach #2 Teach #3 Teach #4 Teach #5 Teach #6
On your You will You will You will You will You will You will
first tape reteach teach a reteach teach a reteach Teach #5
Emphasize Teach #1 which which which
Introduction Skill emphasizes emphasizescribes
View Introduction Model View Questioning Model View Demonstration Model

TEACHING-RETEACHING CYCLE ILLUSTRATION

You will view You will plan and You will evaluate Teacher Educator You will view
the instruc- teach a five min- your teaching ses- will critique the tape with
the tional model ute lesson prac- sion and then your lesson, re- the teacher the teacher
teaching skill ticing the mail the tape to ed- educator's educator's
(lesson is to be teaching skill teacher edu- educator's teaching skill
videotaped). (lesson is to be ucator (include form).)
your critique on the tape, and
model) mailing the tape
back to you.

TEACH

RETEACH
You have been selected to receive in-service teacher education using the Video-Self-Evaluation Technique. This technique requires you to make videotape recordings of your teaching and to critique these videotapes.

In the next six weeks you will be practicing to improve your performance on the following teaching skills:

1. Introducing a Lesson
2. Questioning
3. Demonstrating a Manipulative Skill

Now that you have been pretested, you will be making six videotape recordings of lessons five minutes in length. In the first two of these lessons you will be working on the skill of Introducing a Lesson. The next two lessons you will practice Questioning and during the two remaining lessons you will emphasize Demonstrating a Manipulative Skill. At the end of the six week period you will be tested on the three teaching skills. The pre-test and post-test lessons will be lessons on a manipulative skill. You will select the subject matter to be taught for all the lessons.

You will receive an instructional tape and written instruction which will aid you in developing each of the
teaching skills. Upon receiving the instructional tape on a specified skill you will view the tape in order to learn the behaviors necessary to achieve the skill and to evaluate the skill. After studying the instructional tape, you will plan and teach a complete five minute lesson in which you will devote a part to the specified skill. The lesson will be videotaped. If you have questions or comments, you can place them on the videotape following the lesson. You can then view your teach session and rate it using the critique form for the skill being practiced. You will then mail the critique form and the videotape to the teacher educator (Dr. Ronald E. Glenn).

After one week your videotape will be returned to you. After receiving your tape back you will review your teaching session and replan and reteach the same lesson. In addition you will view the illustration models that have been provided. You will incorporate any improvements that you feel are necessary. For each teaching skill this teaching-reteaching cycle will be repeated (see diagram on following page). You will receive feedback from the teacher educator at the end of the quarter.

**TAPES**

Videotapes for your use will be provided. You also
will be reimbursed for the mailing costs of the tapes. You must, therefore, keep records of your expenses.

**ADDITIONAL INFORMATION**

With your first instructional tape *How to Introduce a Lesson* you will receive a packet of materials which will give you detailed procedures that are to be followed.
VIDEO SELF-EVALUATION TECHNIQUE

Pretest
On your first tape you will reteach
emphasizing Introduction Skill

Teach #1
Teach #2
Teach #3
Teach #4
Teach #5
Teach #6
You will You will You will You will You will You will
/ / / / / / You will be
reteach reteach reteach reteach reteach post-
/ / / / / / tested

Teach #1 lesson
Teach #3 lesson
Teach #5 lesson

Introduction emphasizes
which

Skill

Question­­ing Skill

Demonstrating a Man­­ipulative Skill

You will be post­­tested

TEACHING-RTEACHING CYCLE ILLUSTRATION

You will view the instruc­­tional model of the teach­­ing skill to be performed.

You will plan and teach a five minute lesson practicing the teaching skill (lesson is to be videotaped).

You will evaluate your teaching ses­sion and then mail the tape to the teacher educator (include your critique form).

Teacher Educator will make a duplicate of your recording and will send the tape back to you. (At the end of the quarter the teacher educator will discuss all your taped lessons with you).

You will view your tape and your own critique, Then you will re­­teach the same les­­son.

View Introduction Model View Questioning Model View Demonstration Model

TEACH

RETEACH
### SCHEDULE FOR VIDEO-PHONE GROUP

<table>
<thead>
<tr>
<th>Date</th>
<th>Teacher</th>
<th>Teacher Educator</th>
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<tbody>
<tr>
<td>April 7th</td>
<td>Receive Instructional Model on Introducing a Lesson and packet of materials</td>
<td>Send out Instructional tape, Instructional materials, and Illustration Models</td>
</tr>
<tr>
<td>April 14th</td>
<td>View Instructional Model Teach and Videotape Teach #1</td>
<td>Send out Instructional tape, Instructional materials, and Illustration Models</td>
</tr>
<tr>
<td>April 21st</td>
<td>View Illustration Model Replan and Reteach Teach #1 Self-Critique Reteach which will be Teach #2 Mail tape and Critique form to Teacher Educator (Date ________)</td>
<td>Send Instructional Model back also</td>
</tr>
</tbody>
</table>

**Week of April 7th**
- View Instructional Model
- Teach and Videotape Teach #1
- Self-Critique Teach #1
- Mail Tape and Critique Form to Teacher Educator (Date ________)

**Week of April 14th**
- Two-Way Phone Conference (Time ________ Date ________) Critique of Teach #1 will be discussed.

**Week of April 21st**
- View and Critique Teach #2
- Mail teacher's tape back
- Send out Instructional Model: Questioning
Date  |  Teacher  |  Teacher Educator
---|---|---
Week | Two-Way Phone Conference |  
  (Time  |  Date  )  
  of  
  Critique of Teach #2 will be discussed.

April
28th
View Instructional Model: Questioning
Teach and Videotape Teach #3
Self-Critique Teach #3
Mail Tape and Critique Form
to Teacher Educator (Date  )
  View and Critique Teach #3
  Mail Teacher's tape back

Week | Two-Way Phone Conference |  
  (Time  |  Date  )  
  of  
  Critique of Teach #3 will be discussed.

May
5th
View Illustration Model
Replan and Reteach Teach #3
Self-Critique Reteach which will be Teach #4
Mail tape and Critique Form
to Teacher Educator (Date  )
  Send Instructional Models back also
  View and Critique Teach #4
  Mail teacher's tape back
  Send out Instructional Model: Demonstrating A Manipulative Skill

Week | Two-Way Phone Conference |  
  (Time  |  Date  )  
  of  
  Critique of Teach #4 will be discussed.

May
12th
View Instructional Model:
Demonstrating a Manipulative
Skill
Teach and Videotape Teach #5
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<tbody>
<tr>
<td>Week</td>
<td>of May</td>
<td>View and Critique Teach #5</td>
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<tr>
<td>19th</td>
<td>View Illustration Model</td>
<td>Replan and Reteach Teach #5</td>
</tr>
<tr>
<td>Self-Critique Reteach which will be Teach #6</td>
<td>Mail Tape and Critique Form to Teacher Educator (Date ______)</td>
<td>View and Critique Teach #6</td>
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<tr>
<td>26th</td>
<td>Posttest to be scheduled</td>
<td>Two-Way Phone Conference (Time ______ Date ______)</td>
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<td>April 7th</td>
<td>Request Instructional Model on Introducing a Lesson and packet of materials</td>
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<td>April 14th</td>
<td>View Instructional Model, Teach and Videotape Teach #1</td>
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<td>Send out Instructional Model: Questioning</td>
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<td>of May 26th</td>
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### SCHEDULE FOR VIDEO-SELF-EVALUATION GROUP

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<tbody>
<tr>
<td>Week of April 7th</td>
<td>Receive Instructional Model on Introducing a Lesson and packet of materials</td>
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<td>Send out Instructional Tape, Instructional Materials, and Illustration Models</td>
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<td>Week of April 14th</td>
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<td>Week of April 21st</td>
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<td>Replan and Reteach Teach #1</td>
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<td>Send out Instructional Model back also</td>
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<td>Week of April 28th</td>
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<td>Send Instructional Model back also</td>
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<td>Send out Instructional Model: Demonstrating a Manipulative Skill</td>
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<td>19th</td>
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<td>Week</td>
<td>Review Teach #6</td>
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<td>of Posttest to be scheduled</td>
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<tr>
<td>May</td>
<td>(The Teacher Educator will schedule a conference with the Teacher for the purpose of discussing all the teach sessions at a later date.</td>
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INSTRUCTIONS FOR TEACHING SESSION ONE  
AND TEACHING SESSION TWO  
(Video-Phone)

The materials provided in this packet are designed to help you learn the teaching skill of introducing a lesson. READ ALL THE INSTRUCTIONS CAREFULLY BEFORE YOU VIEW THE INSTRUCTIONAL MODEL TAPE.

Attached to these instructions are three green critique forms for rating an introduction to a lesson and a schedule of activities for the instructional program. One critique form is to be used with the instructional tape, one is to be used with Teaching Session #1 and one is to be used with Teaching Session #2.

The enclosed instructional model tape is designed to provide you with detailed instructions on how to introduce a lesson. The skill of introducing a lesson consists of the pre-instructional procedures that a teacher carries out prior to actual instruction. The introduction sets the stage for student participation in the activities that are to follow and it should help inspire the students to want to accomplish the objectives of the lesson.

TEACHING SESSION #1

The following steps should be followed in preparing Teaching Session #1.
1. **Study the instructional model tape.** View the tape until you feel that you know all the behaviors that a teacher should demonstrate when introducing a lesson. When you view the tape, be sure to have one of the critique forms with you. The tape presentation will include a part that will give you practice in using the critique form.

2. **Plan a five minute lesson in which the introduction is emphasized.** You are to select the subject content to be taught. You may use either a manipulative lesson or a theory lesson.

3. **Teach the planned five minute lesson and videotape the presentation.** You will present the lesson to four students just as you did in the pretest. Record your teaching session on the blank tape that has been sent to you. **NOTE:** Before you start recording wrap the end of the tape three (3) turns onto the take-up reel, zero the tape counter and run the tape forward to 020. You will begin your recording at 020.

4. **Critique your teaching session.** Using one of the critique forms provided, rate your teaching performance for each item. **BE SURE TO GIVE YOUR NAME, NUMBER, TEACHING SESSION ONE, AND**
DATE ON FRONT PAGE OF CRITIQUE FORM. If you have questions or comments you can record them on the videotape following the lesson.

5. Mail your critique form and your taped teaching session to:

   Dr. Ronald E. Glenn
   Dept. of Vocational Education
   Colorado State University
   Ft. Collins, Colorado 80521

   Insure the videotape for at least $30.00. Check the date that you are to mail your tape (see schedule of events). You will be reimbursed for all mailing expenses.

6. The Teacher Educator will contact you by phone and will critique teaching session #1. See schedule for date and time of phone conference. During the phone conference you and the teacher educator will discuss the strengths and weaknesses of your lesson. After the phone conference you will reteach the same lesson.

TEACHING SESSION #2 (Reteach of Teaching Session #1)

The following steps should be followed in preparing Teaching Session #2.

1. Review the Teacher Educator's comments on Teaching Session #1. During the phone conference
the Teacher Educator and you will identify items on the critique form that you need to practice. Study these items carefully.

2. View the illustration model that the Teacher Educator identified for you. The illustration model is an example of an introduction taken from a five minute lesson. The model will show one teacher demonstrating certain behaviors of the teaching skill: Introducing a Lesson. The handouts on the models will tell what specific behaviors to look for in the model. The model's weaknesses will also be pointed out to you.

3. Replan the same lesson that you taught in Teaching Session #1. Incorporate the items identified during the phone conference into the new lesson plan.

4. Teach the replanned five minute lesson and videotape your presentation. You will present the lesson to four students just as you did in the pretest and teaching session #1. Record this teaching session on the same tape that you recorded Teaching Session #1. Be sure to begin your recording at counter number 020. Teaching Session #1 will be erased as you record Teaching Session #2.
5. **Critique Teaching Session #2.** Using one of the critique forms, rate your teaching performance on each item. **BE SURE TO INDICATE YOUR NAME, NUMBER, TEACH SESSION TWO, AND DATE ON FRONT PAGE OF CRITIQUE FORM.** If you have questions or comments you can record them on the videotape following the lesson.

6. Mail your critique form and your tape to the **Teacher Educator.** Check the date that you are to mail your tape. **NOTE: MAIL THE INSTRUCTIONAL MODEL BACK AT THIS TIME.**

7. **The Teacher Educator will contact you by phone and will critique your Teaching Session #2.** See schedule for date and time of phone conference. This conference will follow the same pattern as your first phone conference.

8. **At this time you will begin practicing the skill of questioning.** Additional instructions will be sent with the Instructional Model on Questioning.

**A FEW REMINDERS**

1. Be sure to practice the skill of introducing a lesson continuously in your regular classes.
2. Please keep a record of all your mailing expenses so that you can be reimbursed for them.

3. Plan your time carefully so that you will be able to maintain the schedule specified for you.

4. Remember that you are emphasizing introducing a lesson but you are to teach a complete lesson during the five minutes.
INSTRUCTIONS FOR TEACHING SESSION ONE 
AND TEACHING SESSION TWO 
(Video-Mail)

The materials provided in this packet are designed to help you learn the teaching skill of introducing a lesson. READ ALL THE INSTRUCTIONS CAREFULLY BEFORE YOU VIEW THE INSTRUCTIONAL MODEL TAPE.

Attached to these instructions are three green critique forms for rating an introduction to a lesson and a schedule of activities for the instructional program. One critique form is to be used with the instructional tape, one is to be used with Teaching Session #1, and one is to be used with Teaching Session #2.

The enclosed instructional model tape is designed to provide you with detailed instructions on how to introduce a lesson. The skill of introducing a lesson consists of the pre-instructional procedures that a teacher carries out prior to actual instruction. The introduction sets the stage for student participation in the activities that are to follow and it should help inspire the students to want to accomplish the objectives of the lesson.

TEACHING SESSION #1

The following steps should be followed in preparing Teaching Session #1.
1. **Study the instructional model tape.** View the tape until you feel that you know all the behaviors that a teacher should demonstrate when introducing a lesson. When you view the tape, be sure to have one of the critique forms with you. The tape presentation will include a part that will give you practice in using the critique form.

2. **Plan a five minute lesson in which the introduction is emphasized.** You are to select the subject content to be taught. You may use either a manipulative lesson or theory lesson.

3. **Teach the planned five minute lesson and videotape the presentation.** You will present the lesson to four students just as you did in the pretest. Record your teaching session on the blank tape that has been sent to you. **NOTE:** Before you start recording wrap the end of the tape three (3) turns onto the take-up reel, zero the tape counter and run the tape forward to 020. You will begin your recording at 020.

4. **Critique your teaching session.** Using one of the critique forms provided, rate your teaching performance for each item. **BE SURE TO GIVE YOUR NAME, NUMBER, TEACHING SESSION ONE, AND**
DATE ON FRONT PAGE OF CRITIQUE FORM. If you have questions or comments you can record them on the videotape following the lesson.

5. **Mail your critique form and your taped teaching session to:**

   Dr. Ronald E. Glenn  
   Department of Vocational Education  
   Colorado State University  
   Fort Collins, Colorado 80521

   Insure the videotape for at least $30.00. Check the date that you are to mail your tape (see schedule of events). You will be reimbursed for all mailing expenses.

6. **The Teacher Educator will critique your Teaching Session #1 and record his comments onto your tape.** Your tape with the teacher educator's comments will be mailed back to you. The teacher educator will also identify illustration models for you to view. Instructions for the reteach session will be given next.

**TEACHING SESSION #2 (Reteach of Teaching Session #1)**

The following steps should be followed in preparing Teaching Session #2.

1. **Review the comments that the teacher educator made on Teaching Session #1.** On the tape
immediately following your lesson the teacher educator will point out the items on the critique form that you need to improve.

2. **View the illustration models that the teacher educator identified for you.** The illustration model will show a teacher demonstrating certain behaviors of the teaching skill: **Introducing a Lesson.** The handouts on the models will tell you what specific behaviors to look for in the model. The model's weaknesses will also be identified.

3. **Replan the same lesson that you taught in Teaching Session #1.** Incorporate the teacher educator's suggestions into the new lesson plan.

4. **Teach the replanned five minute lesson and videotape your teaching session.** You will present the lesson to four students just as you did in the pretest and Teaching Session #1. Record this teaching session on the same tape that you recorded Teaching Session #1. Be sure to begin your recording at counter number 020. Teaching Session #1 will be erased as you record teaching session #2.
6. Mail your critique form and your tape to the Teacher Educator. Check the date that you are to mail your tape. NOTE: MAIL THE INSTRUCTIONAL MODEL BACK AT THIS TIME.

7. The Teacher Educator will follow the same procedure in critiquing Teaching Session #2 as he did for Teaching Session #1.

8. After reviewing the teacher educator's comments on Teaching Session #2, you will begin practicing the skill of questioning.

A FEW REMINDERS

1. Be sure to practice the skill of introducing a lesson continuously in your regular classes.

2. Please keep a record of all your mailing expenses so that you can be reimbursed for them.

3. Plan your time carefully so that you will be able to maintain the schedule specified for you.

4. Remember that you are emphasizing introducing a lesson but you are to teach a complete lesson during the five minutes.
INSTRUCTIONS FOR TEACHING SESSION ONE
AND TEACHING SESSION TWO
(Video-Self-Evaluation)

The materials provided in this packet are designed to help you learn the teaching skill of introducing a lesson. READ ALL THE INSTRUCTIONS CAREFULLY BEFORE YOU VIEW THE INSTRUCTIONAL MODEL TAPE.

Attached to these instructions are three green critique forms for rating an introduction to a lesson and a schedule of activities for the instructional program. One critique form is to be used with the instructional tape, one is to be used with Teaching Session #1, and one is to be used with Teaching Session #2.

The enclosed instructional model tape is designed to provide you with detailed instructions on how to introduce a lesson. The skill of introducing a lesson consists of the pre-instructional procedures that a teacher carries out prior to actual instruction. The introduction sets the stage for student participation in the activities that are to follow and it should help inspire the students to want to accomplish the objectives of the lesson.

TEACHING SESSION #1

The following steps should be followed in preparing Teaching Session #1.
1. **Study the instructional model tape.** View the tape until you feel that you know all the behaviors that a teacher should demonstrate when introducing a lesson. When you view the tape, be sure to have one of the critique forms with you. The tape presentation will include a part that will give you practice in using the critique form.

2. **Plan a five minute lesson in which the introduction is emphasized.** You are to select the subject content to be taught. You may use either a manipulative lesson or a theory lesson.

3. **Teach the planned five minute lesson and videotape the presentation.** You will present the lesson to four students just as you did in the pretest. Record your teaching session on the blank tape that has been sent to you. **NOTE:** Before you start recording wrap the end of the tape three (3) turns onto the take-up reel, zero the tape counter and run the tape forward to 020. You will begin your recording at 020.

4. **Critique your teaching session.** Using one of the critique forms, rate your teaching performance for each item. **BE SURE TO GIVE YOUR**
NAME, NUMBER, TEACHING SESSION ONE, AND DATE
ON FRONT PAGE OF CRITIQUE FORM. If you have
questions or comments you can record them on
the videotape following the lesson.

5. Mail your critique form and your taped teaching
session to:

Dr. Ronald E. Glenn
Dept. of Vocational Education
Colorado State University
Fort Collins, Colorado 80521

Insure the videotape for at least $30.00. Check
the date that you are to mail your tape (see
attached schedule). You will be reimbursed
for all mailing expenses.

6. The Teacher Educator will duplicate your record-
ing and send your tape back to you. He will
discuss your lesson with you at a later date.
Instructions for your reteach of Teaching
Session #1 will be given next.

TEACHING SESSION #2 (Reteach of Teaching Session #1)

The following steps should be followed in preparing
Teaching Session #2.

1. Review Teaching Session #1 very carefully and
make a critical evaluation of your performance.
Write down the points that you think will improve
the introduction of your lesson.
2. View the illustration models for the skill of introducing a lesson.

3. Replan the same lesson that you taught in Teaching Session #1. Incorporate your own suggestions for improvement into the new lesson plan.

4. Teach the replanned five minute lesson and videotape your teaching session. You will present the lesson to four students just as you did in the pretest and Teaching Session #1. Record this teach session on the same tape that you recorded Teaching Session #1. Be sure to begin your recording at counter number 020. Teaching Session #1 will be erased as you record Teaching Session #2.

5. Critique Teach #2. Using a critique form, rate your teaching performance on each item. BE SURE TO RECORD YOUR NAME, NUMBER, TEACHING SESSION TWO, AND DATE ON FRONT PAGE OF CRITIQUE FORM. If you have questions or comments you can record them on the videotape following the lesson.

6. Mail your critique form and your tape to the Teacher Educator. Check the schedule for the date that you are to mail your tape. NOTE: MAIL THE INSTRUCTIONAL MODEL TAPE BACK AT THIS TIME.
7. The Teacher Educator will duplicate your recording and send your tape back to you.

8. After reviewing your own critique you will begin practicing the skill of questioning. Additional instructions will be sent with the Instructional Model on Questioning.

A FEW REMINDERS

1. Be sure to practice the skill of introducing a lesson continuously in your regular classes.

2. Please keep a record of all your mailing expenses so that you can be reimbursed for them.

3. Plan your time carefully so that you will be able to maintain the schedule specified for you.

4. Remember that you are emphasizing introducing a lesson but you are to teach a complete lesson during the five minutes.
INSTRUCTIONS FOR TEACHING SESSION
THREE AND TEACHING SESSION FOUR

The materials provided in this packet are designed to help you learn the teaching skill of questioning. You will be following procedures similar to those used in teaching sessions one and two. **READ ALL THE INSTRUCTIONS CAREFULLY BEFORE YOU VIEW THE INSTRUCTIONAL MODEL TAPE.**

Attached to these instructions are three yellow critique forms for questioning. One critique form is to be used with the instructional tape, one is to be used with Teaching Session #3, and one is to be used with Teaching Session #4.

The enclosed instructional model tape is designed to provide you with detailed instructions on questioning. The skill of questioning allows a teacher to promote mental activity on the part of the student by providing the student with an opportunity to be actively involved in the lesson. The effective use of questioning increases the student's freedom of action, gives the student an opportunity to express his ideas, and makes the student less dependent on the teacher.

**NOTE:** In teaching sessions three and four, each of the three treatment groups followed procedures which were similar to those completed in teaching sessions one and two. Therefore, the steps will not be repeated again in the appendix.
INSTRUCTIONS FOR TEACHING SESSION
FIVE AND TEACHING SESSION SIX

The materials provided in this packet are designed to help you learn the teaching skill of demonstrating a manipulative skill. You will be following procedures similar to those used in previous teaching sessions. READ ALL THE INSTRUCTIONS CAREFULLY BEFORE YOU VIEW THE INSTRUCTIONAL MODEL TAPE.

Attached to these instructions are three blue critique forms for rating the teaching skill of demonstrating a manipulative skill. One critique form is to be used with the instructional tape, one is to be used with Teaching Session #5 and one is to be used with Teaching Session #6.

The enclosed instructional model tape is designed to provide you with detailed instructions on how to demonstrate a manipulative skill. The teaching skill of demonstrating a manipulative skill aids the teacher in informing students how to perform a manipulative skill safely and in a step-by-step manner.

NOTE: In teaching sessions five and six, each of the three treatment groups followed procedures which were similar to those completed in teaching sessions one and two. Therefore, the steps will not be repeated again in the appendix.
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Dissertations


