5-14-1975

Moving Toward Effective Teacher Education-One Man's Perspective

Walter R. Borg
Utah State University

MOVING TOWARD EFFECTIVE TEACHER EDUCATION— ONE MAN'S PERSPECTIVE

by Walter R. Borg

Walter R. Borg

May 14, 1975
Business Auditorium
Utah State University
7:30 p.m.

Moving Towards Effective Teacher Education — One Man's Perspective

Walter R. Borg

51st Faculty Honor Lecture
May 14, 1975
Faculty Association
and
The University Press
Utah State University
Logan, Utah

FIFTY-FIRST ANNUAL HONOR LECTURE DELIVERED AT THE UNIVERSITY

A basic objective of The Faculty Association of Utah State University, in the words of its constitution, is:

> to encourage intellectual growth and development of its members by sponsoring and arranging for the publication of two annual faculty research lectures in the fields of (1) the biological and exact sciences, including engineering, called the Annual Faculty Honor Lecture in the Natural Sciences; and (2) the humanities and social sciences, including education and business administration, called the Annual Faculty Honor Lecture in the Humanities.

The administration of the University is sympathetic with these aims and shares, through the Schorarly Publications Committee, the costs of publishing and distributing these lectures.

Lecturers are chosen by a standing committee of the Faculty Association. Among the factors considered by the committee in choosing lecturers are, in the words of the constitution:

> (1) creative activity in the field of the proposed lecture; (2) publication of research through recognized channels in the field of the proposed lecture; (3) outstanding teaching over an extended period of years; (4) personal influence in developing the character of the students.

Walter R. Borg was selected by the committee to deliver the Annual Faculty Honor Lecture in the Humanities. On behalf of the members of the Association we are happy to present Professor Borg's paper.

Moving Towards Effective Teacher Education — One Man's Perspective

Committee on Faculty Honor Lecture

MOVING TOWARDS EFFECTIVE TEACHER EDUCATION — ONE MAN'S PERSPECTIVE

by

Walter R. Borg

Out of the Ivory Tower

It was nine years ago that I decided to leave Utah State University and join one of the newly formed regional educational laboratories. At that time I had 18 years of educational research behind me, and although I had carried out a number of studies and published about 40 articles in the professional research journals, it was obvious to me that none of my research had had any measurable effect upon education. At best, my work might have influenced the decisions of a few school administrators, but this is an optimistic view since most school administrators prefer not to be encumbered with evidence when involved in the decision making process.

Twenty regional educational laboratories had been set up by the U. S. Office of Education in 1965 to attempt to find solutions to major educational problems, through programmatic research and development. "Programmatic" essentially meant that they would work on long-range programs rather than committing their resources to a collection of unrelated research projects as had been the case with most previous research funding in education. The laboratories were also committed to development although at that time no one had a very clear notion of precisely what development would prove to be in the field of education. Basically, it was believed that most educational research had failed to have an impact on the schools because the practitioners were unable to translate research findings into changes that could be made in the day-to-day school activity. Research and development meant that the laboratories would not only attempt to generate educational

knowledge, but would develop and test materials and strategies for implementing that knowledge in the public schools.

In May of 1966 I accepted a position as Program Director at the Far West Laboratory for Educational Research and Development in Berkeley. My first task was to try to decide what program we would carry out. In other words, what educational problem would we attempt to solve over the next five to ten years? One of the first programs we thought of was improving the effectiveness of teacher education. Although I had not worked in teacher education either as a practitioner or researcher, I share the view that was held by virtually everyone except the teacher educators themselves; namely, that teacher education was tragically ineffective and this ineffectiveness was exacting a terrible cost from society in terms of lost human potential.

In this paper I will attempt to relate some of the things that have happened in teacher education over the past ten years. Although most of the research findings that I will refer to have been published in the professional journals, it is virtually impossible to get a clear notion of what went on from the journals alone. Therefore, I will attempt to pull together some significant bits and pieces of information into a story that I hope will go beyond the impersonal research evidence. I hasten to warn you that this narrative will be told from my own point of view as one of many people who have made a contribution to this field. I will draw quite heavily upon my own work, for by doing so I can give you some real feel for the process of research and development that scientists almost never reveal when they report their work in professional journals.

The State of Teacher Education in 1965

Ten years ago an exhaustive review of the literature carried out by Denemark and MacDonald (1964) turned up virtually no evidence that any aspect of teacher education made the slightest difference in subsequent teaching behavior. Teacher education programs typically include subject matter training, professional training, such as courses in educational methodology, some form of supervised student teaching experience, and some type of liberal arts or general education background.

Subject Matter Competence

With regard to these four areas, the review by Denemark and MacDonald (1964) reported no studies that related general education or the teacher's mastery of specific subject matter either to subsequent teaching behavior or to pupil learning. In a later review of studies relating teacher preparation and subject matter knowledge to pupil achievement, Rosenshine (1971) reported some relevant research. Cook (1965) found no significant relationship between the number of semesters teachers were trained in English and subsequent achievement of their students in this field. Howe (1964) in a study of 51 tenth-grade biology teachers over two semesters explored a number of relationships between teacher preparation and pupil achievement. He found only one instance where teacher preparation was related to pupil achievement. This finding actually favored teachers with two or fewer college biology classes as compared with teachers having a greater amount of training. In comparing teachers having different breadth and depth of courses in biology, and teachers having greater or lesser amounts of college preparation in all sciences, no significant differences in pupil outcomes were obtained. Surprisingly, still another study (Torrance and Parent, 1966) found that teachers with higher numbers of graduate courses and higher grades in mathematics actually obtained significantly lower pupil achievement. This study was carried out with 75 mathematics teachers, grades 7 through 12. A replication carried out the following semester with 66 teachers found no significant difference in pupil achievement attributable either to the number of graduate or undergraduate courses teachers had taken or the grades they had obtained in mathematics.

Another way of estimating the teacher's subject matter competence is by administering subject tests to inservice teachers rather than basing competence estimates on the college courses they have taken. Rosenshine (1971) located three studies done between 1955 and 1965 in which tests of subject matter knowledge were correlated with pupil achievement. (Cook, 1965, McCall and Kraus, 1959, and Morsh, Burgess and Smith, 1955). There were no significant relationships found in any of these studies.

Although the failure of the teacher's subject matter training to relate to pupil achievement is subject to a number of different

interpretations, it is my view that most teachers are trained beyond (but not very far beyond) the critical level of subject-matter mastery necessary to teach their subject. Therefore, although the range of subject matter competence is somewhat restricted, there are few teachers who are at a level where their lack of knowledge seriously affects the achievement of their pupils. I would suspect that if we could locate a sample of teachers who were very poorly trained in their subject areas, such as teachers in some of the underdeveloped nations, pupil achievement would suffer.

The findings I have cited in biology and mathematics, indicating that teachers with less college training obtained better pupil achievement, are difficult to interpret. My guess is that teachers with a good deal of advanced training often find it difficult to deal with the very simple problems that the beginning student may have with the subject. I can recall from my own experience as an undergraduate mathematics major that the professors who were the most advanced mathematicians usually had the most difficulty explaining simple concepts to their students. From the standpoint of subject matter preparation, perhaps the best mathematics teachers for the public schools are those who had to work hard to earn "C's" in their college mathematics courses and therefore have some insights into the problems of the average student and have some empathy for him.

Teaching Methods

With regard to college courses in teaching methods, the literature provides virtually no evidence that conventional courses in this area have any measurable effect on either subsequent teaching performance or pupil outcomes. A study by McCall and Kraus (1959) could find no significant correlations between pupil outcomes and either the amount of teacher training, the grades that teachers had earned in their teacher education courses, or their overall professional knowledge. Two studies by Harris and his associates (Harris and Serwer, 1966, and Harris *et al.,* 1968) attempted to relate the teacher's knowledge of methods in reading to pupil reading achievement for samples of first and second grade teachers. None of the correlations obtained were significant.

A study by Popham (1971) probably provides the most damning evidence against teacher education programs that has emerged to date. In this study Popham identified certified teachers in the areas of social science, auto mechanics, and electronics. He then paired the social science teachers with college students having a major or minor in social science. The auto mechanics and electronics teachers were paired with regular auto mechanics and electronics workers. None of the non-teachers had any teacher training or experience in teaching. Popham then developed curriculum units, pre-tests and post-tests in these three areas. Both teachers and non-teachers taught the units to comparable classes. Instructional time was four hours in social science and nine hours in the other two areas. Post-test scores, adjusted for pre-test differences, revealed no significant differences between the achievement of students who had been taught by experienced teachers and those taught by non-teachers. It seems obvious that if certified experienced teachers cannot promote better learning than non-teachers, then there must be something very wrong with teacher education.

Student Teaching

Even the critics of teacher education have generally conceded that student teaching is a desirable part of such programs. Furthermore, surveys have indicated that most teachers perceive it as the only part of their preparation that was of any value. A look at the research literature, however, raises serious questions about the effectiveness of student teaching as it was carried out ten years ago. When one looks at the typical student teaching being offered, some obvious weaknesses become apparent. First, student teaching was rarely focused on the development of any specific teaching skills. Instead, trainees were thrust into the classroom and using trial and error, attempted to develop some procedure that would get them through the day.

To be effective, a student teaching program should have at least three characteristics. First, it should focus the student teacher very sharply on specific behaviors or skills to be employed in teaching. Second, the student teacher should have a competent model; that is, a supervising teacher who can effectively demonstrate the

skills being learned by the student. Third, the student teacher should practice and receive specific feedback on his use of these skills. Very few student teacher programs in 1965 had these characteristics. Although many supervising teachers are competent, they have learned whatever skills they have by trial and error and are often unaware of the specific nature of the skills they have developed. The student teacher typically sees a mixture of good and bad teaching procedures modeled by the supervising teacher and receives little or no guidance as to what is happening or why.

The college supervisor has usually been the source of feedback for student teachers. However, general supervisory feedback rarely focuses on specific skills that the student teacher can apply in the classroom. A number of studies have demonstrated that typical supervisory feedback has little or no effect upon the behavior of the student teacher. One study by Tuckman and Oliver (1968) actually found supervisory feedback to have a negative effect on student teacher performance.

Effects on the Student Teacher

A number of studies carried out during the sixties attempted through observations at the beginning and end of student teaching to determine some of the changes that took place in the student teacher as a result of that experience. With very few exceptions, these studies present a depressing picture of the typical effects of student teaching. For example, several studies, including Jacobs (1967) Osmon (1959), Gewinner (1968), and Muuss (1969) found that student teachers actually became significantly more authoritarian as a result of student teaching even though most programs attempt to achieve the opposite result. Walberg *et al.* (1968) found that student teachers became more control-oriented and less pupil-centered as they progressed through their student teaching experience. Matthews (1967) carried out a longitudinal study of 52 student teachers and found that by the end of student teaching they had become more restrictive of student behavior, they spent more time stating facts, they showed less acceptance of student ideas, and the length of student responses in their classrooms became progressively shorter.

Why Has Teacher Education Failed

One of my first steps as Director of the Teacher Education Program at the Far West Laboratory was to take a rather hard look at conventional teacher education programs and try to draw some conclusions as to why such programs have failed. My feeling was that if we could set up some hypotheses about the reasons for their failure we might be able to develop materials and strategies that would work; that is, that would actually bring about desired changes in the subsequent teaching behavior of persons trained. We also hoped that if we were successful in developing materials that would change teacher behavior we could eventually also change the pupil. After all, the ultimate test of any program of teacher education must deal with the effects that the program has upon the pupils of teachers who have been trained.

Since subject matter training seems to be at least minimally satisfactory for the most part, we concentrated on some of the deficiencies in teaching methods courses and student teaching. There appeared to be two important deficiencies in the typical methods course. One was that these courses tended to deal with generalities rather than identifying specific behaviors that teachers could employ to bring about specific outcomes. The second deficiency was that most of the courses were taught primarily using lecture and discussion techniques (Willis, 1968). Since teaching appeared to us to be essentially a complex combination of skills, we felt that lecture and discussion were simply not effective ways to develop effective teachers. Even simple skills such as driving an automobile or playing golf cannot be learned adequately by listening to lectures and conducting discussions. What reason, therefore, should we have for expecting that the much more complex skill clusters involved in teaching can be learned in this fashion?

Student teaching appears to have failed in most conventional programs for the same three reasons I mentioned earlier. The learner typically does not focus on specific teaching skills; he has no effective model to emulate and he receives no feedback on his performance that he can translate in specific changes in his teaching behavior.

To draw an analogy let me transfer the methods of conven-

tional teacher education to another area of professional training. How much confidence would you have in a brain surgeon whose preparation consisted of listening to lectures and discussions of brain surgery followed by a few attempts at brain surgery on a trial and error basis under the supervision of another surgeon who had also learned by trial and error and had not been very successful at it? This hypothetical brain surgeon would have learned none of the specifics of brain surgery but would have had a good deal of training in such areas as general physiology, the history of brain surgery, and the philosophy of brain surgery. After each of his trial and error attempts at brain surgery he would meet with his supervising physician who had not done any brain surgery for 15 of 20 years and this physician would give him feedback on his performance, such as "You must be warmer in your contacts with patients," or "Before surgery, you should have considered the whole patient," or "You should try to individualize each operation to the needs of the patient." When one considers the effects of teachers on the minds of their students, the importance of the brain surgeon in our society is dwarfed by comparison.

Building the Minicourse Instructional Model

The Minicourse

The Minicourses developed at the Far West Laboratory represented our effort to build a teacher education strategy that would overcome the weaknesses of conventional programs and really make a difference in what teachers did in the classroom. I would like to tell about the model we followed in building Minicourses and some of the results we obtained.

Microteaching

It seemed to us that the key to effective teacher education had to be a method of providing sharply focused practice and feedback to the learner. Dwight Allen at Stanford University had come up with microteaching as a means of providing practice for preservice teacher trainees prior to their student teaching experience. Microteaching required the trainee to plan and teach

a very short lesson, usually five to ten minutes, to a small group of pupils brought in from the schools. These lessons were recorded on videotape, and shortly after completing the lesson, the trainee would replay the tape and receive feedback from a supervisor. Unlike most supervisory feedback, the feedback at Stanford was usually focused on very specific skills (Allen and Fortune, 1966). Microteaching seemed particularly well-adapted for providing practice for preservice trainees because the logistics of providing this practice in regular classroom situations is usually difficult. Microteaching seemed to have one other advantage for the neophyte. That is, that the trainee would be dealing with a somewhat simpler situation than he would encounter in the typical classroom. He need plan only a short lesson, focus on a few teaching skills and interact with only five or six children. In the first steps of skill learning it is usually desirable for the learner to practice in a simple situation. Then, the practice setting can gradually be made more complex until the individual is able to function effectively in the actual job or situation for which he is being trained.

In spite of the long history of successful experience with simulation, we were frequently confronted by critics in teacher education who maintained that the trainee could only learn in a regular classroom. Our usual retort to this criticism, which by the way was somewhat more effective than citing the research evidence on simulation, was to say "You don't teach someone to drive by sending him out on the freeway." To fully appreciate this statement, you must spend a few years, as I did, fighting the rush hour traffic on California's freeways.

The microteaching approach seemed to offer a great deal of promise. However, the research that had been done at Stanford up to that time using the approach was not very impressive (Allen and Fortune, 1966). Although usually showing statistically significant gains in the performance of the trainees, microteaching had not produced the magnitude of behavorial changes that we felt would be necessary for a program to have practical value for training teachers. The Stanford studies typically employed either small sample single-group designs (in which trainees were observed, then receiving microteaching training and were then observed again) or experimental designs in which some variable such as

modeling or feedback was manipulated. In looking over the Stanford studies it soon became apparent to me why they had not brought about greater changes in teaching behavior. Most of these studies were carried out by doctoral candidates and the experimental treatments often consisted of very short periods of instructional microteaching experience (Fortune, Cooper and Allen, 1965; Acheson, 1964; Allen *et al.,* 1967). I believed that these experimental treatments were simply too short to provide a good test the power of the microteaching approach. Therefore, in spite of the Stanford results, we decided that microteaching had sufficient promise so that it should be included as one of the foundations of our teacher education model.

Focus on Specific Teaching Skills

Our look at conventional teacher education programs had convinced us that one of the most serious weaknesses of these programs was their tendency to deal with generalities rather than to train the teacher in specific classroom behaviors and skills. A few specific skills had been identified at Stanford and had been employed in a number of the microteaching studies. Using these as a starting point, we searched the literature carefully for both research and theoretical writing that identified specific teaching skills. Our hope was that we could build our program on a broad base of teaching skills that had been found to relate to some desirable pupil outcome. We were disappointed in this regard since there was very little research linking specific teacher behavior to pupil outcomes, and what little research had been done generally had serious flaws which rendered the findings suspect. However, by drawing on the Stanford microteaching skills plus the small research base that was available and mixing in a large portion of what we hoped was common sense, we identified twelve specific teacher behaviors that appeared to relate to effective teaching in discussion situations. An example of one of these 12 teaching behaviors is *redirection.* Basically, redirection requires the teacher to ask a question that has several parts or several possible answers. The teacher directs the question to a child, who gives part of the answer, and then redirects the question, usually by nodding or calling names, to several other children, each of whom adds his own ideas

to the initial answer. Redirection is a very simple behavior, and yet it brings about a tremendous difference in discussion lessons. It should be remembered that teachers typically frame a question, call on a child, make a comment, then frame another question, call on another child, make another comment and so on. (Bellack *et al,* 1966). Training a teacher to use redirection seems to achieve two things that are important in improving class discussion. First, the teacher who wishes to redirect is obliged to ask questions that cannot be answered with a single fact. Second, redirection greatly increases the amount of pupil participation and reduces the amount of teacher talk. Teacher talk is shockingly high in most classrooms, ranging from 50-80% in a series of studies that have been carried out over the past half-century (Stevens, 1912; Briggs, 1935; Corey, 1940; Floyd, 1960; Borg *et al.,* 1970).

The 12 teaching behaviors we identified formed the base for our first set of teacher education materials which we called Minicourse I. You will find these behaviors listed in Table 1 along with some of our results which I will refer to later.

Feedback

By this time we had decided to employ microteaching in our instructional model and to focus on specific teaching skills. We were still concerned with the problem of providing adequate feedback to the learner. In the Stanford program, supervisors had been carefully trained to provide feedback on the specific skills being trained. However, since we hoped that our materials would be widely used not only in colleges of education but in inservice programs, we felt that requiring extensive supervisory training would greatly reduce our chances of ever achieving any widespread dissemination of our material. For decades the Stanford College of Education has been regarded as one of the nation's best. We feared that what was practical at Stanford with its outstanding faculty, extensive resources and carefully selected graduate students, would be virtually impossible in the typical teachers college or run-of-the-mill school district.

In exploring alternatives to the supervisor, we soon questioned whether or not we could structure the situation in such a way that the trainee could obtain his own feedback by replaying a video-

TABLE 1: Results from Analysis of Minicourse 1 Pre- and Postcourse Tapes[1]

Behavior	Mean Scores		t[2]
	Pre-Course	Post-Course	
1. Number of times teacher used redirection.	26.69	40.92	4.98*
2. Number of times teacher used prompting.	4.10	7.17	3.28*
3. Number of times teacher used further clarification.	4.17	6.73	3.01†
4. Number of times teacher used refocusing.	.10	.02	.00
5. Number of times teacher repeated his own questions.	13.68	4.68	7.26*
6. Number of times teacher repeated pupil answers.	30.68	4.36	11.47*
7. Number of times teacher answered his own questions.	4.62	.72	6.88*
8. Length of pupil responses in words (based on five-minute samples of pre- and posttapes).	5.63	11.78	5.91*
9. Number of one-word pupil responses (based on five-minute samples of pre- and posttapes).	5.82	2.57	3.61*[3]
10. Length of teacher's pause after question (based on five-minute samples of pre- and posttapes).	1.93	2.32	1.90*
11. Frequency of punitive teacher reactions to incorrect pupil answers.	.12	.10	.00
12. Percentage of total questions that called for higher cognitive pupil responses.	37.30	52.00	2.94†
13. Percentage of discussion time taken by teacher talk.	51.64	27.75	8.95*

[1]Eleven comparisons are based on forty-eight cases. One-tailed t-tests are used in this table and succeeding tables.

[2]This is a statistical test designed to determine whether two mean scores are significantly different.

[3]Means would have been approximately four times greater if entire tapes had been analyzed; t-test would have been higher.

[4]p indicates the probability that a difference in mean scores occurred by chance. For example, $p < .01$ indicates that there is only one chance in a hundred that the difference between pre- and postcourse scores would have occurred by chance.

*$p < .01$
†$p < .005$
**$p < .05$

tape of his microteaching lesson? Since we were focusing on highly specific skills, it seemed possible that the trainee could tally his use of these skills on a checklist without intervention from a supervisor. There was already sufficient research, which I have referred to earlier, to indicate that supervisory feedback as employed in conventional teacher education programs was virtually worthless and might even be detrimental in some cases. There was also some research to indicate that self-feedback using videotape was more effective than supervisory feedback (Acheson, 1964; Orme, 1966). Therefore, we decided to employ self-feedback in which the trainee would make a videotape recording of his microteaching practice, replay the videotape and evaluate his own use of the specific skills he was learning, using some sort of checklist or observation form that focused on these skills.

Modeling

Our search of the literature on human learning had turned up some interesting research on modeling. The work of Bandura and his associates showed clearly that viewing a model brought about changes in the subsequent behavior of the viewer. This research had been done over a range of different kinds of subjects and models. The overall conclusion that seemed to emerge was that if a subject views a model emitting some behavior, the probability of the subject emitting that behavior in the future is increased. Bandura and his associates had also demonstrated that a filmed model was just as effective as a live model in changing human behavior (Bandura and Huston, 1961; Bandura, Ross and Ross, 1961; Bandura, Ross and Ross, 1963a; Bandura, Ross and Ross, 1963b). Some of the Stanford studies on microteaching had also looked into modeling. The most noteworthy one was Orme's study which showed that both written models and filmed models were effective in changing the teaching behavior of teacher-interns (Orme, 1966). This finding was later supported by a more carefully controlled study by Gall *et al.* (1972) in which he compared a filmed model with a written transcript of the film. Orme found that a filmed model was significantly more effective than a written model while Gall's later study found the effectiveness of the two forms of modeling about equal. However, since Gall's study had not been done

when we were building the minicourse instructional model, we decided to use filmed models. Since we were interested in training teachers to use certain behaviors in the classroom, it seemed that the use of films of model teachers could make a worthwhile contribution to our overall instructional strategy.

At that point we had identified all of the main elements in what was to be known as the Minicourse Instructional Model. The model would be designed to change the trainees' use of specific, operationally defined teaching behaviors that were hypothesized to relate to pupil outcomes. The trainees would read a description of the specific skills to be learned, then view a film of a model teacher using the skills and would then plan a short lesson designed to apply the skills. He would microteach this lesson, view the videotape replay and evaluate his own use of the skills. An added feature which had been used in some of the work at Stanford required the trainee to replan the same lesson and teach it again in order to improve his initial performance.

Developing the First Minicourse

From the beginning of our program at the Far West Laboratory we were committed to some form of rigorous development of our educational products. At that time virtually no educational materials had been developed using rigorous research and development cycle, and there was very little in the literature to guide us in setting up such a cycle. Perhaps the most useful information we found was on new mathematics and science curriculums that had been developed with National Science Foundation support over the previous years. Although there were serious flaws in the development of most of these curriculums, we hoped to avoid the problems they had caused. Therefore, having looked carefully at the mistakes of others we tried to put together a research and development sequence that had some chance of avoiding these mistakes. We had also decided that in order to make a clean break with conventional teacher education programs which were almost wholly unvalidated, we would not release any of our materials until we could provide evidence that these materials actually brought about substantial changes in the way teachers performed in the classroom.

In addition to the need to further develop the instructional model that we had tentatively designed and build some sort of a specific research and development strategy, we were faced with many unforeseen problems and unanticipated questions that we had to deal with day-by-day. I would like to describe one of these briefly by way of illustration. The problem related to our development of the model lessons that the trainee would view in order to see an application of the skills that we were focusing upon in the course. Our task was to find a teacher who could model the skills and then make a videotape of this modeling in some usable form. We had decided that the model lessons should be as natural as possible, so we identified several teachers who were reported to be outstanding by their principals and went out to make our first model lesson. Before the lesson we discussed the three skills that we would be watching for with the teacher, giving the teacher a clear operational defination of each skill. We then set up our videotaping equipment and started recording. The results were quite discouraging. Over the next two hours the teacher used each of the skills not more than two or three times. Since we were thinking in terms of a ten-minute model lesson, we took our two hours of videotape back to the laboratory and edited it down to include only the segments in which the skills had been modeled. However, when one edits two hours of classroom interaction into a ten-minute film the results are so disjointed as to be impossible for the viewer to follow. Although we were shaken a bit by this initial failure we decided that we might find another teacher who could do the job better. After trying three or four additional teachers we were forced to conclude that most teachers simply do not use these skills very frequently and our chances of getting a satisfactory model lesson using the *cinema verite* approach were not very good.

On the other hand, we felt that setting up a rigid script with dialogue planned in advance, would be highly artificial and very difficult to obtain unless we used professional actors. We finally ended up with a compromise between these two extremes in developing our model lessons. We worked with the teacher for several hours before any taping was done and planned in some detail what the teacher would do in the lesson. This plan included identifying points where the teacher would try to model the skills. We then

had the teacher teach the lesson with a few of her pupils, and we made a videotape of the lesson in her classroom. After school we replayed the videotape, discussed the lesson with the teacher, and decided upon changes that would improve the modeling behavior. The teacher would then try out the lesson again with another group of children, trying to make the changes we had agreed upon. Usually after two or three trials the teacher was modeling the behaviors effectively. However, neither the teacher nor the pupils had anything approaching a rigid script and each try-out usually resulted in different specific comments, although the pattern of the lesson remained fairly stable. We would then make a final videotape of the lesson, either in the teacher's classroom or in our studio, and after some editing this would become our model lesson.

I shall not go into the detail on the development of the first Minicourse since that in itself is a rather long story.[1] I will mention that our basic research and development cycle involved three steps. These steps were (1) developing a prototype, (2) field testing and evaluating the prototype, (3) revising the prototype based on the field test data. The field test and revision steps were repeated until our evaluation indicated that the course brought about substantial changes in the teacher behaviors being taught. A more detailed description of our development cycle as it finally evolved after several minicourses is given in Table 2.

As we went on to develop more minicourses, it became increasingly apparent to me why conventional teacher education programs had never reached very high levels of effectiveness. The fact is that developing teacher education materials that actually bring about substantial changes in teacher behavior is an expensive and difficult task. Not even the great universities have had the time and money to carry out this task for a total teacher education program, and the typical teacher's college has virtually no chance of developing such a program. We kept rather detailed cost figures on some of the early minicourses and found that developing a single minicourse from the initial planning stage to the point where it was turned over to a commercial publisher, took about 200

---

[1]The process is described in detail in *The Minicourse—A Microteaching Approach to Teacher Education* by Borg, Kelley, Langer and Gall. (Macmillan Educational Services, 1970).

TABLE 2: The Major Steps in the Development Cycle

1. Research and Data Gathering	Includes review of literature, classroom observations, and preparation of report on the state of the art.
2. Planning	Includes definition of skills, statement of objectives, determination of course sequence, and small-scale feasibility testing.
3. Developing Preliminary Form of Product	Includes preparation of instructional and model lessons, handbooks, and evaluation devices.
4. Preliminary Field Test	Conducted by Laboratory personnel in one, two, or three schools, using between six and twelve teachers. Includes collection and analysis of interview, observational, and questionnaire data.
5. Main Product Revision	Revision of product as suggested by preliminary field test results.
6. Main Field Test	Conducted by Laboratory personnel in between five and fifteen schools using between thirty and one hundred teachers. Includes collection of quantitative data on teachers' pre- and post-course performances, usually in the form of classroom videotapes. Results are compared with course objectives.
7. Operational Product Revision	Revision of product as suggested by the main field test results.
8. Operational Field Test	Conducted by regular school personnel in between ten and thirty schools, using between forty and two hundred teachers. Includes collection and analysis of interview, observation, and questionaire data.
9. Final Product Revision	Revision of product as suggested by operational field test results.
10. Dissemination and Distribution	Reports at professional meetings, in journals, etc. Includes work with publisher who assumes commercial distribution, and monitoring of distribution to provide quality control.

man-weeks of research and development effort and cost approximately $100,000 (Borg, 1972). One minicourse probably covers not more than five percent of the basic teaching skills needed by the average teacher.

Can We Change Teacher Behavior?

After Minicourse I had gone through its initial field testing and revision we felt that during the second field test we should collect some evidence to determine whether the course actually brought about changes in the teacher's classroom behavior. Our sample consisted of a group of 48 inservice teachers working in fourth, fifth and sixth grade classrooms. Since we were not sure how well the microteaching practice would carry over into the regular classroom, we decided that our criterion measure would employ 20-minute videotapes of these teachers in their own classrooms working with all of their pupils. After obtaining the pre-training videotape, we trained the teachers using Minicourse I over a period of about four weeks. After training we made a second 20-minute videotape of each teacher's classroom performance to determine whether teachers had improved on the twelve specific behaviors covered in the course. These videotapes were taken back to the Far West Laboratory where trained observers played and replayed the tapes until they had obtained reliable scores on the teachers' use of each of the specific behaviors. The tapes were assigned to the observers at random and the observer did not know whether he was viewing a pre- or post-training tape. The results of our pre- and post-evaluation of Minicourse I are given in Table 1. The initial results were encouraging since the teachers had made significant improvements on 11 of the 13 behaviors that we had scored.[2] The 13th behavior, i.e. teacher-talk, had not been taught directly in Minicourse I. However, several of the specific behaviors had been aimed at reducing teacher-talk and for that reason this variable was scored along with the specific skills covered in the course.

---

[2]One of the original behaviors covered in Minicourse I, "Calling on both volunteers and nonvolunteers" could not be reliably scored from the videotapes. Another behavior, "Framing questions that call for pupil responses" was scored for two pupil outcomes, i.e. *length of pupil responses* and *number of one-word pupil responses.*

Our results demonstrated that training teachers with Minicourse I could bring about substantial changes in their classroom behavior. Establishing this fact was the first big step along the road to building a teacher education program that would actually work. We had also learned that some of these teacher behaviors had brought about changes in pupil outcomes, although we had given little attention to pupil outcomes in the evaluation of this first minicourse.

How Permanent are These Changes?

The next question that we had to deal with, since we now knew that we could change teacher behavior, was how permanent would these changes be? Those of you who are familiar with human learning know that students remember very little about most courses they take in college three months after the course has been completed. Curves showing the recall of course content usually peak immediately after the course is completed and then drop off sharply, eventually reaching a plateau that is often not a great deal higher than the student's pre-course knowledge. If this pattern were to maintain for the minicourses, it would be difficult to justify the time and money involved in developing these courses or the teacher time involved in taking them.

To determine whether teachers would continue to use the Minicourse I skills in their own classrooms, we made a third 20-minute videotape four months after these teachers had been trained and a fourth videotape 39 months after training. Since mobility of teachers was quite high in California at that time, we found that after three years many of the teachers had moved to other schools and were unavailable. We were able to obtain the four videotapes (pre, immediate post, 4-month delay and 39-month delay) on only 24 of the 48 teachers.

The three-year follow-up videotapes were scored using the same scoring instructions and criteria that had been employed in scoring the earlier videotapes. Two raters independently scored each videotape. The inter-rater reliabilities for the scores on the Minicourse I skills ranged from .96 to .99 for the various skills. Performance of the twenty-four teachers included in the three-year follow-up is summarized in Table 3.

TABLE 3: Teacher Performance Before and After Minicourse 1 and on Two Follow-Up Evaluations

Measure	Redirection	Prompting	Clarification	Repeating Own Questions	Repeating Pupil Answers	Answering Own Question	Length of Pupil Response	One-Word Pupil Responses	Higher Order Questions	Teacher Talk
Precourse *M*	23.75	4.05	3.65	14.35	29.90	4.40	6.02	6.00	.38	.53
Postcourse *M*	34.60	11.30	7.90	5.25	5.75	1.25	12.33	2.50	.50	.33
4-month delay *M*	38.15	5.15	10.25	2.55	5.35	.60	10.47	2.85	.51	.34
3-year delay *M*	38.00	5.25	6.10	2.50	6.80	.55	9.74	9.00	.51	.45
Post vs. pre *F*	12.66	14.52	12.61	30.51	53.28	17.47	15.24	6.38	15.77	27.60
p less than	.0018	.0010	.0018	.0001	.0001	.0004	.0008	.0193	.0007	.0001
4 month vs. pre *F*	8.28	.61	22.41	34.07	41.83	23.33	20.23	5.00	14.49	15.90
p less than	.0097	.4433	.0002	.0001	.0001	.0002	.0003	.0376	.0012	.0008
→3 year vs. pre *F*	6.62	.80	11.04	46.68	43.83	29.09	14.15	7.45	13.28	3.92
→*p* less than	.0174	.3790	.0031	.0001	.0001	.0001	.0011	.0123	.0015	.0603
4 month vs. post *F*	.97	6.89	2.87	15.37	.11	2.65	.67	.21	.03	.03
p less than	.3369	.0167	.1065	.0010	.7473	.1200	.4235	.6541	.8685	.8682
3 year vs. post *F*	.01	13.64	2.24	12.58	.89	3.79	2.13	19.58	.05	16.93
p less than	.9097	.0013	.1492	.0019	.3559	.0645	.1585	.0003	.8265	.0005
3-year vs. 4-month *F*	.00	.00	10.45	.01	.99	.03	.26	15.55	.09	18.68
p less than	.9727	.9450	.0044	.9315	.3334	.8708	.6173	.0009	.7618	.0004

One of the 12 skills, *calling on both volunteers and non-volunteers,* could not be scored because of technical problems, i.e., it was often not possible to determine from the videotape recording whether or not a given pupil had volunteered.

Three other skills covered in Minicourse I, *refocusing, frequency of punitive teacher responses to incorrect pupil answers,* and *pausing* had not changed between the pre-course and post-course evaluation and therefore, were not scored since it seemed very unlikely they would show significant results on the three-year follow-up.

This left seven of the original twelve teacher skills, plus two pupil outcomes, plus teacher-talk which were analyzed in the three-year follow-up.[3] Analysis of variance was employed to compare the performance of the subjects on the videotapes made of their teaching performance before minicourse training, shortly after training, four months after training and 39 months after training. Table 3 summarizes performance changes of the 24 teachers for whom all four videotapes were available. The first four rows give the mean performance frequencies for the teacher behaviors. However, the most important results are found in the two rows I have marked with arrows. These give the F-ratios obtained by comparing pre-training teacher performance with performance three years after training and the level of significance of these ratios. You will note that the teacher performance on six of the seven Minicourse I skills plus one of the two pupil outcome variables was significantly improved from the pretraining level.

The two pupil outcome variables are difficult to interpret since, of course, the teachers had different pupils when the three-year follow-up videotapes were made.

The results on the three negative behaviors that the Minicourse attempted to extinguish are especially noteworthy. These behaviors are *repeating the question, repeating the pupil's answer,* and *answering one's own questions.* Repeating the question is generally considered a poor practice since it wastes discussion time and encourages pupil inattention. We consider repeating pupil answers undesirable because it increases teacher talk and also conditions

[3]The teacher behavior *Framing questions that call for longer pupil responses* was not scored directly, but instead was scored for two pupil outcomes on all four videotapes.

pupils to listen to the teacher rather than to one another since they can expect the pupil's answer to be repeated by the teacher. The disadvantages of the teacher answering his or her own questions are obvious. If carried to an extreme, this behavior results in the teacher giving a monologue rather than conducting a discussion.

Table 3 shows that all three of these negative practices were drastically reduced after teachers had completed the course. It will also be noted that these reductions held up remarkably well over the three years following training. These results suggest that the minicourse instructional model may be particularly effective in helping teachers reduce their use of undesirable teaching behaviors.

We also tried to increase the teacher's use of *higher cognitive questions*. Research (e.g., Floyd, 1960) had demonstrated that many teacher questions require little of the pupil except the recall of isolated facts. Our analysis indicated that only 38 percent of the teachers' pre-course questions called for higher cognitive processes. On the post-course tapes, higher cognitive questions increased to 50 percent. This percentage remained virtually unchanged when measured in the two follow-up evaluations. This reflects considerable stability in the post-training behavior of the average teacher who received the Minicourse.

One major objective of the course that related to several of the specific skills was to reduce the percentage of time during class discussion when the teacher was talking. Previous studies have shown that teachers talk as much as 80 percent of the time during class discussions, thereby severely restricting the amount of time available for pupil contributions. Analysis of Minicourse I data revealed that the average teacher talked 53 percent of the time before the course and only 33 percent after the course. Reducing teacher talk to this degree resulted in a profound change in the discussion atmosphere on the post-course videotapes. Pupils were generally more interested and more willing to participate; direct interactions between pupils were more in evidence; and teachers no longer dominated and restricted the discussion.

This change persisted virtually undiminished to the point of the first follow-up. After three years, however, the average

teacher had regressed, and the proportion of teacher talk had increased to 45 percent. Apparently, the tendency for teachers to talk when they could be listening is a very powerful one.

In summary, it appeared from our longitudinal study of Minicourse I that teacher behavior in the classroom could be changed and that at least some of the changes brought about could become a permanent part of the teacher's classroom behavior. However, we had changed but a handful of teaching behaviors when there are probably dozens if not hundreds of such behaviors, still undiscovered, that would have to be changed if we were to develop a really competent teacher. We were still very far away from a total teacher education program that would develop a wide range of teaching skills in a way that would make them a permanent part of the teacher's professional repertoire. Also, we had hardly scratched the surface of the difficult task of relating teacher performance to pupil outcomes such as improved achievement.

What we had done was demonstrate that an effecive teacher education program could be built by developing and proving the effectiveness of Minicourse I, which could become one small part of such a program.

Protocol Materials for Teacher Education

By 1969 the original staff of six people at the Far West Laboratory who had developed Minicourse I had grown into a staff of about 40. At that point, our budget had increased tremendously and we had four teams of developers busily engaged in building minicourses. As program director my role had degenerated to that of a full-time administrator. Since the rapid growth of the teacher education program had in effect removed me from all of the activities that I felt most competent to do, I decided that the best way to resolve this ridiculous situation was for me to remove myself from the Far West Laboratory. When I stated my intention to return to a university, the laboratory director extracted from me a promise that I would not leave until a suitable replacement had been found. It turned out that over two years were to pass before a suitable replacement was ready to take over the program. I never knew whether the director's great care in selecting my replacement was

because he felt my skills were difficult to duplicate or because he felt it would take an outstanding person to correct all the mistakes that I had made in the previous years. In any case, by the fall of 1971 my five years at the Far West Laboratory were over. I was out of Berkeley and back to Utah State University where three is still a crowd, ten minutes is a long commute and drugs are things that you buy in drugstores.

In order to continue my work in teacher education I obtained a grant from the U.S. Office of Education to develop *protocol materials*. This term was originated by B. Othanel Smith in his book, *Teachers for the Real World* (1969). By one definition, a protocol is an original draft or record of a transaction. Essentially, Smith considered protocols to be materials based on original recordings of classroom interactions which could be used to help teachers relate teaching concepts to actual classroom events. My goal in planning the Utah State University Protocol Project was to develop materials that would train teachers to apply concepts and behaviors basic to teaching in either simulated classroom situations, in the case of preservice trainees or in their regular classrooms, in the case of inservice teachers. The instructional model that I developed for the protocol project required the learner to go through the following steps:

1. Scan the *Learning Sequence*. This gives gives the learner a step-by-step outline of what he will do. It is essential when the modules are used in an independent study mode.
2. Read the module objectives and a description of the concept and the three specific teacher behaviors to be used to apply the concept in a classroom.
3. Complete the Recognition Practice Lessons. These are transcripts made from classroom audiotapes. The learner must identify instances when the teacher used the behaviors being learned and determine which behavior was used.
4. View the Protocol Film and identify instances when the teacher in the film used the behaviors covered in the module. This film also provides a model for the learner.
5. Take a performance test designed to measure the learner's ability to recognize classroom applications of the teacher

behaviors and discriminate between applications and non-applications.

6. Complete the Application Practice Lessons. These are transcripts made from classroom audiotapes. The learner writes in appropriate remarks that apply the teaching behaviors at points in the class discussion where the teacher's remarks have been deleted from the transcript. A third transcript is used as the Application Test.
7. Plan a brief lesson designed to practice the teaching behaviors. In the inservice mode, the teacher teaches this lesson in his or her own class, and records it on audiotape. In the preservice mode, the learner practices the teaching behaviors in role playing situations or other simulations.
8. Replay the lesson with another teacher or group of preservice peers, record use of the three behaviors on a tally sheet and discuss.

In some respects the protocol instructional model is similar to the minicourse instructional model. Both employ the use of very specific operational definitions of teacher behavior and both employ motion picture film to provide a model of these behaviors. The protocol instructional model, however, is different in several respects. First, in the protocols the learner learns to recognize the behaviors by reading written simulations based on transcripts made from regular classroom recordings. These simulations are very similar to the written models found to be effective by Gall *et al.* (1972) so, in effect, the protocols combine both forms of modeling, i.e., filmed and written. Later, the learner obtains his initial practice in *applying* the behaviors from written simulations in which certain teacher's remarks have been omitted, requiring him to think of a remark that appropriately applies one of the behaviors he is learning. Therefore, the protocols make use of written simulation during the initial stages of learning, while the minicourses do not. A major problem in using minicourses was the logistics involved in obtaining, setting up and maintaining videotape equipment for the microteaching lessons. Another difficulty is arranging to bring in pupils that the trainee can work with during microteaching.

Since I had worked primarily with verbal teacher behaviors,

I had suspected for some time that an audiotape replay shortly after a practice lesson would be nearly as effective as a videotape replay and would be much cheaper and easier to obtain. Therefore, in the protocols pre-service trainees work with their peers in role playing situations which are recorded on audiotape and replayed and discussed by the peer group immediately after the lesson is completed. For inservice teachers the protocols require the teacher to plan lessons applying the skills being learned, teach these lessons in his own classroom, and record them on audiotape. Each teacher then works with a colleague who is also undergoing training. The two teachers play their audiotapes, recording each other's performance on a checklist and discussing their use of the skills being learned.

During the first three years of the Utah State University Protocol Project, we developed three sets of modules for training preservice and inservice teachers. Our first set of six modules covered 18 teacher verbal behaviors that we hypothesized to be related to pupil achievement. Our second set included four modules concerned with classroom management. These covered 13 teacher behaviors intended to increase pupil work involvement in the classroom and decrease pupil disruptive behavior. Our third set of four modules, which we developed last year, is concerned with eleven teacher verbal behaviors which related to pupil self-concept. The protocol modules we have developed all attempt to go beyond changing teacher behavior to the ultimate criterion of teacher education which is changing the pupils of teachers who have been trained.

During the current academic year our main task has involved carrying out three inservice evaluation studies, one for each of our three sets of protocols. These are aimed at determining whether pupil outcomes are related to the behaviors that our modules train teachers to use in the classroom. The results of these studies, however, will not be available when this paper goes to the printer.

Results of our Protocol Evaluation to Date

Although our data on this year's evaluation studies will not be analyzed until the fall of 1975, we did carry out two similar studies last year and have completed some analysis of these results.

One of these studies evaluated four of our six Teacher Language Protocols while the other evaluated our four Classroom Management Modules. Both studies employed pre- and post-training observations of inservice teachers in experimental and control groups, and also collected data on pupil outcomes. Table 4 shows the performance of our 25 experimental group teachers who completed the teacher language protocols. These protocols covered 12 specific teacher verbal behaviors which we hypothesized to be related to pupil achievement. All of these teachers were working in team teaching classrooms at the fourth, fifth and sixth grade levels. You will note that the experimental group teachers made significant gains on all 12 of the behaviors covered on the four protocols. Many of these gains go well beyond statistical significance and are large enough to have a practical impact on the teacher's behavior in the classroom. For example, several of the behaviors doubled in frequency between pre- and post-training and some such as *use of student ideas* and *paraphrasing* increased several fold.

In this study, each experimental and control group teacher taught a standard curriculum unit that we developed as part of the project — one that was not part of the regular curriculum. Its purpose was to obtain comparable measures of pupil achievement for participating teachers. The unit was taught one hour a day for four days and on the fifth day an achievement test was administered to all children in the classes of participating teachers. This achievement test covered only the content included in the four hour unit.

The achievement test was divided into two parts. One part was multiple choice and was aimed primarily at measuring knowledge and comprehension. The second part was an essay test designed to measure application and other higher cognitive processes. Using teachers in both the experimental and control groups, we computed correlations between each of the twelve teacher behaviors and pupil achievement on both subtests. These were partial correlations in which the effects of the pupil's scholastic ability and socio-economic status were partialled out. We also asked each teacher to go over the test and indicate the degree to which he had covered the material necessary to answer each item. Since teachers vary considerably in their coverage of material even when

TABLE 4: Teacher Application of USU Language Concepts Before and After Training During 100 Minute Observation (N=25)

	Initial Mean	Final Mean	t
CLARITY			
1. *Multiple Questions* — teacher asks two or more questions before seeking a student response. (negative behavior)	9.04	5.15	2.27*
2. *Defining* — teacher defines new terms or elicits student definitions	14.03	27.36	4.09**
3. *Vague Words* — teacher avoids use of vague language (score is number of vague words used, a negative behavior]	20.38	13.92	2.23*
ENCOURAGEMENT			
4. *General Praise* — teacher uses general praise statements such as "good," "fine," etc. in reference to a specific student behavior	67.67	96.04	3.32**
5. *Specific Praise* — teacher uses praise statements which identify specifically the elements of the student's performance that are being praised	13.15	21.05	2.49**
6. *Use of Student Ideas* — teacher acknowledges student ideas by referring to them in the discussion	2.81	13.14	6.79**
EMPHASIS			
7. *Voice Modulation* — teacher uses voice tone and inflection to emphasize main points	10.90	17.03	2.67**
8. *Paraphrasing* — teacher repeats important content of either a student response or of her own remarks using different words or phrases	5.18	15.10	4.75**
9. *Cueing* — teacher calls students' attention to important points by using phrases such as "this is important" or "be sure to remember this."	20.21	36.10	3.86**
ORGANIZATION			
10. *Opening Review* — at start of lesson, teacher reviews or elicits student review of relavent past learning	3.04	6.38	6.03**
11. *Terminal Structure* — near end of lesson teacher adds content relevant information which has not been covered previously	1.74	7.94	3.69**
12. *Summary Review* — near end of lesson teacher reviews important points of the lesson	2.17	6.36	11.40

*t-ratios from 2.06 to 2.48 are significant at .05 level.
**t-ratios or 2.49 or higher are significant at .01 level.

a standard curriculum unit is given to them, we thought that some sort of correction for teacher coverage would be desirable. Combining the teacher's responses we obtained a composite teacher coverage score for each teacher so that the effects of teacher coverage could also be partialled out of the correlations between teacher and pupil achievement. Table 5 gives partial correlations. It will be noted that of the 12 teacher behaviors, four were significantly correlated with pupil achievement on both the essay and multiple choice measures while two additional behaviors were correlated on one measure or the other. Although these correlations are all below 0.5, it should be remembered that the behaviors covered on these four protocol modules represent a very small part of the teacher's total behavior in the classroom. A multiple correlation between

TABLE 5: Correlations Between Teacher Behaviors and Student Achievement When Pupil Scholastic Ability, Pupil Socio-economic Status and Differences in Teacher Coverage of Tested Content Are Partialled Out. (N = 40)

Teacher Behavior	Pupil Achievem. on Essay Measure	Pupil Achievem. on M.C. Measure
1. Multiple Questions	.04	-.08
2. Defining	.36*	.33*
3. Vague Words	-.06	-.11
4. General Praise	.07	.05
5. Specific Praise	.24	.24
6. Use of Student Ideas	.12	.06
7. Voice Modulation	.31*	.36*
8. Paraphrasing	.48**	.49**
9. Cueing	.48**	.47**
10. Opening Review	.36*	.22
11. Terminal Structure	.23	.37*
12. Summary Review	.12	.17

*Partial correlation significant at .05 level.
**Partial correlation significant at .01 level.

the four behaviors that were significantly correlated for both measures and pupil achievement indicated that these four behaviors account for about 13% of the total variance in pupil achievement. These results suggest that if we could identify 20 or 30 basic teaching behaviors that are significantly related to learner achievement over a variety of teaching situations and could train teachers to use these behaviors effectively, it would be possible to bring about substantial improvements in pupil achievement. At present we are far from that goal; however, this research along with other work that is being done over the past ten years suggests that the goal of training teachers in such a way that their pupils will make greater achievement gains is attainable.

Classroom Management

Although training teachers in skills that will improve pupil achievement is certainly one of the most important goals in teacher education, it should be remembered that there are a great many important aspects of teaching that are not directly related to achievement. Classroom management is an example of such an area. A number of surveys have indicated that beginning teachers generally believe that control in the classroom is their most serious problem. Pupils not actively involved in their school work constantly cause disturbances and discipline problems, and opportunities for pupil learning are greatly reduced. Therefore, effective classroom management is not only important in helping children learn desirable work habits and self-control, but probably also has an important indirect effect on pupil learning. We have developed four protocol modules at Utah State University that are designed to train teachers in the use of specific classroom management skills. Three of these modules deal with teacher behaviors designed to increase pupil work involvement and reduce the likelihood of the child becoming involved in disruptive behavior. In other words, these modules are designed to help the teacher create a classroom climate in which pupil interest and work involvement is high and consequently off-task and disruptive behavior is less likely to occur. The fourth module is designed to give the teacher four options for dealing with disruptive behavior when it does occur in the classroom. Most teachers deal with disruptive behavior using what

is called a desist technique. The desist technique involves stopping the disruptive behavior by confronting the child and demanding a stop to the behavior in question. Desist techniques are certainly necessary in certain situations. However, by giving the teacher alternative techniques, it is possible for the teacher to fit his or her response to the type and seriousness of the disruptive behavior.

To determine the effectiveness of our Classroom Management Modules we first observed in the classrooms of experimental and control group teachers for approximately 200 minutes before and after the experimental group teachers had been trained. We were primarily interested in pupil behavior during these observations, although we also collected observational data on teacher use of the classroom management skills. We recorded pupil behavior during both recitation and seat-work situations although most of the skills covered in the Classroom Management Modules can best be applied by the teacher during recitation. The results of our pre-post pupil observations in the experimental classrooms are given in Table 6. Since most of the teachers involved in this study were

TABLE 6: Changes in On-Task and Deviant Behavior in Classrooms of Teachers Who Completed the USU Classroom Management Modules.

Pupil Behavior	Pre-training Mean	Post-training Mean	t*
RECITATION			
1. Definitely involved in classwork	1156.5	1376.6	1.84
2. Probably involved in classwork	289.4	104.6	-3.36
3. Definitely off task	254.1	133.6	3.08
4. Mildly deviant behavior	79.5	34.1	1.90
5. Seriously deviant behavior	2.9	.4	1.79
SEAT WORK			
1. Definitely involved in classwork	1192.2	1540.4	2.21
2. Probably involved in classwork	157.8	116.9	-1.26
3. Definitely off task	217.4	217.9	.0
4. Mildly deviant behavior	101.9	108.9	.2
5. Seriously deviant behavior	3.0	4.7	.4

*$t > 1.74$ is significant at .05 level; $t < 2.57$ significant at .01 level using one-tailed test.

teaching in middle class schools, work involvement was generally quite high prior to training and deviant behavior quite low. However, you will note that the number of occasions in which pupils were definitely involved in their class work increased significantly under both the recitation and seat work situations. In the recitation situation, definitely off-task behavior was nearly cut in half as was mildly deviant behavior. Seriously deviant behavior which disrupted the entire class or constituted a physical danger to one or more children occurred very rarely in these classrooms. However, the little that occurred did drop substantially in the recitation situation.

Although the analysis is not complete for either of these two studies, the preliminary results indicate that teachers can be trained to use behaviors that change pupil outcomes in the areas of achievement and classroom management. At this point, very little experimental research has been done in teacher education that involves changing both teacher behavior and pupil outcomes. We will certainly know much more about the potential of teacher education to change pupil outcomes after the analyses of these two studies and the three we now have underway have been completed.

A Summing Up

In looking over the work that has been done in teacher education over the past ten years, it is obvious that we are still many years away from a comprehensive teacher education program that would train teachers to use a wide range of critical teaching skills that are significantly related to important pupil outcomes. On the other hand, I believe that the work that I have reported does lay the foundation upon which such a program can be built. Ten years ago we had very little evidence available to indicate that permanent changes could be made in the classroom behavior of teachers and virtually no evidence that teachers could be trained to emit behaviors that would have a significant relationship to important pupil outcomes such as achievement. We now know that these things are possible, and this seems to me to be the very knowledge needed to move ahead towards a truly effective teacher education program.

We have also learned, unfortunately, that developing and validating effective teacher education materials is a costly and time-consuming task. Yet, the benefits of building effective programs in terms of the better development of human potential would be tremendous. Based on the work that has already been done, I am confident that we could develop teacher education techniques and materials within the next few years that would bring about at least a 20 percent overall gain in pupil achievement. Therefore, after centuries in which no one has had a clear idea of how to develop an effective teacher, we are finally on the threshhold of programs that will actually teach a teacher how to teach.

References

Acheson, K. A. *The effects of feedback from television recording and three types of supervisory treatment on selected teacher behavior.* unpublished doctoral dissertation, Stanford University, 1964.

Allen, D. W., Berliner, D. O., McDonald, F. J., & Sobel, F. T. *A comparison of different modeling procedures in the acquisition of a teaching skill.* Paper presented at the annual meeting of the American Educational Research Association, New York, 1967.

Allen, D. W., & Fortune, J. C. An analysis of microteaching: New procedure in teacher education. In *Microteaching: A Description.* Stanford University: School of Education, Summer 1966.

Bandura, A., & Huston, A. C. Identification as a process of incidental learning. *Journal of Abnormal and Social Psychology,* 1961, 63: 311-318 .

Bandura, A., Ross, D., & Ross, S. A. Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology,* 1961, 63: 575-582.

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

Bandura, A., Ross, S. A. Vicarious reinforcement and imitative learning. *Journal of Abnormal and Social Psychology,* 1963, 67: 601-607. (b)

Bellack, A. A., Kliebard, H. M., Hyman, R. G., & Smith, F. L., Jr. *The language of the classroom.* New York: Teachers College, Columbia University, 1966.

Borg, W. R. *The cost of different phases of the research and development cycle.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 1972.

Borg, W. R., Kelley, M. L., Langer, P., & Gall, M. *The Minicourse: a microteaching approach to teacher education.* Beverly Hills, Calif.: Macmillan Educational Services, Inc., 1970.

Briggs, T. H. The practice of best high school teachers. *School Review,* 1935, 43: 745-752.

Cook, R. E. *The effect of teacher methodology upon certain achievements of students in secondary school biology.* Unpublished doctoral dissertation, University of Iowa, Iowa City, 1967.

Corey, S. M. The teachers out-talk the pupils. *School Review,* 1940, 48: 745-752.

Denemark, G. W., & Macdonald, J. B. Preservice and in-service education of teachers. *Review of Educational Research,* 1967, 37: 233-247.

Floyd, W. D. *An analysis of the oral questioning activity in selected Colorado primary classrooms.* Unpublished doctoral dissertation, Colorado State College, 1960.

Fortune, J. C., Cooper, J. M., & Allen, D. W. The Stanford summer microteaching clinic, *Journal of Teacher Education,* 1967, 28: 389-393.

Gall, M. D., Dunning, B., Banks, H., & Galassi, J. *Comparison of instructional media in a minicourse on higher cognitive questioning.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 1972.

Gewinner, M. N. A study of the results of the interaction of student teachers with their supervising teachers during the student teaching period (Doctoral dissertation, Mississippi State University, 1968). Ann Arbor, Mich.: (University Microfilms No. 68-9413)

Harris, A. J., Morrison, C., Serwer, B. L. & Gold, L. A continuation of the CRAFT project: *Comparing reading approaches with disadvantaged urban Negro children in primary grades.* New York: Division of Teacher Education of the City University of New York (US Office of Education Project No. 5-0570-2-12-1), 1968. (ERIC Document Reproduction Service No. ED 013 371)

Harris, A. J., & Serwer, B. L. *Comparison of reading approaches in first grade teaching with disadvantaged children* (the CRAFT project, US Office of Education Research No. 2677). New York: City University of New York, 1966.

Howe, R. W. *The relationship of learning outcomes to selected teacher factors and teaching methods in tenth grade biology classes in Oregon.* Unpublished doctoral publication, Oregon State University, 1964.

Jacobs, E. B. Personal and instructional variables as related to changes in educational attitudes of prospective elementary school teachers during two phases of the teacher education program (Doctoral dissertation, Northern Illinois University, 1967). Ann Arbor, Mich.: (University Microfilms No. 67-12,898)

Matthews, C. C. The classroom verbal behavior of selected secondary school science student teachers and their cooperating classroom teachers (Doctoral dissertation, Cornell University, 1967). Ann Arbor, Mich.: (University Microfilms No. 67-1394)

McCall, W. A., & Krause, G. R. Measurement of teacher merit for salary purposes. *Journal of Educational Research,* 1959, 53: 73-75.

Morsh, J. E., Burgess, G. G., & Smith, P. N. *Student achievement as a measure of instructor effectiveness* (Project No. 7950, Task No. 77243). Lackland Air Force Base, San Antonio, Texas: USAF Personnel Training Research Centre, 1955.

Muuss, R. E. Differential effects of studying various teaching on teachers' attitudes. *The Journal of Educational Research,* 1969, 63: 185-189.

Orme, M. E. *The effects of modeling and feedback variables on the acquisition of a complex teaching strategy.* Unpublished doctoral dissertation, Stanford University, 1966.

Osmon, R. V. Associative factors in changes of student teachers' attitudes during student teaching (Doctoral dissertation, Indiana University, 1959). Ann Arbor, Mich.: (University Microfilms No. 59-4279)

Popham, W. J. Performance tests of teaching proficiency: Rationale, development and validation. *American Educational Research Journal,* 1971, 8: 105-117.

Rosenshine, B. *Teaching behaviours and student achievement.* London: National Foundation for Educational Research in England and Wales, 1971.

Smith, B. O. *Teachers for the real world.* Wash., D.C.: American Assn. of Colleges for Teacher Education, 1969.

Stevens, R. The question as a measure of efficiency in instruction. *Teachers College Contributions to Education, No. 48.* New York City: Teachers College, Columbia University, 1912.

Torrance, E. P., & Parent, E. *Characteristics of mathematics teachers that affect students' learning.* Final report, US Department of Health, Education and Welfare, Office of Education, Bureau of Research, 1966. (ERIC Document Reproduction Service No. ED 010 378)

Tuckman, B. W., & Oliver, W. F. Effectiveness of feedback to teachers as a function of source. *Journal of Educational Psychology,* 1968, 59: 297-301.

Walberg, H. J., Metzner, S., Todd, R. M., & Henry, P. M. Effects of tutoring and practice teaching on self-concept and attitudes in education students. *The Journal of Teacher Education,* 1968, 19: 283-291.

Willis, D. E. Learning and teaching in methods courses, part I: Current practice. *Journal of Teacher Education.* 1968, 19: 39-46.

Walter R. Borg

Moving Towards Effective Teacher Education — One Man's Perspective

Walter R. Borg was born 24 June, 1921. in California where he received his education. In 1939 Professor Borg graduated from San Diego State College with majors in education and mathematics and minors in physics and English. In 1964 he received an M.A. and in 1948 a Ph.D. in educational psychology from the University of California at Berkeley.

He came to Utah State University in 1957 as chairman of the Bureau of Educational Research. He remained at USU until 1966 when he returned to California as director of the Far West Laboratory for Educational Research and Development. He returned to USU in 1971.

Professor Borg has written many articles and several books, many of these dealing with his theories of teacher education. Several articles describe the mini course that is mentioned in this lecture.

Professor Borg has also been active in many professional associations, including the American Psychological Association, of which he is a fellow.