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ABSTRACT

Procedures for training undergraduates in basic teaching skills were developed over 7 semesters. The training involved six individual experimental programs of a semester's duration and a follow-up study of the students in the Spring of 1970 program. The training has been given to 438 elementary education majors. The purpose of the program was to make training a basic teaching interaction skills an effective and economical procedure in the preparation of elementary teachers. In each study, the students' teaching behavior was analyzed specifically according to procedures developed and tested at the Far West Laboratory. The curriculum of skills selected for study and use in the program have been Minicourse I, Effective Questioning; Minicourse V, Tutoring in Elementary Mathematics; and Self-Guided Teaching Skills. Results indicated that the process appears to operate independently of the variables of supervisory attention, visual and written models, and large-group discussion as compared with independent study. In all experiments with the model, the behavioral changes induced appeared to be strong and positive; and with the follow-up study group, highly persistent through the period of student teaching. (A 25-item bibliography is included.) (Author/MJM)

The Fredonia Teaching Skills Laboratory:

Experimental Development of a Model

Final Report

Fall, 1972

TEACHER EDUCATION RESEARCH CENTER

STATE UNIVERSITY COLLEGE

FREDONIA, NEW YORK

FOREWORD

This report is the record of a series of experiments with teaching skills training on the Fredonia campus, conducted jointly by the Center, members of the Education Department, and the Far West Laboratory for Educational Research and Development.

It is of major importance as a record of the implementation by the staff of a clear and central objective - to make skills training at the pre-service level a functional and viable part of elementary teacher preparation.

The report can be final only in the sense that the first phase of experimentation in the Skills Laboratory has been completed, and a preliminary model appears to be ready for a more complete definition and dissemination as a product for teacher education. Skills definition and development at the pre-teaching level is in its beginning.

Acknowledgement and appreciation should be extended to the many individuals who made the program possible. Margaret Rector, as laboratory supervisor, took a deep personal interest in both the program and the students. We are also deeply indebted to Dr. Walter Borg, for both the cooperation of the Far West Laboratory, and for his personal advice and guidance. Recognition should also be given to Dr. Donald McFarland who acted as project director in the original study, and to Dr. Lonie Rudd who made his classes and his time available.

Special thanks are due to Freeman Hockenberger for his willingness to "drop everything" to give technical assistance, and to Marian Anderson and Chris Halas not only for fine manuscript preparation, but for the host of course materials involved in the several years of the program.

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ABSTRACT

The report encompasses seven semesters of development of procedures for training undergraduates in basic teaching skills. The training involved six individual experimental programs of a semester's duration, and a follow-up study of the students in the Spring, 1970, program. The training has been given to 438 elementary education majors.

The purpose of the program has been to make training in basic teaching-interaction skills an effective and economical procedure in the preparation of elementary teachers. In each study, the students' teaching behavior was analyzed specifically according to procedures developed and tested at the Far West Laboratory.

The curriculums of skills selected for study and use in the program have been Minicourse I, Effective Questioning, Minicourse V, Tutoring in Elementary Mathematics, and Self-Guided Teaching Skills.

The initial program, Spring, 1969, involved thirty-one elementary junior students in a microteaching program with elementary pupils using Minicourse I. Also being tested was a variable of pupil feedback to the teacher concerning teacher behavior. Analysis of the data failed to support the assumption of effectiveness of the program as used with undergraduates or to show effect of the variable of pupil feedback procedures.

It was concluded that adaptation of the inservice Minicourse model program to fit the needs and characteristics of the college student and the college situation was a prerequisite to the successful use of a teaching-skills program prior to student teaching.

The Fall Semester, 1969, was a period of study and design, resulting in a pilot study in which over 100 students were involved. It was determined that large groups of students could work with the TV recorders with minimal staff instruction and assistance, and that peer-microteaching and role-playing procedures were acceptable and enjoyed by the majority of the students involved.

The Spring, 1970, program involved the use of Minicourse V, Tutoring in Elementary Mathematics with the total population of the Junior Professional Semester, 181 students, as an adjunct to Education 316, Methods in Elementary Mathematics. In addition to the testing of the program in terms of student behavioral change and attitudes of the program's functional effectiveness, a variable of positive supervisory assistance was also introduced.

The results appeared to indicate that under the conditions of the program the students were able to make significant changes in their teaching behavior according to the stated goals of the Minicourse program. Attitudes toward the Minicourse, the peer-teaching and the group and role playing situation were strongly affirmative. The value of direct and positive supervisory assistance was not supported by any of the data. Analysis of the program indicated that the entire program, exclusive of the research portion, was easily managed by the equivalent of one staff person.

The Follow-up Study, Fall, 1970, was concerned with the teaching behaviors, in student teaching of students from the previous study. Its purpose was the determination of the retention of the training. Data obtained from 42 students indicated that the teaching skills were retained and used at a relatively high level.

The research concern in the Fall, 1970, program was a testing of two modeling procedures. One group studied and discussed the training materials without visual modeling of any kind,

using typescripts of the model films and lesson films. The other group used the Minicourse as designed; with a combination of the visual and symbolic models. The data did not support any assumption concerning increased effectiveness of either procedure.

In the Spring, 1971, program, an attempt was made, without increasing laboratory time, to add to the basic skills program a study of several of the discussion skills of Minicourse I. It was the considered judgment of the staff, by the end of the second laboratory session, that simple interactive behaviors, such as those of Minicourse V are more appropriate for beginning study than the more complex skills of discussion management. In spite of the shortness of the ensuing laboratory program, the behavioral change achieved in these skills was comparable to earlier studies.

The two experimental programs for the year 1971-72 were devoted to a pilot testing of Self-Guided Teaching Skills, an independent study manual of basic teaching-interaction skills, written by Douglas and Margaret Rector.

In both programs, the laboratory program of grouping, peer-teaching and video-practice was continued. In order to achieve comparability of data, only those skills from the handbook congruent to those previously studied in Minicourse V were chosen for study. Analysis of the data from the 77 students participating in the two studies appears to show strength for the procedure comparable to the results achieved by the use of Minicourse materials.

SUMMARY CONCLUSIONS

As an integral part of the pre-service preparation of teachers, with both extrinsic and intrinsic motivation, a laboratory process of teaching skills training which involves small-group teaching and role-playing, with videotaped feedback, appears to offer a student-accepted, economical and effective means of achieving desired changes in the teaching behavior of the students. The process appears to operate independently of the variables of supervisory attention, visual and written models, and large group discussion as compared with independent study.

In all experiments with the model, the behavioral changes induced appear to be strong and positive, and, with the follow-up study group, highly persistent through the period of student teaching.

INTRODUCTION

A common problem of institutions preparing students for teaching is the need to provide a program of gradual and successful induction into teaching. The repeated experimentation described in this paper has been designed to develop an effective and practical program of teaching skills development for elementary teachers in the training period prior to student teaching.

The following criteria were developed and established as goals for the program, through successive iterations:

1. The program should effectively modify the teaching behaviors of the students, in regard to the specific skills taught.

2. The students should value the program and consider it highly relevant to their classroom participation and student teaching.

3. The program should be operationally and economically practical for use in conjunction with the pre-student teaching instructional program.

4. The program should not demand a high level of training in the "technical skills of teaching" on the part of the individuals in charge of the program.

The first section of this report, The Background, consists of a brief discussion of the problem, and a summary of the microteaching approach to a solution of the problem, with particular reference to the Minicourse programs developed by the Far West Laboratory for Educational Research and Development, under the direction of Walter Borg.

In the second section, The Experimentation, is included a chronological report and description of the successive experimentations, together with discussion of observations, findings, and possible implications for each experiment.

In the third section, The Model Program, the undergraduate program that has been evolved is outlined and discussed, together with recommendations for further development and use.

THE BACKGROUND

The Problem

The reality of induction into classroom teaching is that most institutions preparing teachers have traditionally depended upon the cooperating teacher to provide the student with his first opportunity to practice his classroom teaching skills. The difficulties inherent in this process have been too well documented to bear repetition at this point. At the best, the student's role expectations are frequently in conflict with role-reality, and stress is almost inescapable. All too often, under the stress of the situation, the focus may be upon the "tricks of the trade" rather than a reasoned approach to desirable teaching behavior. Goodlad sees in the process a danger to the continued orderly development of the teacher's teaching skills:

> But the cards are stacked in favor of his controlling habit becoming fixed with little reference to the principles of pedagogy; the student teacher's need to survive, together with the cooperating teacher's need to have him survive, are powerful factors adding to other factors favoring early closure in survival skills.[1]

Against the ideal of a program of practice in classroom skills prior to student teaching stand the realities of the pre-student teaching environment in many colleges - large numbers of students, unavailable children for practice, and a limited staff.

Beyond these realities are the problems of procedure and content, almost untouched until the beginning research in microteaching at Stanford University.

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[1]John J. Goodlad, "An Analysis of Professional Laboratory Experiences in the Education of Teachers," Journal of Teacher Education, XVI, No. 3 (1965), 266.

Microteaching - The Procedure

Less than a decade ago the researchers in teacher education at Stanford University initiated a quiet procedural revolution in the supervision of student teaching. The elements of change were the television videotape recorder and the development of microteaching as a training procedure. The videotape recorder proved to be a powerful tool for feedback concerning the teacher's exact behavior, at any time following the lesson.

At the same time, it was discovered that, using the recorder, the teaching sessions could be encapsulated in terms of time and the number of pupils taught - the essence of microteaching. Though these two procedures were used and tested in the Stanford Workshops as a substitute for student teaching, they were subsequently used and tested in many settings, both in undergraduate and inservice education.

It soon became apparent that the Stanford Model for microteaching, as described by Allen and Ryan,[2] could form the basis for a laboratory approach for the gradual induction of students into classroom teaching. Though pupils were still a necessity, their numbers were greatly reduced. The supervisor was fundamental to the procedure, but the per-student demands upon his time could be greatly reduced.

The Curriculum

There is a saying, "The tool shapes its uses." Prior to the videorecorder, the supervisor could only discuss, in general terms, what had happened in the lesson, a lesson which the teacher never observed. The videorecorder made possible an exact observation by both.

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[2]Dwight Allen and Kevin Ryan, Microteaching. (Reading, Mass.: Addison-Wesley, 1969).

The change from the general to the specific is illustrated by Ned Flanders:

> It is one thing to say that "the teacher should find ways to motivate pupils so that the learning tasks have real meaning in the life experiences of the pupils." A different vocabulary is involved when you say that "a teacher can connect the interests of boys and girls to a learning task by asking open questions, by clarifying and developing selected responses which link interests to tasks, and then asking questions which become more and more specific so that the tasks and the methods of work incorporate the suggestions of the pupils.[3]

The definition of the microteaching curriculum began with what the Stanford researchers called the "Technical Skills of Teaching." This curriculum is described in the previously mentioned work by Allen and Ryan, and is published as model films and text by General Learning Corporation.[4] The development of a curriculum of skills is still in a very early stage, both for training teachers and as a subject for research investigation. It is not a static thing, almost anyone observing teaching can and does conceptualize teaching in terms of specific goal-directed skills.

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[3]Ned Flanders, Analyzing Teaching Behavior, (Reading, Mass.: Addison-Wesley, 1970), pp. 4,5.

[4]Dwight Allen and others, Teaching Skills for Elementary and Secondary School Teachers. (New York: General Learning Corporation, 1969).

A primary difficulty with a skills curriculum lies in the fact that there is little research relating specific teaching behaviors to pupil performance. When the complexities of the interaction, and the personal and situational variables that are encompassed in a single teaching episode are considered, it is not surprising that this should be the case. In a recent summary of research on teacher effectiveness, Berj Harootunian cites the work of Barak Rosenshine, Norma Furst and others in synthesizing the relationship between teaching process characteristics and student achievement. He prefaces the summary with a caution:

> Recently, teacher educators have placed much emphasis upon performance criteria. There is no doubt that this is a desirable step, but given the present state of what we know about teaching, we may entrap ourselves into the same situation we are trying to get out of. We may in effect be requiring teachers or would-be-teachers to demonstrate behaviors which may have the same sort of validity for their teaching as does the ability to identify Comenius.[5]

In view of the extent of the problem and the need, the foregoing can serve as a caution and a charge for both the educational researcher and those engaged in program development. Perhaps Harold Mitzel mirrors current thinking concerning the problem when he suggests a focus upon "process criteria of teacher and student behavior which are believed to be worthwhile in their own right."[6]

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[5]Berj Harootunian, "Research on Teacher Effectiveness," The Researcher, (Newsletter of the Northeastern Educational Research Association), Vol. 9, No. 1, (February, 1971), p. 31.

[6]Harold Mitzel, "Teacher Effectiveness," in C.W. Harris (Ed.), Encyclopedia of Educational Research, 3rd ed. (New York: Macmillan, 1960), pp. 1481-1486.

The Minicourses

For the past several years the Far West Laboratory for Educational Research and Development, under the direction of Walter Borg, has been developing integrated programs of skills-development materials designed specifically for use in independent microteaching study by experienced teachers in the local school setting. Currently, Minicourse I, Effective Questioning in a Classroom Discussion, is commercially published by Macmillan Educational Services, and Minicourse V, Tutoring in Elementary Mathematics, is soon to be released. Others are in various stages of development.

Each program is an integrated group of skills which are related to a central instructional goal. After careful investigation of research and practice, the development team prepares self-instructional materials which include the modeling, practice and feedback cycle developed at Stanford. The process of development, the rigorous cycle of repeated field testing, and the behaviorally significant research findings concerning the effects of the program are summarized by Walter Borg in a recent publication.[7]

The Minicourses differ from previous microteaching in several important dimensions. The first is the element of selectivity. Each program focuses upon a few skills of potential value. The next is the heavy use of planned repetition, both in the instructional materials and in the practice. The most important, potentially, is the independent study feature, which is unique to the Far West Laboratory programs. This approach makes the programs compatible with a heuristic approach to teaching, and bypasses the problem of a very real shortage of supervisors who have had any more than an academic or remote acquaintanceship with the process of teaching skills definition and development. Additionally, as has already been noted, staff limitations have been one of the major elements inhibiting the development of programs involving gradual induction into teaching.

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[7]Walter Borg, and others, The Minicourse, a Microteaching Approach to Teacher Education, (Beverly Hills: Macmillan Educational Services, 1970).

MINICOURSE I - SPRING, 1969

The first attempt of the Teacher Education Research Center to implement training in teaching skills prior to student teaching was undertaken with a group of thirty-two juniors in the professional education semester at the State University College, Fredonia.

The program was carried out in cooperation with the Far West Laboratory for Educational Research and Development, and constituted a field test of the Minicourse I program at the undergraduate level. The materials used were those of the field test edition of the program as published by the Far West Laboratory. Similarly, the analysis of the pre and post-teaching behavioral data was done by observers using the procedures and materials developed by the Far West Laboratory for field-test analysis.

The project had three major goals:

1. To test the effectiveness of the Minicourse Model as a tool for inducing desired change in the teaching behavior of the students prior to student teaching.

2. To determine whether an initial experience in this type of program can contribute significantly to the students' later performance during student teaching.

3. To test the effectiveness of pupil feedback as a training procedure.

The project involved a randomly-selected group of non-volunteer students, who were further divided randomly into the two treatment groups. One group used the self-feedback procedures as specified in the program, while the group using pupil-feedback watched the replay with the children and used a variety of questionnaires and other devices to obtain the pupil feedback. The total group taught elementary pupils from the public school in a ten-week experiment, which was unrelated to the other professional training.

At the close of the program a questionnaire was given to determine their attitudes toward the training. Their responses showed that they liked and valued, to a high degree, both the Minicourse training and the microteaching procedures. Over seventy per cent indicated that they would voluntarily enroll in a similar program, if it were offered. A similar proportion of the group using pupil-feedback indicated that the procedures were desirable, and that they would continue to use them.

Analysis of the pre and post-teaching tapes showed that although statistically significant changes in the behaviors stressed in the program did occur, they were so small as to be unimportant and were characteristic only of the students receiving the pupil feedback. These were: "teacher talk," "length of pupil responses," "use of higher order questions," and "repeats pupil answers." Behavior changes for the self-feedback group were significant only in "teacher talk," an indirect measure.

It may be noted that in the three categories of "negative" behavior that the Minicourse I program is designed to extinguish, the level of these behaviors was desirably low both on the pre tapes and the post-tapes. The post-tape means were comparable to those reported in the field test with experienced teachers.[8]

Discussion

The data indicates clearly a high level of student satisfaction with both the Minicourse and the microteaching procedures. It may be concluded that the use of a Minicourse program in undergraduate skills development prior to student teaching clearly meets one of the original criteria for such a program, that of student acceptance.

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[8]Philip Langer, "The Range of Teaching Skills That Can Be Changed by the Minicourse Model," paper presented at the annual meeting, American Psychological Association, (Washington: September, 1969).

The criterion relating to cost in terms of staff time was incompletely met. Although part of the staff time expended can be attributed to unfamiliarity with procedures and to the unfavorable facilities, a disproportionate amount of staff time was devoted to the scheduling of the use of public school children, the coordination of the teaching content between the microteaching and the classroom, and the actual management of classrooms and groups.

The primary goal of the experiment, and the basic criterion of any skills-development program was not met. Statistical significance of change in teaching behavior at minimal levels, such as was attained with the group receiving the pupil-feedback, may be considered inferential in nature. What is sought is behavioral significance, which may be indicated by consistent and purposeful use of the behavior, at a frequency of use level well beyond simple significance.

Finally, in view of the lack of major behavioral change in the teaching of the students, it was decided to abandon the follow-up study that had been planned at the close of their student teaching experience.

It was concluded that adaptation of the Minicourse model program to fit the needs and characteristics of the undergraduate student was a prerequisite to the successful use of the program in teaching skills development prior to student teaching.

PROJECT DESIGN - FALL, 1969

The focus during the Fall of 1969 was upon ways of adapting the Minicourse model to undergraduate instruction, and upon the design of an experimental program incorporating the adaptations to be tried in the Spring semester. It was initially agreed that the basic structure and program of the Minicourse model should remain undisturbed on the basis of its proven success with experienced teachers. Instead, adaptation should be peripheral to the course and operational in nature.

The first area of evaluation was of the overall relevance of the program to the student's other preparation for teaching. It was noted that the college student lacked the opportunity for constant practice in the skills available to the practicing teacher and that some other form of relevance was needed. It was decided that to integrate the program with one or more of the courses in the professional sequence would provide relevance. Agreement was reached to make the proposed program an integral part of Education 316, Elementary Mathematics Methods. Further motivational relevance was to be provided by a grading program and required attendance.

Minicourse V was selected for the skills development, as more appropriate for this type of integration. It was also felt that the skills involved might be more appropriate for students who had not yet done formal teaching.

In all the discussion and planning, the primary objective was to devise a model for use with large groups of students. It was very apparent that even the reduced numbers of children involved in micro-teaching was an obstacle, when a large-scale program was envisioned.

The conclusion was reached that peer-group teaching and tutoring, with the college students alternately role-playing the parts of pupil and teacher offered the only possible way of using the training program with large groups of students.

The decision to abandon the use of elementary children was influenced by observations made of teacher-child interaction during the course of the previous experiment:

1. In many instances the children appeared to produce stress similar to that encountered in student teaching. It was difficult to see how the students could focus upon their own behaviors and skills because of interference of pupil behavior. Sometimes children appeared bored and restless, in other classes they appeared overstimulated by the camera and the situation. "You're not my teacher" was an unspoken attitude, sometimes voiced. The problem has been encountered in other microteaching situations, even with experienced teachers, though it is rarely reported.

2. Reality in teaching, or microteaching, once a camera or observer intrudes, is a fragile thing, easily lost. In the in-service microteaching, the experienced teachers are sometimes able to interest the children so that they forget the camera. At the best, the children identify with the teacher and the group situation and consciously respond in the way they feel is expected of them, which is essentially role-playing. These latter behaviors of children were noted in the previous experiment, but not to a highly desirable degree.

3. In addition, there are many indications that even well-behaved interested children may interfere with the self-study of behavior. Studies of teaching have noted the pupil-orientation of teachers. All too often, after watching a live or taped model-teaching demonstration, the pre-teaching student can recall exactly what some pupils said and did, but cannot recall the model-teacher's actions. The remark of an experienced teacher concerning self-study may be significant. "I'm too busy trying to teach the material and help the children to pay any attention to what I'm doing. It's artificial!"

The Pilot Study

During the last few weeks of the semester, a pilot microteaching project was undertaken with over one hundred students in the professional sequence. The goals were:

1. To test procedures for training groups in videotape operation.

2. To determine the manageability of the procedures with large numbers of students.

3. To determine the reaction of the students to peer-group teaching and role-playing.

The program was carried out in various locations, with a half-inch videorecorder in each room. Students were assigned, in groups of four, to prepare and teach a short discussion lesson to the group of their peers, taking turns teaching and role-playing the part of the pupil. Each small group watched the playback of the recorded teaching together, and discussion was encouraged. During the first of the two sessions, two supervisors were needed to begin the teaching in the four widely separated locations. During the second session, one supervisor was able to control the practice, since all groups could start and stop the machines, and some groups could rewind the tapes and start the playback.

Discussion

Student reaction to the program was excellent. They seemed to enjoy working in the peer groups and worked well together. The staff quickly learned that the showing of a videotaped segment of similar practice by another student was an excellent device to alleviate initial fears of the process and the camera.

More important, the process appeared one that could be administered by one supervisor, after the initial lesson, even with the disadvantage of separated locations for the four teaching groups. The students appeared to gain confidence and to learn machine operation and control far more readily than did the solitary student, teaching children alone. They also appeared to find more enjoyment in the process, as a whole.

It was concluded that the procedure showed promise as a low-cost mode of implementing the training with large groups of students.

It was decided to test the procedure with a large group of students the following semester, in order to answer the question, "Under conditions of peer teaching and peer group operation, is a Minicourse program an effective means of accomplishing behavioral change in students preparing for elementary teaching, in the period prior to student teaching?"

By January 1970, a three-room trailer became available, and was used for the subsequent experimentation until September 1972, at which time the larger Skills Laboratory in Old Main was made ready for use.

PROGRAM 1 - SPRING, 1970

The program in the Spring Semester, 1970 was provided to 181 elementary education majors in the junior professional semester, prior to student teaching, as an adjunct to Education 316, Methods in Elementary Mathematics. The objectives of the program were:

1. To determine the effectiveness of the program in effecting changes in the teaching behavior of elementary pre-teaching students, according to the goals of the program, Minicourse V, Individualizing Instruction in Mathematics.

2. To determine student acceptance of the program.

3. To determine the possible effect of a variable of direct supervisory assistance and positive verbal praise and reinforcement.

4. To determine the effectiveness of the program in terms of economy of use of staff time and college resources.

Procedures

In Table 1, page 15, the major elements of the Spring, 1970 program are summarized, along with a similar tabulation of both the Spring 1969 experiment, and the two subsequent revisions and iterations. It is felt that the tabulation can clarify, in brief form, both the elements and the major and minor shifts of these elements during the successive experiments and repetitions.

The program was offered to 181 students, the total population of the Spring, 1970 elementary education professional semester at Fredonia. The program for each student consisted of eleven weekly laboratory sessions, 75 minutes in length, using peer group teaching and feedback. Two of these sessions were used for the making of videotapes of the preliminary and final recorded teaching.

In the teaching and program design no changes were made in the program as outlined in the Minicourse,

Program Elements 1969-71

TABLE 1

Spring 1969	Spring 1970
1. Minicourse I program	1. Minicourse V program
2. Elementary junior students	2. Elementary junior students
3. Small group (32 students)	3. Large group (181 students)
4. Isolation from professional program	4. Integration with Ed. 316
5. Independent study	5. Extrinsic reward, grading
6. Microteaching - elem. pupils	6. Group study, peer feedback
7. Large-group presentations of films and materials	7. Peer teaching and role playing
8. Experimental variable of pupil feedback	8. Large-group presentations of films and materials
	9. Experimental variable of supervision

Fall 1970	Spring 1971
1. Minicourse V program	1. Selected lessons, Minicourse I and V programs
2. Elementary junior students	2. Elementary junior students
3. Large group (60 students)	3. Large group (90 students)
4. Integration with Ed. 316	4. Integration with Ed. 316
5. Extrinsic reward, grading	5. Extrinsic reward, grading
6. Group study, peer feedback	6. Group study, peer feedback
7. Peer teaching and role-playing	7. Peer teaching and role-playing
8. Small group presentation of films and materials	8. Small group presentation of films and materials
9. Performance Criteria	9. Performance Criteria
10. Constant Practice	10. Constant Practice
11. Experimental variable of symbolic modeling (printed	11. Iteration of Model

except those noted, which included peer group teaching, role-playing, and group interaction and feedback. All showing of lesson and model films, discussion, and details of scheduling were made a part of the college large-group classroom situation.

For the purposes of the experimentation, students in each section were randomly assigned in groups of four to one of the microteaching rooms, and the groups remained constant throughout the experiment. Because of time limitation, the lessons on "evaluation and practice" were not scheduled for practice. However, it was noted that many students included these strategies in the final teaching, on the basis of the Teacher's Handbook alone.

Of particular interest was the testing of a variable of supervisory assistance and positive verbal reinforcement. In a sense, this capitalized upon the fact that the only station for the trailer supervisor was a desk space in the center room of the trailer. At first it was planned to screen the area to make her presence less obtrusive. The procedure adopted made use of the condition. With the groups randomly assigned to this room, the supervisor naturally and vigorously praised and positively assisted the groups and individuals. The other room groups were left rigorously alone, except for technical assistance, or when individuals requested advice or assistance, or chose to discuss the teaching informally.

Data Collection and Analysis

The principal data sources for the study were the recording of teaching done prior to and following the program, and an attitudinal questionnaire to which the students could respond anonymously at the close of the program.

Problems were encountered in both the pre-taping and the post-taping. In the pre-taping it was quickly found that only a few exceptional students were able to make tutoring tapes of beyond seven minutes in length. This is attributed to their lack of experience and the effect of the videotaping process. As a result, the analysis was standardized at five minutes of recorded teaching. This has been true in subsequent iterations.

The post taping was scheduled as 5 or more minutes of number problem tutoring, and five or more minutes of

verbal problem tutoring. Because of the size of the groups, the taping was scheduled for two successive weeks. During the first round, a student strike was called, but all students completed their teaching. At the close of the week, the college was closed for the summer, thus eliminating the possibility of making the recording of the verbal problem tutoring.

At first it was intended that analysis be done of the entire group. However, the presence of an instructor variable, and the large numbers of tapes involved made it advisable to limit the analysis and subsequent follow-up to the four college sections taught by one instructor. 144 complete pre and post tapes were obtained from these groups, which represented minimal attrition.

Analysis was done according to protocols and procedures developed for the research field testing of Minicourse V by the staff of the Far West Laboratory. Both college staff and work study students regularly assigned to the Research Center constituted the rating staff.

Tapes were coded according to random numbers and pre and post tapes were mixed to achieve uniformity of rating. However, it was soon learned that the behavioral changes were so pronounced that raters quickly knew the type of tape being rated, thus raising questions as to the value of the procedure. Reliability was maintained both by double rating by two or more students and by spot checking by college staff. Since all ratings are quantitative and require no judgment, no difficulty was encountered.

Results

The behavioral changes in the skills stressed in Minicourse V are summarized in Table 2, page 18. As may be seen from an examination of the data, the behavioral changes were strong and positive. It might be assumed, in the quantitative measurement of behaviors in a short recorded lesson that as one behavior is stressed, other behaviors might diminish proportionately. Most students, however, appeared to show a high facility for a combining high frequency of use of the behaviors into a complex but unified teaching structure.

The determination of student acceptance was considered to be of major importance, and was the second objective of the study. It is a truism that innovations in education tend to have little chance of survival if pupil acceptance is lacking. It had been found in the previous study, using

TABLE 2

Frequency of Use of Skill-Behaviors Before and After Minicourse V, Spring 1970

CATEGORY	TUTORING BEHAVIOR	MEANS[1] Pre-test	MEANS[1] Post-test[2]	SIGN CHANGES +	SIGN CHANGES 0	SIGN CHANGES -	PROBABILITY (X^2)
DIAGNOSTIC QUESTIONS	General questions	2.47	4.26	97	12	31	.00000
	Reading difficulty	.15	.75	74	56	10	.00000
	Word definition	.84	.44	28	81	31	.39729
	Number concepts	.69	12.04	138	0	2	.00000
	Number operations	.04	1.09	85	53	2	.00000
	Total	4.19	18.58				.00000
DEMONSTRATION TECHNIQUES TIME MEASURES (SECONDS)	Estimation	.00	36.49	117	23	0	.00000
	Expanded notation	21.57	104.37	119	8	13	.00000
	Number lines	.79	12.76	41	96	3	.00000
	Manipulative materials	.00	61.69				.00000
	Picture or diagram	2.04	11.00	20	115	5	.00204
	Number sentences	.38	4.69	14	122	4	.01544
	Total	24.78	231.00				.00000
PRAISING	Verbal praise	4.59	13.09	127	6	7	.00000
	Specific praise	2.51	6.01	110	11	19	.00000
	Total	7.10	19.1				.00000

n = 144 students

[1]Five minute recording

[2]Number problems only

Minicourse I with grade school children, that elementary juniors were highly acceptant of the minicourse program and procedures as developed by the Far West Laboratory. However, this was a different Minicourse, and, as shown in Table 1, many new elements and procedures were introduced. The results of a questionnaire given to the students at the close of the program are reproduced and summarized in part in Table 3, page 20. The questionnaire was kept completely anonymous, to ensure valid response. Written comments were encouraged and were obtained from a large part of the group.

As may be seen, student reaction was highly favorable, not only toward the program as a whole but also toward most of the components. The written comments tended to support and amplify the data shown. Most critical comment focused upon the absence of "real" children in the teaching, the quality of the research videotaped model lessons and the shortness of the time available for study. Interestingly, the stability of grouping forced by the needs of the research was one of the parts of the program that received approval. The groups were observed to function harmoniously, and to solve problems amicably.

The third objective was the determination of the effect of additional supervisory guidance and positive reinforcement, as previously described. Table 4, page 21, is a tabulation of pre and post test scores for the group receiving the treatment, as compared with a similar group which did not. It may be observed that the scores for both groups are remarkably similar, both in entering and terminal behaviors. It may be noted that the group receiving supervisory reinforcement scored somewhat higher in all categories, but little behavioral significance can be attached to minimal differences.

Finally, the effectiveness of the program in terms of staff time and college resources was an important consideration. To carry out the program for 191 students, with a weekly laboratory period for each student for eleven weeks, involved the following:

1 Laboratory supervisor, 12 weeks, 4/5 time
1 college instructor, five 20 minute presentations weekly, 12 weeks
1 technician, AV, approximately 3 hours weekly
3 rooms, 8 x 14 or larger
3 General Electric Tri Pak Videotape recorders, $1495 each, of which one was a reserve machine. Subsequent experience has shown the average life expectancy of these machines to be in excess of 1400 hours, which with necessary repairs, brings the per-hour cost of a machine to less than $1.25 or $4.75 for each hour-long laboratory session.

TABLE 3

Attitudinal Study - Response Summarization (partial)

Note: Students responded anonymously on a 5 point Likert scale, with the mid-point "average." The students responding to the two "favorable" items of the scale are grouped and expressed as a percent of the total group.

	Question	Percent Favorable
a.	How do you feel about having participated in the mathematics microteaching?	100%
b.	How much do you feel you learned from the program?	78%
c.	How beneficial do you feel it will be in your later professional career?	86%
d.	How important will the experience be for you when you start teaching?	76%
e.	How do you feel about the fact the trailer groups remained unchanged?	98%
f.	What were your feelings toward your group?	98%
g.	Did the comments or reactions of your group help you do better teaching?	83%
h.	The program was done without a great deal of supervision due to the size of the group. How do you feel about more teacher supervision? (specific answers) a. I didn't need it	60%
	b. I'd have liked a little more	31%

TABLE 4

Effect of Supervisory Reinforcement Techniques (Mean Scores)

		Supervisory Reinforcement Group (48)	Non-Reinforced Group (48)
Diagnostic Questions, frequency*	Pre-Test	3.52	4.37
	Post-Test	19.25	19.08
Demonstration Techniques, use in Total Minutes	Pre-Test	.44	.40
	Post-Test	4.01	3.73
Praising, frequency	Pre-Test	7.16	7.25
	Post-Test	20.42	19.06

*5 minutes of recorded teaching

An initial investment in videotape of $100 would have been sufficient for all needs of the program. The newer tapes seem to be almost infinitely reusable. No breakage has been experienced.

Finally, the additional materials and supplies needed for the program were minimal, since the Far West Laboratory made the program available on videotape. The sole cost was the duplication of the teachers' handbooks.

Minicourse V is now commercially available from Macmillan Educational Services, with an initial cost of $1395, or $198 on a six-week rental.

Discussion

It must be emphasized that the purpose of the experiment was program development; the testing of an educational procedure, rather than the separate testing of individual components. The initial experiment, Spring 1969, had shown high student satisfaction in an educationally attractive program that had repeatedly demonstrated its success as an inservice training program. That it had its lesser success at the undergraduate level was attributed to the nature of the situation and the learner; therefore, each adaptation was one that, in the considered judgment of the researchers, would fit the program to the situation and the learners.

A second and primary objective was economy. Not only had the program involved a substantial part of the Center's resources in order to give the program to 30 students, but the larger goal of devising a program that could be effectively operated with large groups of students seemed very important to teacher education.

In conclusion, it would appear that the Spring 1970 program was quite successful in attaining all the stated objectives. The data indicate that the teaching behavior of the students changed quite strongly in the directions that were the objectives of the Minicourse.

Further, the satisfaction of the students with the program was amply evident to the staff, even before the attitudinal study was given at the conclusion of the program. By the end of the third week, it was obvious that the groups were functioning smoothly and well. Though the pilot study has indicated possible acceptance of the peer teaching and the role playing, the strength of the group process was realized as the program was developed.

The testing of the variable of positive supervision was an examination of an additive rather than an alternative factor. The results appear to indicate that the Minicourse, under conditions of peer group laboratory teaching, with extrinsic motivation provided by required attendance and normal college grading practices, requires no additional motivational elements. The implications of this finding are that a program such as this can be supervised by a person who, initially, is not particularly well versed in the skills, providing the other conditions are met.

Finally, and of equal importance, is the comparatively low cost of the program, and its demonstrated use with large numbers of students with minimal staff. It is felt that in this respect, the laboratory program compares very favorably with cost and staffing practices in laboratory work in the more traditional disciplines, such as the science laboratories.

The study offers strong evidence that with the use of the procedural model developed at Fredonia, skills training laboratory programs can become an effective and economical part of an elementary pre-student teaching preparation program.

FOLLOW-UP STUDY - FALL, 1970

In any teaching skills training involving micro-teaching procedures and the self-shaping of teaching behavior, the question of the persistence of the skill behavior in normal teaching over a period of time is of both academic and educational importance. To be effective, the habitual skills must persist in the teacher's behavior.

The determination of this persistence has been the subject of attention by the Far West Laboratory. In a study reported by Walter Borg and others[9], a high persistence of the Minicourse I behavior was shown after a period of four months. A field study reported by the Center[10] has found similar persistence over a six-month period with the same program.

A follow-up study of the use of Minicourse V, which involves a completely different group of skills in a somewhat different teaching situation was felt to be of value as a further testing of the factor of persistence. Of even more importance, however, was the use of the follow-up study as support and substantiation of the procedures for training involved in the Fredonia adaptation of the Minicourse program. Not only was the training accomplished with students who lacked experience in teaching, but, unlike the field studies with experienced teachers, it was carried on with total non-volunteer student groups. Further, the training was carried on in a laboratory situation, remote from "real" teaching. In addition peer-teaching and role playing were used. Even the students criticized the "artificial" nature of the experience, though they enjoyed it.

Procedures

The most immediately available group for the study were the 54 students who began a full semester elementary student teaching experience in September, 1970. In order to achieve the maximum time-delay, 7 months, the testing was postponed until December and early January, at the close of the student teaching. It was also felt that at this time any possible effect of student teaching would be at the maximum.

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9 Walter Borg and others, The Minicourse, op. cit., pp. 81-83.

10 Douglas Rector, Jack Bicknell and David Mack, The Usefulness of Minicourse I in the Training of Elementary Teachers, Teacher Education Research Center, Fredonia, N. Y., 1972.

Of the 53 students actually teaching, the recorded ten minute teaching sessions were obtained from 42. There were two refusals from students in a junior high school and three recordings could not be made because of schools closed by snow conditions. The others ran the gamut from accident to illness. The forty-two students studied were in nearly thirty widely scattered schools, and were fairly well assorted from traditional to innovative schools and from kindergarten to grade 6.

The recorded teaching was analyzed according to procedures described in the Spring 1970 study.

Results

In the selection of the sample group for study, the assumption was made that the sample would prove similar to the total group of the Spring 1970 study. An examination of the pre-test and post-test median scores for the two groups (Col. I-IV), Table 5, shows that while the pre-test mean scores of frequency of behavior were somewhat at variance, the mean total post-test scores for two of the behaviors, diagnostic questions and praising, were almost exactly congruent. The demonstration techniques total mean scores variation of 21 seconds may reflect a slight initial difference in the groups, and is not considered of importance.

The student teachers in the follow-up study were asked to record ten minutes of teaching, using both verbal and number problems, in order to make the teaching sessions more comparable with those obtained for experienced teachers in the main field test which was carried out by the Far West Laboratory. However, teachers of grades K-2 were free to adjust to the ability of their children to read verbal problems. The analysis was carried out on the total recorded session, but of not more than 10 minutes. These results are given in Column V, Table 5. In order to obtain comparisons with the post-test scores, it was considered most appropriate to divide the final scores by two, to obtain an average performance level over five minutes of teaching. These adjusted scores are listed in Column VI, Table 5.

As may be seen from an examination of Columns IV and VI, there was a general overall regression of the skills frequencies. It appears that the behaviors were best maintained in the varied use of diagnostic questions, while the greatest regression appeared in the use of praise, and the use of some of the demonstration skills, particularly estimation, expanded notation, and number line. The latter

TABLE 5 - Comparison of Mean Frequency of Performance;

Total Group, 1970 Study (144) Sub-Study Follow-up Group (42)

Skill	Pre Test*		Post-Test *		Post-Post # Test	Post-Post-Test Adjusted (1)
Column	Total Group I	Study Group II	Total Group III	Study Group IV	Study Group V	VI
DIAGNOSTIC QUESTIONS						
General	2.47	2.42	4.26	5.14	13.24	6.62
Reading	.15	.17	.75	.81	1.69	.84
Word Definition	.84	.40	.44	.29	1.02	.51
Number Concept	.69	.57	12.04	10.71	16.95	8.47
Number Operations	.04	1.88	1.09	1.17	1.88	.94
Total	4.19	5.45	18.58	18.12	34.79	17.39
DEMONSTRATION TECHNIQUES (seconds)						
Estimation	.00	.00	36.49	35.57	13.67	6.83
Expanded Notation	21.57	18.10	104.37	86.71	62.45	31.22
Number Lines	.79	.00	12.76	11.78	14.71	7.35
Man. Materials	.00	.00	61.69	64.86	149.33	74.66
Picture or Diagram	2.04	.00	11.00	7.02	28.05	14.02
Number Sentence	.38	1.14	4.69	4.41	21.24	10.62
Total	24.78	19.24	231.00	210.36	309.45	154.72
PRAISING						
Verbal Praise	4.59	5.12	13.09	13.71	10.07	5.03
Specific Praise	2.51	3.00	6.01	5.40	15.71	7.85
Total	7.10	8.12	19.10	19.11	25.78	12.88

*Pre-test, post test, 5 minutes
#Post-Post test, 10 minutes
All Column V scores ÷ 2 to obtain equivalent with Columns I-IV (5 minutes average).

may reflect the fact that many of the teachers were teaching in the primary grades, and that these are specific teaching behaviors for specific sources of pupil difficulty. The increases in use of manipulative materials, pictures and diagrams and number sentence may reflect the more general utility of the procedures in elementary teaching.

Conclusions and Discussion

The results of the study are of major importance to the research. As the staff watched and analyzed the final tapes of the laboratory teaching, often carefully prepared to "show what they could do," there was a keen awareness of the shortness of the laboratory program and a certainty that there would be a tremendous dimunition, or even extinction of the behaviors in the real and frequently highly stressed experience of student teaching. The decreases were far less than expected, and in some areas, notably in specific praise, and in the use of manipulative materials, pictures, diagrams, and number sentences there were evidences of gain.

The maintenance of the diagnostic questioning frequency is particularly important. It is felt that it represents the basic skill of tutoring, since it is an index of the manner or style of the tutoring. A mean of three diagnostic questions to the minute represents a teacher who may be assumed to be constantly probing and prompting to ascertain the child's difficulties and structuring the teaching to fit his needs.

In Table 6, page 28, the mean total frequency scores of the study group are summarized for two of the behaviors together with the corresponding scores of experienced teachers who underwent the training in the main field test of Minicourse V. It appears to be evident, at least at the conclusion of student teaching, that the students were, indeed, using the skills of Minicourse V in one-to-one teaching at a high level of frequency as compared with experienced teachers.

Most important, the study confines the oft-repeated remark of both field supervisors and cooperating teachers, who dealt with these students individually, "They are different."

TABLE 6

Summary of Two Skills: Praise, and Diagnostic Questions

(From Main Field Study and Fredonia Follow-up Study Group)

	Field Study (1)		Fredonia	
	Praise	Diag. Questions	Praise	Diag. Questions
Pre (2)	6.89	10.25	8.12 (3)	5.45
Post (2)	10.59	15.23	19.11 (3)	18.12
Post-Post (2)			25.79	34.79

1 Walter Borg and others, The Minicourse, op. cit. excerpts from Table 22, p. 157 and Table 23, p. 158.

2 8-10 minute session

3 five minute session

PROGRAM II - FALL, 1970

The experimental program was repeated in the Fall of 1970, with sixty undergraduates in three sections of Education 316, taught by Dr. Alice Hilton. It constituted an iteration of the previous experiment, with small procedural changes, and with the testing of the effects of a variable of symbolic modeling in contrast with visual or perceptual modeling.

The procedural changes are summarized in Table 1, page 15. They represent, in fact, developments that had occurred naturally during the course of the previous experiment, and were incorporated into the model as a result of experience.

The small group presentation of films and materials, and the emphasis on discussion was one of these. It had been found that the presentation of films and materials, and the attempted discussion were cumbersome and unproductive in the large college classes. The key person was, in reality, the laboratory supervisor who found herself repeating, with small groups, what they had not been willing to question and discuss in the large group sessions in the classroom. Making the laboratory section, twelve students or less, the presentation and discussion group was felt to be more effective.

Similarly, an emphasis on the specific skills led to a specific rating of the final recorded teaching as the performance criterion for the grading in the program. The students tended, in spite of all efforts, to disregard the principal of "teach-reteach" and change it into something that could only be called "constant practice." The remark, "I'm still working on specific praise," was very common.

Symbolic Modeling

In the Minicourse 5 program, a combination of perceptual models (filmed models) is combined with symbolic modeling, in that printed typescripts of the model films are included in the Teacher's Handbook, and teachers are referred to them.

Some research concerning symbolic modeling in comparison with live or filmed models has previously been done. Orme (1966) using written and verbal directions as the symbolic

mode found that while both these and filmed models produced behavioral change, the gains from perceptual modeling were significantly greater.[11]

Borg (1970) commenting on Orme's work, cites his finding of the effectiveness of a combination of both symbolic and perceptual models as the rationale for including a combination of these modes in the Minicourses.[12] In an early study, using typescripts, Allen and others (1967) found no significant differences in effect between the two modes.[13]

To retest the procedure under a Minicourse program was attractive for a variety of reasons. The Minicourse experimentation was a setting which allowed the procedure to be tested over a fairly long period of time. Also, it would be tested within a model which, in the previous study, had resulted in a high level of change in the teaching behavior of the students. Most important is the potential value of the procedure in skills training. Typescripts are inexpensive to make and easy to revise in the developmental stage. In use they do away with the need for cumbersome audio-visual equipment. Finally, they may offer flexibility for individualizing the program with large groups of students.

Procedures

In order to test the variable, students in each of the three college sections were randomly assigned to one of two laboratory groups, and one of each pair of groups was chosen by lot for the experimental treatment of written models. This group was to receive transcripts of the models and lessons, while the other group watched the teaching lessons and models as prescribed in the Minicourse programs. In

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11 M.E. Orme., The Effects of Modeling and Feedback Variables on the Acquisition of a Complex Teaching Strategy. Unpublished Doctoral Dissertation (Stanford University, 1966).

12 Walter Borg and others, The Minicourse, op. cit., p. 39.

13 Dwight Allen and others, A Comparison of Different Modeling Procedures in the Acquisition of a Teaching Skill. Paper presented at the annual meeting, AERA (New York: 1967).

order to accommodate the teaching materials and discussion, the length of the laboratory sessions was increased to approximately 85 minutes.

There were discussions of the skills regularly with all groups. However, since the written models were frequently assigned for outside reading, more time was available for discussion with these groups during the presentation session. It was felt that the in-program time should be kept equivalent, and that discussion gave equivalent value and emphasis to the written models.

As in the previous study, pre and post teaching tapes were made. At the close of the semester, the staff found the analysis tasks of this and other studies to be overwhelming. Samples were taken of both the pre tapes and post tapes. The samples showed that the pre-course behaviors of these students were closely similar to those of the students in the previous study, and that the post-course behaviors were very high. Therefore, the decision was made to score only the post teaching behaviors, and to consider the 144 pre-teaching scores of the previous study as normative data for this and subsequent studies. Primarily, it was felt that the making of pre-tapes of lessons, without explanation of the program or the sharing of models of similar teaching was unduly traumatic to many of the students; a beginning of the program with the wrong atmosphere, to no great purpose.

Results

Though the final teaching lessons were, most of them, well in excess of five minutes, only a sample five minutes of teaching was analyzed in order to make the behavioral frequency scores comparable with the Spring 1970 experiment. This comparative listing is shown in Table 7, page 32. As may be seen from an examination of the comparative scores, there were small and positive changes in ten of the sub-categories, as compared with negative changes in only three, while totals in the three major skill areas all showed increases. It must be noted that the increases in the categories of reading diagnosis and word definition may be attributable to the circumstances surrounding the Spring 1970 final teaching. (See page 17)

TABLE 7

COMPARISON OF SKILLS FREQUENCY: SPRING 1970, FALL 1970

FINAL TEACHING SCORES

	Spring 1970 (144)	Fall 1970 (57)
PRAISING BEHAVIOR		
Verbal	13.09	12.02
Specific Praise	6.01	9.05
TOTAL	19.10	21.00
DIAGNOSTIC QUESTIONS		
General Questions	4.26	0.88
Reading Diagnosis	.75	1.77
Word Definitions	.44	1.00
Number-Concepts	12.04	12.80
Number-Operations	1.09	1.89
TOTAL	18.58	24.59
DEMONSTRATION TECHNIQUES (In Minutes)		
Estimation	.61	.62
Expanded Notation	1.74	2.29
Number Line	.21	.20
Manipulative Material	1.03	1.21
Diagram, Picture	.68	.19
Number Sentence	.08	.47
TOTAL	3.85	4.90

A similar tabulation is shown for the testing of the variable of symbolic modeling in Table 8, page 34. Between-group variations are slight, and do not consistently favor either group (+6, +8).

Conclusions

It is apparent that the net result of the procedural changes incorporated into the program is something more than a group of changes toward a more preferred teaching style in the laboratory and a more smoothly functioning program. The analysis of the final teaching indicates that the groups not only equalled but surpassed the highly significant gains in skills behavior reported in the Spring 1970 program.

These findings, however, are overshadowed by the results encountered in the testing of the program. As has been said, the practical utility and low cost of the written models makes them a highly attractive procedure both in the development of new training programs and in normal laboratory use.

In view of this, the initial attitude of the staff was that the procedure was attractive in the highly motivated laboratory situation even if the findings showed it to be somewhat less effective. This attitude was reinforced, as the program developed, by the obvious satisfaction of the "reading-discussion" group as compared with the "model lesson-discussion" group, who showed approximately the same number of complaints and inattention to the lessons and models as had been regularly experienced in the previous study.

To the great surprise of the staff, the results shown in Table 7 appear to indicate that, in the Fredonia laboratory, neither model assumes any effect on the training procedure. These findings are closely supported by a similar study reported by Meredith Gall[14] in which almost identical procedures were used for testing the written treatment. The study was accomplished with 56 experienced teachers. The findings replicate the Fredonia study in that no significant differences were found between the video and written groups.

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14 Meredith Gall, and others. Comparison of Instructional Media in a Minicourse on Higher Cognitive Questioning, Paper presented annual meeting, American Educational Research Association, Chicago, April, 1972.

TABLE 8

COMPARISON OF SUB-GROUP SCORES: SYMBOLIC (WRITTEN) LESSONS AND MODELS: VIDEOTAPED LESSONS AND MODELS

	Group Using Symbolic Models (31)	Group Using Videotape Models (26)
PRAISING BEHAVIOR		
Verbal	11.93	12.11
Specific Praise	9.80	8.15
TOTAL	21.41	20.50
DIAGNOSTIC QUESTIONS		
General Questions	7.22	6.46
Reading Diagnosis	1.87	1.69
Word Definitions	1.00	1.00
Number-Concepts	12.74	12.88
Number-Operations	2.03	1.73
TOTAL	25.19	23.88
DEMONSTRATION TECHNIQUES (In Minutes)		
Estimation	.49	.78
Expanded Notation	2.07	2.54
Number Line	.33	.05
Manipulative Material	.83	1.66
Diagram, Picture	.30	.06
Number Sentence	.56	.36
TOTAL	4.49	5.38

The net effect of the findings of these two studies is considerable. The studies differed in populations; experienced teachers and pre-teachers, in emphasis; since two widely differing Minicourses were used, one of which, Minicourse 5, emphasizes basic skills in one-to-one teaching, while Minicourse 9 is focused upon skills applicable to discussion teaching and, finally, in the training situation, public school and laboratory.

There is strong evidence for the effectiveness and utility of inexpensive and easily developed written models and lessons in skills training procedures using the Minicourse model.

Discussion

The sharply curtailed attempt to combine the skills of Minicourse I with Minicourse 5 emphasized the effect of levels of skill, from simple habitual behavior to somewhat more complex strategies. It would appear that some of the simple behavioral skills of Minicourse 5 are more appropriate a beginning at the pre-service level than other strategies. It was noted that the introduction of praising behavior, quickly followed by the emphasis upon diagnosis, seemed to increase student motivation and interest quite rapidly. In spite of the shortness of the remaining program, the behavioral change level in these skills was comparable with the earlier studies.

PROGRAM 3 - SPRING, 1971

The program for the Spring Semester, 1971, was a further iteration of the previous experiments, and involved 90 undergraduates. The elements of the program were essentially similar to the previous experiments, as shown in Table 1, page 15.

A major variation was the attempt to introduce, without increasing the time spent in the laboratory, several of the skills of Minicourse I, Effective Questioning.

Procedures

As has been noted, the pre-taping was eliminated, thereby increasing the effective use of the laboratory time and enabling a more pleasant and effective introduction to the skills.

The Minicourse I materials were used from the commercial program, for three laboratory sessions, then the Minicourse 5 program was introduced, beginning with praising behavior instead of the usual sequence.

Results and Discussion

The use of the Minicourse I skills in the program was originally intended for four laboratory sessions, and for final research analysis in a teaching session. The lessons were curtailed, and the final measurement was not carried out, for a variety of reasons. It was the considered judgment of the staff, by the end of the second session, that the simple tutorial behaviors of the Minicourse 5 behaviors were more appropriate for the initial introduction of pre-service students to skills than the more complex strategies of discussion management. It was evident that students were less motivated, and that many were floundering. There was little doubt that the skills of discussion could be learned and practiced. It simply was not considered desirable or advisable as a beginning focus, in view of the shortness of the laboratory program and the needs of the students.

The remaining seven laboratory sessions were devoted to the Minicourse 5 program skills. The results of the analysis of the final teaching analysis are shown in Table 9, page 37, along with comparable data from the earlier studies. Gains in praising and diagnostic questioning behavior are consistent. It may be noted that, in a five minute analysis, the use of demonstration techniques had reached a maximum both in the Fall 1970 study and the present study. It must also be noted that, in the scoring, many students had developed the habit of using two demonstration techniques simulatneously. They are not self-exclusive.

TABLE 9

COMPARISON OF SKILLS: THREE PROGRAMS, TERMINAL

TEACHING BEHAVIORS (MEAN FREQUENCY)

	Spring, 1970 (144)	Fall, 1970 (57)	Spring, 1971 (84)
PRAISING BEHAVIOR			
Verbal	13.09	12.02	12.60
Specific Praise	6.01	9.05	11.83
TOTAL	19.10	21.00	24.68
DIAGNOSTIC QUESTIONS			
General	4.26	6.88	6.64
Reading Diagnosis	.75	1.77	2.12
Word Definition	.44	1.00	1.75
Number Concepts	12.04	12.80	12.85
Number Operations	1.09	1.89	2.02
TOTAL	18.58	24.59	25.40
DEMONSTRATION (In minutes)			
Estimation	.61	.62	.54
Expanded Notation	1.74	2.29	2.29
Number Line	.21	.20	.02
Man. Materials	1.03	1.21	1.41
Picture or Diagram	.68	.19	.04
Number Sentence	.08	.47	.32
TOTAL	3.85	4.90	4.63

The sharply curtailed attempt to combine the skills of Minicourse I with Minicourse 5 emphasized the effect of levels of skill, from simple habitual behaviors to somewhat more complex strategies. It would appear that some of the simple behavioral skills of Minicourse 5 are more appropriate a beginning at the pre-service level than other strategies. It was noted that the introduction of praising behavior, quickly followed by the emphasis upon diagnosis seemed to increase student motivation and interest quite rapidly. In spite of the shortness of the remaining program, the behavioral change level in these skills was comparable with the earlier studies.

THE TEACHING SKILLS LABORATORY MODEL - A SUMMARIZATION

In review, the initial attempt to use the Minicourse model of independent study in skills development, without adaptation, resulted in little change in the teaching behavior of the students at Fredonia. It was also judged to be unsuited for large groups of students, in that large numbers of pupils and considerable staff time are involved.

In view of the fact that the Minicourse model, as developed by the Far West Laboratory has had successful use as an inservice program with experienced teachers, the successive experimental programs have focused upon procedural and environmental factors designed to implement the effective use of the Minicourse programs in the undergraduate professional sequence prior to student teaching, without substantial alteration in the programs and procedures.

The basic purpose of the experimentation has been to adapt the Minicourse procedures and curriculum into a model skills development laboratory program that meets the following objectives:

1. To incorporate procedures that consistently effect a high level of change in the students' teaching behaviors.

2. To incorporate procedures that are relatively economical of staff time and resources.

3. To develop a program that has a high level of student acceptance.

Many of the elements of the Borg Minicourse Model remain unchanged in the present undergraduate model. They are:

1. The text, and the lesson and modeling materials (though the latter has been subject to a varied mode of presentation).

2. The program of planned and repetitive microteaching practice.

3. The basic concept and procedure of self-feedback through each student viewing and evaluating his teaching. (This has been somewhat modified through group procedures).

The following procedures have been tested in two successive experiments and are considered basic to the model:

1. Fusion of the Minicourse program with the elementary professional education sequence.

   This has, up to the present, been accomplished through the use of the Mathematics Tutoring Minicourse

in conjunction with Education 316. In the Minicourse model, the training is relevant to daily teaching. The fusion provides relevance to the college student in terms of mathematics, and in terms of other motivational factors available to and characteristic of college instruction. It is viewed, however, as only one factor in achieving relevance.

2. Small group process (the four-student group)

This study and teaching team represents a major variation from the Minicourse model, in that it represents a shift from isolated independent study to group study. (Though the Minicourse model recommends a teaching "buddy," it is not a required part of the inservice model). Instances of the effect of the small group on attendance, preparation, patterns of teaching, and feedback on the tape analysis have been noted. Analysis of the data from the attitudinal study made at the close of the first Minicourse 5 experiment, shows a high level of satisfaction on the part of the students with their group, and a corresponding absence of friction in the group process. There are many indicators that this group process approach may be the component of the model most relevant to the high level of change in the students' teaching behaviors measured in both experiments, and to thehigh level of satisfaction reported.

The Minicourse model is based on independent study. The Fredonia experimentation appears to indicate that independent group study is more appropriate for college students than individual independent study. Since many forward-looking schools are emphasizing cooperative team and unit approaches to instruction, it would seem advisable to include an experience of this nature in the preparation for student teaching.

3. Peer-teaching

Peer teaching is almost inextricably linked in the undergraduate model within the group-study approach. Specifically:

a. It, along with the elimination of individual supervision, contributes greatly to the economical use of staff and resources.

b. The data indicates that it produces a threat-free environment, characterized by mutually supportive interrelationships in which the abstract concepts of the skills can be freely translated into behaviors by the students.

4. The Laboratory Supervisor

The development of the role of the laboratory supervisor has been a major but primarily unstressed portion of the laboratory model. Originally, the training program was a divided responsibility, with the presentation and discussion in the college classroom setting, and the role of the laboratory supervisor that of a technician and attendant. As the programs developed, the advantages of the amalgamation of the two roles into one became apparent. Until the students become familiar with the machines and the procedures, the technical aspects are a larger part of the task. After the first few weeks, however, the role of supervisor as discussion leader, motivator and ultimately, evaluator of skills performance becomes predominant. In any program in which the ultimate measure is performance, there must be an individual who knows the specifics of each skill.

A NEW CURRICULUM OF SKILLS

Margaret Rector and Douglas Rector, Self-Guided Teaching Skills: The Master Teacher's Handbook

During the Summer of 1971, Margaret Rector and Douglas Rector developed and wrote a simplified program of skills for self-guided teacher study, under the title listed above. Since the next projects of the Fredonia Skills Laboratory program described in this report involve the use and testing of the handbook, it was felt that the background, nature and purpose of the handbook should be outlined briefly at this point.

About The Authors

Margaret Rector was an integral part of the Fredonia Skills Program, from 1969 to 1971, as laboratory supervisor, planner, and evaluator of the teaching skills.

Douglas Rector began the study of teaching skills in 1966 with a dissertation proposal, Teachers Questioning Skills: A Training Program. He became involved with the 1969 Minicourse testing program, and has been coordinator of the subsequent projects.

Together, they have authored an independent group study program in reading, entitled, "The Story Plays," published by Harcourt Brace Jovanovich, 1971.

The Handbook

The following statements may serve to describe the purpose and scope of the handbook:

1. The handbook was developed and written in the absolute conviction on the part of the authors that the interaction skills outlined for study are some of the basic master skills of teaching.

2. The handbook has a process orientation. It focuses completely upon the personal and professional interaction between the teacher, the learner, and the learning.

3. The skills-behaviors selected for study are limited to simple behaviors which have been related to a major goal of desirable teacher-pupil interaction, to the degree that they have value as a constant habitual part of the teacher's interaction with children.

4. A major objective has been to write as clearly and simply as possible, avoiding technical language.

5. The area chosen for study, and the mode of presentation, are directed toward securing both the intellectual and the emotional involvement of professionally-oriented teachers in the program. The total message, in its simplest form, is intended to say, "These are the ways you can interact with, diagnose, reinforce and involve the 'poor slob;' the emotionally, socially or educationally deprived child."

6. The handbook is intended for individualization of the study procedure, either on a self-choice, voluntary basis, or as a tool for skills-study under the guidance of a supervisor. After the initial introduction to a self-study and analysis, by means of videotaped or audiotaped recorded lesson, the entire skills curriculum is open for selection and study, in any sequence.

7. It is intended that the handbook be introductory or supplementary, as well as compatible with other similar skills programs such as the Minicourses, or the rapidly-expanding area of teaching skills protocols.

8. A primary purpose of the handbook is to make a skills-study program available at low cost. The primary factor in the achievement of low cost is the use of many brief written "examples" of each skill, rather than longer protocols or more elaborate filmed or videotaped models. The purpose is to reach, through low-cost dissemination, both teachers and schools which, through budgetary limitation, may not otherwise be able to make even a beginning in skills study.

9. Finally, an overall purpose is the total dissemination of skills-study. A major portion of the appendix, directed to supervisors and school leaders, will be devoted to the Minicourse program at Fredonia, and other Minicourse or protocol teaching skills programs.

PILOT STUDY - FALL, 1971

By the beginning of the school year the first preliminary draft of the handbook was ready for pilot testing in the undergraduate laboratory program. After discussions with Dr. Alice Hilton and with Dr. Kenneth Nelson, it was agreed to try the curriculum, with the clear understanding that the program could be shifted quickly to the original program of Minicourse 5, should the curriculum prove to be inadequate.

Procedures

The laboratory program of grouping, peer-teaching, and video-practice was continued as usual. Since Margaret Rector was no longer on the staff of the Center, the role of technician, supervisor and, not incidentally, observer and evaluator was undertaken by the principal researcher, Douglas Rector.

In order to prevent possible contamination of the testing, the material was introduced and its importance stressed in the college classroom, rather than in laboratory discussion as had been the custom. The students were also shown an introductory tape of a peer-teaching performance, in order to make the initial teaching less threatening.

During the laboratory group meetings, the topics for discussion were confined to matters of scheduling, grouping, and other operational procedures. If individuals wished to discuss skills individually, this was done, but no discussion was initiated by the staff.

The course content was structured as closely as possible to the similar skills of Minicourse 5, and the same final evaluation was done for grading purposes as had been previously practiced. Students were told to progress through the skills at their own pace, with an emphasis on the skills they felt needed the most attention.

The only modification to this procedure was that, midway in the program, both Dr. Hilton and Mr. Rector briefly discussed the various demonstration techniques of mathematics and suggested resources for study if the students were unfamiliar with a particular technique. This procedure was felt necessary because the handbook was designed for general use with any subject area, rather than specifically for mathematics.

Results and Discussion

The students were observed to adjust quickly and well to the program. Personal comments concerning their skills were frequent and positive during the program. Most important, there were very few requests from individuals for definition or explanation of the skills.

The final teaching was seven or more minutes in length, but only seven minutes was analyzed. In order to make the scores comparable with those of earlier studies the scores were adjusted to a five minute equivalent. The sample behaviors of praising and diagnostic questions are shown in Table 10, page 46, in comparison with similar scores from the Spring, 1970 study. It was felt that these studies were most nearly comparable, since both were beginning studies before the possible intrusion of supervisory or practice variables.

As may be seen, the amount of verbal praise was very closely comparable in the two studies, while the amount of specific praise was somewhat less in the 1971 study. The patterns of praise, however, were observed to be somewhat different. In the handbook, there are three "levels" of praise, simple use, variety of use, and the use of specific praise and reinforcement. Unlike the final tapes for the earlier studies, these students were trying to use a variety of praise words, and to avoid repetitious use of any praise expressions.

Demonstration techniques were observed and noted but not timed, though the amount of use appeared to be at the levels found in the previous studies. All except one student used two or more techniques.

Finally, the lesson was examined for the presence of the "non-skill" behaviors stressed in the introductory lesson. Though no pre-tapes were made for comparison, the incidence of such behaviors as "O.K,", "all right," and question and answer repetitions were observed to be desirably low.

At the conclusion of the program, some sections of the program were rewritten, and preparation was made for further use in the Spring semester, 1972.

TABLE 10

A COMPARISON OF TWO SKILLS: FALL, 1971, STUDY

PROGRAM I, 1970

	Fall 1971 (40)	Spring 1970 (144)
PRAISING BEHAVIOR		
Verbal	12.98	13.08
Specific Praise	4.13	6.01
TOTAL	17.11	19.10
(Variety of Praise)	6.6	
DIAGNOSTIC QUESTIONS		
TOTAL	21.53	18.58

PROGRAM SPRING 1972

The program was, essentially, a simple iteration of the program of the previous semester (p. 44), with a student population of 37 elementary juniors. The primary procedural change was the reaffirmation of the role of the laboratory supervisor as discussion leader and active guide in the independent study program, as had been done in the previous Minicourse V programs.

Results and Discussion

Procedures for collection and analysis of data were identical to those of the previous study. The behavioral data for the two major skills are tabulated in Table 11, page 48, column 3, in comparison with two previous studies. It is readily apparent that the results of the training in the different programs are consistently similar.

The intended purpose of the procedural changes was to secure a more free and open learning situation, and to obtain feedback from the group concerning improvements and modifications in the Handbook. Both objectives were met, to the satisfaction of the staff.

TABLE 11

A COMPARISON OF TWO SKILLS: THREE STUDIES

	SPRING 1970 N=144	FALL 1971 N=40	SPRING 1972 N=37
PRAISING BEHAVIOR			
Verbal (frequency)	13.08	12.98	12.78
Specific Praise	6.01	4.13	5.14
TOTAL	19.09	17.11	17.92
Variety of Verbal Praise	--	6.60	6.95
DIAGNOSTIC QUESTIONS			
TOTAL	18.58	21.53	19.71

SUMMARY

The value of the Fredonia teaching skills laboratory as a process model in elementary teacher education is well supported by the repeated studies. Not only did the students enjoy and value the training, but the reported studies showed consistently significant changes regularly occurring in their teaching behavior. Further, in the follow-up study, the effect of the training appeared to persist strongly through the elementary student teaching experience.

Of equal significance, operationally, is the fact that the training was carried on as group instruction in the independent-study mode, and proved to be economical of staff and student time, as well as college resources.

The strength of the process appears to lie within a combination of the following factors: high extrinsic and intrinsic motivation of the students, independent study toward clear attainable goals, repeated practice with videotaped feedback and small group process and interaction in a role-playing situation.

Other factors subjected to analysis appeared to have little effect within the situation. Among these are: direct and positive supervisory reinforcement, pupil participation in feedback procedures, and variations in modeling procedures, i.e.: written models in comparison with a combination of visual and written models.

IMPLICATIONS

1. The definition of specific teaching competencies and the development of materials for training teachers in these competencies is a matter of concern to teacher education. The skills laboratory process offers a stable and tested setting in which materials may be tried and evaluated.

2. The results of the studies would appear to indicate that second and third generation skills-training materials may be characteristically simpler and less elaborate than those originally developed.

3. The skills laboratory process may be viewed as a third mode of teacher preparation; intermediate between the large-group on-campus instruction and the frequently highly stressed and variable environment of student teaching. It possesses many of the economies of the former, and provides a controlled and stress-free environment for the study and practice of an organized curriculum of skills. Its development and curricular content should be in relationship to the tasks of the supervisor of beginning teachers.

4. The problems of "competency-based" teacher evaluation and certification are compounded by the fact that the competencies of an experienced teacher can be almost numberless. A beginning in this area will require simplification processes. At the same time, the development of a viable process for modifying teaching behavior through the skills laboratory would imply a similar need for the identification of a common core of simple

competencies relevant to the student's initial teaching experiences. It might be suggested that this congruence of need indicates an area for serious research study.

5. That this "common core" of skills should be the teachers verbal interactive behaviors is supported by the summative work of Barak Rosenshine and others, in the analysis of the many studies of teachers classroom behaviors. The laboratory experience at Fredonia suggests that students value and profit from the practice and self study of the skills relating to these behaviors, and that the skills are very appropriate to teaching practice that verges on simulation, because of the peer group interaction. Self-study is introspective, and there is frequently little place in a busy classroom for introspection.

RECOMMENDATIONS

1. That the procedures for the instruction and operation of a skills laboratory be specifically outlined, as a publication of the Research Center, for dissemination and field testing in other settings. (In process)

2. Pre-service training in teaching skills is suggested as an appropriate addition to the various teaching professional sequences. This may be accomplished feasibly by (a) fusion of the elements into a unified program, or, (b) a separate course offering.

3. It is suggested that teaching skills instruction at the graduate level at the college may take two forms:

   a. Program(s) for teachers essentially similar to the pre-service level. This is envisioned as completely and specifically individualized.

   b. A program, both theoretical and operational, designed for individuals involved in the administration and supervision of skills-training in both the college and public school setting. This may be done in conjunction with (a) in individualized study and small-group study modes, in a workshop setting.

Notes

Much of the original data of the Spring, 1970 study will be incorporated in a forthcoming publication by the Far West Laboratory. The work has also been cited by Barbara Dunning and Meredith Gall in the Arithmetic Teacher, May, 1972, p. 344.

The program was also discussed in "Audiovisual in Action," College Management, April, 1972, p. 13.

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