

AN ABSTRACT OF THE THESIS OF

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Title: AN ANALYSIS AND SYNTHESIS OF EXPERIMENTAL
TEACHER TRAINING STUDIES (1963-1974) WHICH TESTED
ELEMENTS OF BANDURA'S SOCIAL LEARNING THEORY

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Abstract Approved: _____
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The purpose of this study was to locate and analyze experimental studies of teacher training that tested elements of Bandura's social learning theory. Bandura's theory emphasizes the role of modeling in the acquisition of new modes of interpersonal behavior, and it also provides for the integration of practice and feedback in training sequences. Since these three variables were commonly tested in research on teacher training, Bandura's theory was the framework used for synthesizing the many findings.

The experimental studies were located by conducting four types of searches:

1. a computer search of the Research in Education and Current Index to Journals in Education files;

2. a systematic search of 19 prominent educational journals (1963-1974);
3. a computer search of the files at Xerox University Microfilms for doctoral dissertations;
4. and a search of books on teacher education, teacher training, and teacher behaviors at five university libraries.

Experimental studies were defined as those including: some form of modeling, specific teaching behaviors as the dependent variable, detailed training procedures, an observation system, a true experimental design, and inferential statistics. The 56 studies that met these limitations were carefully examined, and 43 different kinds of information were recorded for each. Then, a cross-tabulation analysis was made for 27 major treatments and 75 teaching behaviors. From this analysis, two-dimensional matrices were prepared to illustrate the particular comparisons of treatment and teaching behavior for each finding. The findings in each cell of a matrix were then examined for replications, effective training procedures, and support for assumptions of Bandura's theory.

The following major conclusions were drawn from the analysis of 476 findings:

1. Most of the findings showed that modeling, in general,

was effective in teaching questioning skills, increasing indirect behaviors, and decreasing most direct behaviors.

The form of modeling (written, audio, or video) was not as important as whether the model behaviors were cued and practice provided following the modeling.

2. The form of practice (microteaching or classroom) did not make any difference as long as a specific model was presented prior to practice. In fact, microteaching practice and video feedback without modeling was less effective than no treatment.
3. Most of the findings showed that when cued modeling and practice were provided, feedback made no significant difference in training teachers. The only exception was when written matrices were provided as feedback of the subjects' use of interaction behaviors.
4. The most effective combination for training teachers to use questioning skills and other interaction behaviors was a specific modeling of the behaviors with supervisory cueing, cycled microteaching practice, and some form of cued feedback. The use of videotape in modeling and feedback was not essential.
5. When teachers used more higher-order questioning or

more indirect interaction behaviors, their students talked more in response to the questions and initiated more student talk.

6. All of the 15 assumptions, postulates, and propositions of Bandura's theory that were tested, received at least partial support from several findings, and contradictory findings were generally small in number. This theory was very useful in comparing findings and explaining non-significant differences.

An Analysis and Synthesis of
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Which Tested Elements of
Bandura's Social Learning Theory

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AN ANALYSIS AND SYNTHESIS OF EXPERIMENTAL TEACHER TRAINING STUDIES (1963-1974) WHICH TESTED ELEMENTS OF BANDURA'S SOCIAL LEARNING THEORY

INTRODUCTION

Research on teacher effectiveness goes back many years in its search for the universal set of "good" teaching behaviors. Ober, Bentley, and Miller think that the teacher role has been studied, defined, and restudied so many times and ways that there is "probably documentation available to support any description of the teacher that one wishes to suggest." (1971, p. 2)

Many educators over the years have held the position that teaching is primarily an art and good teachers are mysteriously endowed with talent that cannot be dissected nor readily developed.

It appears that we have been more concerned with investigating teacher characteristics than with studying teaching behaviors. One can conclude that many teacher educators have greater confidence in the possibilities of eliminating potentially poor teachers from preparation programs than they have in their own ability to increase their knowledge of teaching skills and of how future teachers can acquire them. (Cyphert and Openshaw, 1964, p. 27)

However, many researchers of learning and instruction since 1960 have altered that position through systematic study of teaching-learning processes in classrooms. Investigations carried out by Ryans (1960), Flanders (1970), and others have provided a variety of frameworks for analyzing what teachers actually do.

Donald M. Medley, in his foreword to Systematic Observation of Teaching by Ober, Bentley, and Miller (1971), presents the growing position of many researchers that there is no single set of skills that are universally effective.

The large number of studies of teacher behavior carried out during the last two decades have made it more and more apparent that the effect achieved by a given way of behaving is specific to the teacher, the pupil, and the situation. (Ober, Bentley, and Miller, 1971, p. 2)

Gage (1963_p) proposed that those interested in improving the instructional processes in the schools, stop looking for one pattern of instruction and instead develop the notion of "micro-effectiveness."

Rather than seek criteria for the over-all effectiveness of teachers in the many, varied facets of their roles, we may have better success with criteria of effectiveness in small, specifically defined aspects of the role. Many scientific problems have eventually been solved by being analyzed into smaller problems, whose variables are less complex. (Gage, 1963, p. 120)

The development of systematic observation schemes along with the use of video and audio recorders has made possible the selective analysis of specific aspects of teaching-learning situations. Many researchers who have analyzed teaching-learning interactions have come to the conclusion that teaching is essentially a social function and therefore the teacher needs certain skills in guiding

group behavior and "organizing and directing the activity of large and small groups as to insure maximum individual participation." (Schueler and Lesser, 1967, p. 9)

In the years since the Handbook of Research on Teaching (Gage, 1963_b) was published, not only has the interest in studying teaching grown, but also interest in the major problem of designing instructional strategies for helping teachers acquire specific behavioral skills. Many recent studies in teacher training have made use of systematic observation, task analysis, and videotape recorders to isolate, understand, and develop elemental performing skills for at least some aspects of the teacher's role. As a case in point, microteaching and the technical skills approach have been extensively tested as a training paradigm.

The Problem

Many researchers, such as Cruickshank, feel that "the resources are now available for the development of a competency-based and systematically designed teacher education program." (Cruickshank, 1971, p. iii) The difficulties in developing such programs lay in the fact that much of the research and findings are not readily accessible to teacher educators and "there continues to be a lack of systematic organization of studies and information in

the field." (Brottman, 1971, p. 141)

After extensive search through the literature, Lesser and Schueler found that

. . . the scarcity and recency of research, the inherent complexity of the phenomena, the lack of attention to developing systematic theory, . . . the profusion of nonsignificant differences and testimonials--all contribute to the scarcity of replicated, established findings. (Lesser and Schueler, 1966, p. 326)

Since that time there have been many more studies, but the need for systematic analysis and organization has continued.

The main purpose of this study was to analyze experimental studies concerned with training teachers for specific classroom teaching behaviors and to do the analysis in terms of a social learning theoretical framework, so that the findings could be systematically organized and synthesized. More specifically to:

1. collect studies from a wide variety of sources, which sought to experimentally test elements of Bandura's social learning theory (Bandura, 1963, 1969, and 1971) in the training of teachers;
2. analyze and synthesize the studies in terms of the assumptions and principles of Bandura's theory;
3. organize the findings in terms of desirable treatments for specific behaviors;

4. describe the treatment procedures that have been extensively examined and replicated;
5. suggest areas that need further research.

Needs for the Study

The need for this study was established on the basis of several trends which have developed in teacher training research. These trends are discussed below to give the background from which the studies to be analyzed seemed to develop.

Importance of the Teacher

Critics, such as Conant (1963) and Silberman (1970) have been calling for changes in the educational system ever since the launching of Sputnik. The focus of criticism has often been on the preparation of teachers. As early as 1963, Aschner felt that the studies of Ned Flanders, B. O. Smith, and others had adequately shown that the teaching process must be studied, and

If our purpose is to upgrade the quality of the education that our schools provide, then one focal point of concern for educational theory and research is the quality of teaching done in school, in the classroom. (Aschner, 1963, p. 53)

By 1970, many new curricula had been developed, tried, and tested; and some educators came full cycle to the realization that improvement of education depended on the teacher. The main area

in which many new curricula were tried was in fields of science education where educators came to realize that

We have learned again during this period of science curriculum development that the teacher is of central importance in a learning situation, probably more important than the materials, facilities, buildings or type of school organization. (Jacobson, 1970, p. 224)

Ned Flanders is probably one of the most influential persons in teacher education research because of his interaction analysis scheme and the imaginative research that he and others have carried on using that instrument. He also makes a very persuasive case for the importance of teachers to the educational process.

Teachers are in contact with pupils constantly during the twelve years of public education. To whatever extent these contacts are influential, it is in the classroom that patterns of thinking should be set, attitudes should be shaped, and participation can influence the growth of independence and self-direction. Teaching behavior is the most potent, single, controllable factor that can alter learning opportunities in the classroom. Equalizing educational opportunities depends, in the last analysis, on: How often does the teacher ask questions? What kinds of questions are asked? What happens to ideas that are expressed by children? To what extent and under what conditions are pupils encouraged to express their own initiative? (Flanders, 1970, p. 13)

Focus on Behavioral Skills

Although most educators might agree that the teacher is an important element in the classroom, a large controversy has

gone on through the past decades as to what should be done to train (or prepare) teachers. Since 1960 a large amount of opinion and research has favored going beyond giving teachers academic study and aiding their cognitive growth.

It is all right for a teacher to know about learning, to know his subject matter, to have appropriate instructional materials, and to fit into a given organization for instructions. But what a teacher actually wants to know is, "What should I do in the classroom?" If you ask prospective teachers or teachers on the job, "Where do you really want help?" I think the reply will deal with some aspect of instructional methods. (Gage, 1968_a, p. 119)

Gage is probably the most notable proponent of the position that educators should prepare teachers to deal with interaction in the classroom by providing them with techniques, tools, and strategies. He argues that other professions give their practitioners whole arrays of techniques and "tools of the trade," yet

. . . in teaching, we find relatively few of these ways of making complex tasks more manageable. Teachers are expected to rediscover for themselves the formulas that experienced and ingenious teachers have acquired over the years. (Gage, 1972, p. 195)

Many researchers have followed this kind of rationale and have specified behaviors which generally meet the following criteria:

1. they are related to curriculum objectives and/or educational taxonomies, such as Bloom's Taxonomy (McDonald and Koran, 1969, p. 28);

2. they occur in classrooms and can be observed;
3. any teacher probably needs the skills in his repertoire;
4. and beginning teachers generally have difficulty in performing them (2, 3, 4 from McDonald and Allen, 1967, p. 24).

Rosenshine and Furst (1971, p. 38) feel that the relatively recent emphasis on training teachers to perform specific teaching behaviors, such as asking evaluative questions, represents a "radical shift from the traditional, vague objectives of 'providing meaningful experiences,' 'educating the whole child' and 'providing for individual differences.'" The new focus upon denotable actions is praiseworthy."

Since 1963, a great amount of research has focused on specifying behaviors and training techniques to help teachers acquire those behaviors. Many teacher education researchers have probably taken this direction as the result of admonitions on the following order:

. . . Much of what teachers must know about teaching does not directly follow from a knowledge of the learning process. Their knowledge must be acquired explicitly rather than by inference. Farmers need to know more than how plants grow. Mechanics need to know more than how a machine works. Physicians need to know more than how the body functions.

Teachers must know how to manipulate the independent variables, especially their own behaviors, that determine learning. (Gage, 1964_a, pp. 272-273)

Some educators have objected to the whole idea of "training" teachers because they feel that this violates his individuality,

makes him incapable of operating as a self-determining agent, and cripples his innovative capacity. However, Smith (1969) argues that this is an unrealistic view of training which could actually damage the preparation of teachers.

. . . This is a strange position because it is contradicted by everything known about training in other occupations. The trained surgeon or airplane pilot will perform his duties more successfully in an emergency than anyone else. A trained individual has relaxed control which frees him from preoccupation with immediate acts so he can scan the new situation and respond to it constructively. Training and resourcefulness are complementary, not antithetical, elements of behavior.

The second objection is that there are not enough tested techniques to form the basis of an explicit program. No one can deny that the effectiveness of most teaching skills has yet to be proved.

. . . Research workers can test the effects of these techniques when there is a dependable way to train teachers. The effectiveness of skills cannot be established experimentally until teachers can be trained to perform them. (Smith, 1969, pp. 79-80)

Need for Analysis of Research

It cannot be assumed that teacher behavior will change because of exhortations. Travers (1962, p. 555) felt that as desirable changes in teacher behavior can be identified, systematic work must be undertaken to change teachers' behaviors and to find the best methods for producing such change. Unfortunately, the teacher educator too often has to rely on a handful of studies and personal observations to prescribe a curriculum or make broad

generalizations about instructional practice. At a time when increased relevance in teacher education is called for, there continues to be a lack of systematic organization of studies in the field.

One need only read any recent issue of The Journal of Teacher Education to be impressed with the diversity of studies that are relevant to teacher education. However, as Brottman (1971, p. 146) has pointed out, "the large number of and variety of studies of teacher behavior require organization that will facilitate their use by researchers, teachers and teacher-educators." The problem is that the usual attempts at organization of research take the form of general reviews. Most reviewers take Brottman's approach by following their call for organization with very limited reviews of the available literature. Brottman (1971) reviewed only eleven studies and provided general statements about the findings with no apparent detailed analysis.

Koran (1972) wrote a review that was purported to analyze the research on teacher training relevant to four elements of a teaching paradigm: (1) demonstration variables; (2) practice variables; (3) feedback variables, and (4) interaction of trainee aptitude and training method. However, the paradigm and its theoretical basis was not discussed and was only mentioned in a

single sentence in the summary of the article. In his review of research on demonstration variables, only seven studies are reported and Koran was a principal author of three of those, which gives the strong impression that the review was far from extensive. One might expect that with so few studies, at least the analysis would be thorough; but Koran made no mention of hypotheses to be tested, experimental designs, statistical analyses, or descriptions of experimental treatments for any of the studies. The only things provided were simple declarative statements of conclusion which may have been those of Koran rather than the researcher. He never mentioned how the studies were analyzed nor how the conclusions were derived.

Blosser and Howe (1969) noted that since 1964 there has been an increase in research programs for educating science teachers. However, their review also was very limited in the number of studies included, and they mainly relied on general statements about the results of the studies. In referring to six studies involving verbal interaction analysis, they said that, "These investigations reveal that student teachers can establish classroom teaching patterns and that they are able to vary the verbal interaction patterns in desired directions." (p. 91)

Reviews containing these kinds of generalizations occur over and

over in the literature and give so little for the teacher or researcher to use that one wonders why they are continually accepted for publication.

Rosenshine (1970) points out what may be the worst problem with the general types of review found in the literature; they are often based on secondary sources and yield conclusions inconsistent with the original data. Rosenshine feels that such flaws occur because the reviewers

. . . marshall a number of half-read, half-digested studies into some form of educational truth. In compiling such reviews, the authors usually limit themselves to reading reports abstracted in other reviews or short abstracts of the original investigation. . . . reviewers and authors of short articles frequently omit details which are critical. There is a need for more comprehensive reviews which are based upon a reading of the original research documents, and such reviews should be acceptable as doctoral dissertations. Without such reviews we may continue to be misled into crying "truth, truth" where there is no truth. (p. 446)

Gage (1968) feels that some reviewers may not look for what can be learned from studies and get so engrossed in flaw-finding that they carry their critiques to the point of wholesale rejection of all research which has gone before.

We need more searching reviews of what research on teaching has to offer. Such reviews would piece together the evidence from a variety of approaches to a given problem and determine whether constructive suggestions concerning the practice of teaching might be warranted. (Gage, 1968_b, p. 401)

Gage thinks that "state-of-the-art" papers based on more meticulous sifting of the literature should yield less pessimism about past research and lead to more positive research in the future.

To Cut Across Disciplines

Burnett (1964) commented on the scarcity of research findings which could lead toward modifications of practices in science teacher education, but Bruce (1969) found that researchers were increasingly concerned with teacher classroom behaviors and their relationship to science teacher education by 1969. However, both of these reviewers may have been hampered in making generalizations about science teacher education because they limited their reviews to studies dealing only with science education. Householder (1968, p. 390) noted that educational researchers are often unaware of similar work being done by others in related fields and he felt that

. . . this may be one of the reasons that substantial research activity has not yet made significant contributions toward the establishment of a body of knowledge on techniques and modes of instruction.

When researchers in science education, social science education, vocational education, teacher education, and educational psychology are investigating the same teacher behaviors, then the analyst and synthesizer must go beyond the bounds of disciplines to

bring together all the findings for the improvement of teacher education.

Replication is Essential

The physical and biological sciences have long recognized the importance of replication of studies and have made it a requirement for acceptance of any idea. For too long, educational researchers have been satisfied with single limited studies to answer questions which are often more complex and less controllable than those of the physical sciences.

Ever since the publication of The Handbook of Research on Teaching (Gage, 1963), there has been an increase in research on teaching, and with Campbell and Stanley's chapter on experimental designs, the necessity of replication of educational studies has had greater attention.

Successful replication of research results across times as well as settings increases our confidence in a generalization by making interaction with history less likely. (Campbell and Stanley, 1963, p. 190)

Bauernfeind (1968, pp. 126-127) lists four major errors that can occur in any given study: (1) administrative errors in design; (2) computational errors; (3) sampling errors, and (4) population errors. He especially points out that the only way to know the

applicability of findings for other populations is through replication in a variety of populations.

Replications of studies should serve to point out those studies in which serious errors probably occurred. Without replications, many single studies are cited, recited, and acted upon as though a great truth had been discovered. . . . replication studies will serve to yield a broad view of findings, with the influence of occasional errors minimized. (Bauernfeind, 1968, pp. 126-127)

As Campbell and Stanley (1963) have pointed out, there is a great need to determine whether the results of studies are valid across time and setting so that educators can have confidence in research findings. This will require analysis and synthesis of many studies in order to minimize the errors that can occur in any given study.

. . . Glib insights based on uncontrolled experience can lead us astray. Research on teaching--the effort to apply scientific method to the description and improvement of teaching--is much more laborious and usually makes much less interesting reading than the essay of the shrewd, compassionate, and imaginative observer. . . . In the long run, as humanity has learned, it is safer in matters of this kind to rely on the scientific method. (Gage, 1972, p. 39)

Synthesis in Terms of Theory

Research on teacher education seldom produces studies which are exact replications of previous work. Many reviewers, such as Ornstein (1971) have found that the research on teacher education is

voluminous but so complex and contradictory that little sense can be made from it. This negative view of research is frequently repeated in the literature, as can be illustrated by quotations from two prominent sources.

Rigorous empirical research on applications of new media in teacher training is scarce, and existing studies are primarily recent. As a result, few replicated findings have accumulated as yet. The absence of replication and cross-validation of results is perhaps the most conspicuous characteristic of research on media use in teacher training. (Schueler and Lesser, 1967, pp. 37-38)

. . . The guiding force of much of the research on teaching has not been the discovery and systematic accumulation of empirical knowledge, and certainly not the gradual refinement of seminal models and larger theoretical structures. Rather, the greatest amount of research and discussion has been generated by debate and controversy over certain highly provocative pedagogical concepts and claims about how teaching ought to be viewed. (Nuthall and Snook, 1973, p. 48)

The complexities and contradictions which have come out of the voluminous research are not surprising when one considers how seldom specific theories have consciously been used to direct educational research. There is a great need for research to be done in terms of some theoretical framework. Gage (1963), Ryans (1960), and MacDonald (1964) point out that there are some real and necessary research advantages provided by using a theoretical

framework. A good theory will:

1. reflect past experience and past research findings;
2. provide a framework and starting point from which the researcher may derive new hypotheses;
3. sharpen research objectives;
4. suggest variables which should be included and those which could be excluded from the studies;
5. increase the likelihood of obtaining significant findings;
6. aid in interpreting nonsignificant results which may be meaningful;
7. promote more careful thought about research and discourage "fact gathering" for its own sake;
8. stimulate and guide more practical research toward usable knowledge;
9. and make possible the comparison and accumulation of findings from one study to another.

By the 1960s, the need for theory in educational research was not only well established, but researchers were also seeking to base theory on empirical study.

Research, in education as well as in other areas, seldom consists simply of "fact gathering." It usually issues from a set of assumptions and organized thinking based on inferences from earlier research findings. It then proceeds to extrapolate and go beyond the accumulation of verifiable sensory-perceptual data and take

into account inferences that may be reasonably drawn about the phenomena under consideration. Such inferences, when systematized and fitted together to form a nomological network, constitute empirically-based theory. Theory and empirical research are by no means antithetical; they are complementary rather than opposed. This has been true throughout the history of science. (Ryans, 1965, p. 3)

Many studies do not identify a theoretical framework, and reviewers, such as Denemark and MacDonald (1967), have found it difficult to relate studies to each other. They felt that the lack of any integrating framework had resulted in a divorce of theory and practice.

. . . . Not to establish a theoretical position means that we continue to attack educational problems on a haphazard basis, always potshooting, and fragmenting our efforts rather than making a broad attack on the frontier of the unknown. The significance of a research result is found not in the statistics which spawn it but in the ideas and explanations which vitalize it; truth is more than measurement. (Hurd, 1971, p. 244)

Studies carried on without any theoretical framework have been found to provide very little as a basis for teacher education. Likewise, to review a number of studies and to compile a great deal of findings in a haphazard fashion will do very little to improve the situation.

Many times, the reviewers who attempt to analyze the literature on some segment of teacher education do little more than report the findings under broad headings or techniques for changing

teacher behavior. One such report by Ned Flanders (1970) examines studies to determine the relative effectiveness of four training techniques (T-groups, simulated skill training, interaction analysis and microteaching), but does not really carry out any explicit analysis in terms of a theoretical framework. Knowing the results of studies is not enough.

. . . while the additional accumulation and analyses of empirical data are certainly necessary, the most crucial continuing tasks will be to solve the logical, theoretical problems of combining small, discrete units of facts and propositions into systematically ordered knowledge and at least to approximate the true complexity of the instructional process in this theoretical model. (Lesser and Schueler, 1966, pp. 318-361)

There is a need for theory to guide all educational research, but especially the need is great for developing theory to guide research in teacher education. Teacher education cannot remain in a fragmented ineffectual position if it is to prepare skilled teachers for now and the future.

. . . It is a truism that research should be guided by theoretical frameworks. The process of teaching is complex. The program of teacher education is likely to be even more complex. A sound conceptual framework capable of both analyzing and synthesizing is required. (Clarke, 1971, p. 149)

Peck and Tucker (1973, p. 971) think that theoretical principles are available, in a developing stage, and that additional research will uncover the principles which will lead to more

effective teacher training. They went on to review numerous studies involving Flanders' interaction system, microteaching, and various other feedback systems. However, they failed to examine the principles upon which such research has been based.

There is a great need for reviewers to stop praising the value of theoretical principles and to begin analyzing studies in terms of principles which are already available. Scandura and Anderson (1968, p. 355) pointed out that there is a current trend toward treating teaching as a technology based on learning theory.

. . . Thus, many investigators, typically those with a background in experimental psychology, have been attacking the educational problem with the tools of their trade--such psychological notions as contiguity, reinforcement, and mediation. Most of these scientists are under no delusions that variables already identified in the laboratory will be sufficient in the educational situation; they are willing to embellish, but they are not willing to disregard what is already known about learning.

Novak, Ring, and Tamir (1971) believed that the gap between the experimental psychology of learning and the practical needs of teaching and training could best be narrowed by examining selected studies which test some aspect of a learning theory and interpret the results in terms of that theory. They used Ausubel's theory of reception learning to analyze studies of learning in science. They derived hypotheses based on Ausubel's theory and then reviewed the studies that seemed to test each hypothesis. In this way, they

were able to analyze and synthesize a variety of seemingly unrelated studies.

Many teacher training studies since 1963 have been based on behavior modification principles in at least an implicit way. A large number of them can be traced to the principles of social learning elaborated by Bandura (1962) and Bandura and Walters (1963).

It is the connection of Bandura and his research associates that much of the learning of social interactions takes place through observation and imitation of models. He thinks that operant conditioning is inadequate in the learning and teaching of complex behaviors. Instead, the learner observes an exemplary model performing complex social interactions and then proceeds to imitate the observed behavior patterns. This theory has had a strong influence on research in teacher training since 1963, and will be elaborated in Chapter II. Assumptions and principles of Bandura's theory will be used as the framework for analyzing and synthesizing the studies reviewed for this dissertation in Chapters V and VI.

Basic Assumptions

There are a number of basic assumptions which must be made in order for researchers to conduct experimental studies

on teacher training. The assumptions listed below are primarily those necessary to the experimenter, but they also must be made by the synthesizer of such studies. The particular assumptions of the social learning theory are not included here because they will be incorporated in the elaboration of that theory in the following chapter.

The following assumptions were made for this study:

1. The act of teaching is a complex process that is influenced by a field of forces of which teachers can be only in part aware and which teachers can only partially control.
2. Teaching is an activity which can be described and analyzed.
3. Teacher behaviors are observable.
4. Teacher behaviors can be operationally defined.
5. Similar teacher behavior terms can be related to single categories by comparison of operational definitions, even when a variety of terms are used by different researchers.
6. Teachers can be made aware of the nature of their interactions with students.

7. Teachers can use objective evidence about their teaching to evaluate and change their teaching behaviors.
8. Teachers are capable of making rational and creative decisions regarding their teaching behaviors.
9. Learning of teaching behaviors can be measured only through observations that reveal changes in behavior.
10. The principles needed to guide teacher training cannot be deduced solely from general propositions, applicable to any and all forms of learning.
11. The formulation of training principles can be produced through development of a specifically applicable theory and experimental testing of that theory. Such a theory should relate instructional variables to specific teaching behaviors and learner characteristics.
12. Experimental studies which place emphasis on the management of learning conditions designed to create a desired teaching behavior would be more useful than correlational studies in developing training principles for teacher educators to use.
13. Synthesis of outstanding and replicated experimental studies should produce principles which would assist the teacher educator in developing a training paradigm.

14. Most of the important experimental studies are available in some form, even if not published.

Definition of Terms

1. Teacher - A person engaged in interactive behavior with one or more students for the purpose of effecting a change in those students (whether this person is preservice or full time in a classroom).
(McNeil and Popham, 1973, p. 219)
2. Teaching Behaviors - Observable overt behaviors occurring while the teacher is interacting with students for the purpose of effecting change within natural classroom or a microteaching classroom (subsumes, instructional skills, and technical skills of teaching).

It is recognized that teaching involves more than interaction with students. Hough and Duncan (1970, p. 2) defined four teaching phases: curriculum-planning, instructing, measuring, and evaluating. They further distinguished certain characteristics for each phase in order to provide a framework for all of the teaching acts. However, since most of the research on training

teachers over the past 15 years has dealt with interactive behavior within the classroom and since the social learning theory confines itself to the acquisition of observable behaviors, only studies which deal with the instructing (interacting) phase of teaching behavior have been examined in this study.

3. Behavior Modification - An observable change in the behavior pattern of a person which may come about as a result of cognitive restructuring, operant conditioning, observation of a model, or some combination of the three.
4. Social Learning (also observational learning) - Occurs when a behavior that has zero or near zero probability of occurrence, occurs after the observance of a model performing those behaviors. It includes all of the phenomena generally described as modeling, imitation, identification, copying, vicarious learning, and simulation.

(Bandura, 1969, p. 118)

Further elaboration of the interconnections between the modeling, practice, and feedback aspects of this theory is discussed in the next chapter.

5. Theory - A set of propositions that follow certain rules by which they can be logically related to one another and to some observable phenomena.
(Snelbecker, 1974, p. 31)

A theory needs to have logically related propositions; however, all of the relationships cannot be specified at the beginning, but must develop through experimental testing over a long period of time. Certain definitions and assumptions should also be clearly identified and related to the propositions.

6. Paradigms (or models) - Are not theories, but are patterns for research that often represent variables and their relationships in some graphic or outline form. Paradigms, when carried out in research programs, can lead to the development of theory and often prove useful in communicating the logical connections between the theory's propositions. (Gage, 1963, p. 95)

7. Teacher Training - A subset of teacher education, which can be differentiated from the wider area, in that teacher training focuses on a specific set of instructional behaviors that teachers may use in

the classroom. (Koran, 1972, p. 285) These behaviors are carefully specified and the teacher is guided in their acquisition and use under carefully controlled conditions. In the larger area of teacher education, the outcomes are broadly defined in terms of knowledge, attitudes, and philosophies, whereas in teacher training, the outcomes are more narrowly defined in terms of observable behaviors.

Most of the studies which were analyzed followed a "systems approach" paradigm, consisting of six basic steps outlined by Peck and Tucker (1973, p. 943):

- a. precise specification of the behavioral objectives;
- b. carefully planned training procedures aimed explicitly at those objectives;
- c. measurement of the results of the training in terms of the behavioral objectives;
- d. feedback of the results to the learner;
- e. reentry into the training procedure;
- f. and measurement, again, of the results.

8. Systematic Observation - An observational technique in which observable teaching behaviors are recorded

in the form of tallies or checks into predefined categories with a minimum of time and judgment required between the observation of a behavior and the recording of it. (Medley and Mitzel, 1963_a, p. 253)

Observation systems generally have two major characteristics: (a) it makes possible the classification of all events that occur in the classroom that are in the domain of the system, and (b) the events can be categorized as falling into one and only one of the several categories. (Hough and Duncan, 1970, p. 117)

Most observation systems try to focus on certain sets of behaviors which have a particular set of interrelationships. As an accepted frame of reference, systematic observation serves as a set of rules by which teachers and researchers can analyze and plan teaching strategies. Since 1960, many systems for categorizing teaching behaviors have been developed.

Mirrors for Behavior (Simon and Boyer, 1967, 1970) includes documents on 79 observational systems, and this represents only a part of the systems which have been developed.

9. Experimental Studies - Are those of a research design in which variables are manipulated and their effects upon other variables are observed.
(Campbell and Stanley, 1963)

The result in this kind of study usually takes the form of a difference between means on the dependent variable. Campbell and Stanley describe and analyze 16 different designs, but only discuss three "true experimental designs" which have all internal validity factors controlled. (pp. 183-204) These three designs, or some variation of them, must be used in the studies analyzed in order for them to be considered experimental for purposes of this study.

10. Correlational Studies - Are those of a design in which the variables are not manipulated. Typically, some measures of a teacher's behavior and personal characteristics obtained by observation, testing, or rating are correlated to see if any relationships exist. (Gage, 1972, p. 174)
11. Operational Definition (of teaching behaviors) - Names specific features of the observable behavior and the conditions of occurrence (tells what to look

for in order to recognize the behavior). All descriptive terms in the definition refer either to objects, or to some directly observable properties and relations among them. (Brodbeck, 1963, pp. 49-51)

12. Replications - Experimental studies in which the same variables are manipulated and examined under the same or slightly varied conditions. With the great proliferation of behaviors and observation instruments available, the similarity of variables and treatments will often have to be determined on a comparison of the operational definitions.

Limitations of the Study

A number of limitations were necessary in this study in order to make any meaningful analysis and synthesis possible. To try to analyze all studies in teacher education would have been an impossible task, since thousands have been done. Therefore, the following limitations were made in the selection of studies:

1. The studies had to test some principle of social learning theory in the training of teachers (either preservice or inservice). The main factors involved were modeling,

practice, feedback conditions, or some combination as the independent variable. The use of social learning theory had to be at least implicit in the study.

2. An operationally defined teaching behavior (or skill) was used as the dependent variable. McDonald and Allen (1967, p. 20) advocate that training experiments limit the behavior class to be learned. A specific behavior, such as reinforcing pupil participatory responses, should be the dependent variable under one set of experimental conditions.

. . . This limitation effectively eliminates the problem of attempting to change a wide range of teaching behaviors and of measuring these changes under the rubric of general teaching effectiveness.

3. The studies selected had to use an experimental design (as previously defined) so that some conclusions could be drawn about cause-effect relationships. Correlational data included in the experimental studies were also considered if they seemed to help clarify any of the relationships.
4. A systematic observation technique was used to collect data on the dependent variable (teaching behavior), even though other means were sometimes used in

conjunction with systematic observation to obtain additional data.

5. The dependent variable (teaching behavior) was observed in a regular classroom or some "micro" classroom setting (where smaller groups of students or peers were the subjects of instruction in a classroom or other representative setting).
6. Inferential statistical analysis of data was made and reported, including the type of test, acceptance level, and some details on the data analyzed. This required that the studies have adequate sized samples, as well as a good experimental design.
7. The studies had to be printed in English and available through journals, published books, reports from ERIC centers on microfiche, and unpublished doctoral dissertations.
8. Studies were omitted if they were only concerned with dependent variables such as, attitudes, self-concepts, perceptions, knowledges, and skills tested by paper and pencil instruments. This was primarily because such variables are not directly observable in the

classroom, and they are not the types of behavior to which social learning theory applies.

9. The training procedures (independent variable) had to be very clearly described so that comparisons could be made with principles of social learning and with other similar studies to determine whether they were replications.

. . . the set of operations in an experiment must be replicable to some degree. This requires that the description of the set of operations must be sufficient to permit another experimenter to reproduce the set of operations to a reasonable extent. Such a detailed and complete description of the experiment is also necessary for the reader who must estimate to what extent the results can be generalized to other situations. If the description is not sufficient, the scientific value of the experiment is diminished.

(Bracht and Glass, 1968, p. 455)

10. The search for studies was confined to the years since 1960 because so many reviewers have previously found very few experimental studies before 1960, even in the broader area of teacher education.

. . . Since 1960 there has been a dramatic increase of interest in the analysis of the teaching process. A survey of the literature published in 1963 was barely able to turn up a score of studies using objective procedures for analyzing teachers' classroom behavior; now an admittedly incomplete anthology of

instruments of this type runs to sixteen volumes. (Medley, 1972, p. 430)

. . . in 1964 Cyphert and Spraight reviewed 188 fairly recent studies in teacher education. The poor quality of research in this field of study is reflected by the following observations. Only six projects included a measure of teaching behavior; most of the projects were surveys; none of the studies included a measure of the college instructor's teaching behavior. (Flanders, 1970, p. 347)

11. Studies which only made gross comparisons between some poorly defined "experimental" treatment and the vague "traditional" procedure were not included. Several researchers and reviewers have pointed out the many problems and weaknesses of such studies and find them practically without value to the educational profession.

. . . The writer's evaluation of the last 50 studies which have been undertaken which compare the outcomes of one teaching methodology with another is that they have contributed almost nothing to our knowledge of the factors that influence the learning process in the classroom. Many of them do not even identify what the experimentally controlled variables are and indicate only that the study compares the outcomes of educational practices in the community where the study originates with educational practices elsewhere. (Travers, 1962, p. 539)

. . . The time is long overdue when investigators stop inquiring whether one mode of presentation is as good as another and undertake instead investigations of those

conditions thought to optimize the realization of educational objectives under clearly specified and delimited conditions. (Siegel and Siegel, 1964, pp. 17-20)

II. REVIEW OF LITERATURE

This chapter presents the historical background that led to the development of teacher training research previous to 1967. The background discussion will be followed by a presentation of the kinds of classroom teaching behaviors and training paradigms that developed out of the early research efforts. Then the theoretical basis for analyzing the recent experimental studies will be presented.

Historical Background

During the late 1950s and early 1960s, a number of developments took place in society and educational research that changed the nature of much research in teacher education and brought a great increase in the number of experimental studies concerned with training teachers to use specific teaching skills.

The NDEA act of 1958 was the beginning of serious interest in and monetary support for educational research by the federal government. Many types of curriculum materials were developed for teachers, and this was followed by an increased interest in teacher education. Cyphert and Spaghts (1964) published a report on a United States Office of Education conference on research in teacher education that showed an acceleration in variety and quantity of

studies for the period of 1958-1964.

Moreover, it is our strong impression that a quantum leap occurred, somewhere between 1963 and 1965, in the quality of both the design and the reporting of research in this field. One can only speculate about possible causes, but the most likely one would appear to be the influx of substantial federal monetary support for graduate training and research in education, for the first time in American history, starting in the early 1960s. (Peck and Tucker, 1973, p. 941)

In the late 1950s, private institutions also began to support research in teacher education. By 1960, millions of dollars were being given to educational institutions to carry on such research. The major efforts were probably made by the Fund for the Advancement of Education and the Ford Foundation to bring about a series of what they called "breakthroughs" in teacher education. In the early 1960s, a sum of \$29 million was allocated to 39 institutions for investigation of teacher training. (Denemark and MacDonald, 1967, p. 234)

Following the influx of large amounts of money came the development of centers for educational research that concentrated mainly on teacher education. The federal government began giving funds in large packages to centers such as the Northwest Regional Educational Laboratory, the Stanford Center for Research and Development in Teaching, and the Texas Research and Development Center for Teacher Education. These centers and others were able to collect

the brainpower and resources to study the inherently complex phenomena of teacher education.

. . . a programmatic attempt to study at once many parameters operating as a totality requires an extremely complex, multifaceted research operation which is inherently expensive to perform correctly. It appears quite understandable, therefore, why very few good empirical studies of teacher education were ever carried out before the middle 1960s. (Peck and Tucker, 1973, p. 942)

By 1962, experimental and learning-theory oriented psychologists were showing increasing interest in education and training. Training studies were being carried out in military settings by psychologists, such as Sheffield, who were interested in the application of programmed instruction. Much of this work stressed breaking complex tasks into smaller segments which could be demonstrated and practiced before attempting the entire sequence. A large number of these studies became available through a symposium report edited by Lumsdaine in 1961 and a much larger work, Teaching Machines and Programed Learning - A Sourcebook, by Lumsdaine and Glaser, 1960.

Lumsdaine reported on instruments and media of instruction in the 1963 edition of the Handbook of Research on Teaching (edited by N. L. Gage). In his chapter, he organized most of the programmed learning variables that had been tested up to that time. This listing

and discussion of variables in using media for instruction prepared the way for the use of media in teacher training studies.

In 1964, the National Society for the Study of Education (NSSE) published their 63rd Yearbook, in which Glaser described the implications of training research for education. He pointed to the many devices and aids developed by the military for instruction in complex tasks, and he recommended that educators should be using the same types of manuals, films, teaching machines, and simulators in training teachers. At the same time, he described the task analysis process that psychologists had developed for military training in which they attempted to define specific objectives in behavioral terms. The combination of instructional media and behavioral specification of tasks provided by years of military research was pressed upon educational psychologists and researchers during the 1960-1964 period as a promising direction for teacher education research.

During this same period, the Carnegie Foundation persuaded James Bryant Conant to undertake a two-year study of the education of American teachers. His report was published in 1963 and was even a best-seller for several weeks. Many people from a variety of backgrounds read this report which described the many flaws in teacher education programs across the country. For several years thereafter, it was the best known and most controversial study of

teacher education. As a result, much pressure and money were applied toward the improvement of teacher education.

In the early 1960s, there were several attempts to carefully analyze the teaching act through the study of teacher behavior in classroom situations. Studies by Flanders (1960) and Bellack (1963) and their associates helped educational researchers see new ways to check the speculations of philosophers and psychologists. Flanders and associates developed a classification scheme which they used to observe and describe the process of teaching. Bellack and associates conducted an extensive descriptive study into the linguistic behavior of teachers and students in 15 social studies classrooms in New York City. Both groups felt that before any prescriptive work on the teaching act could be done, there had to be a description of just what occurs in the classroom. Flanders (1963) gave what he believed to be the best progression for research on teaching. He called for a deemphasis on knowledge and increased definition of what goes on in classrooms, developing new procedures for analyzing teaching behavior and changing roles for the education instructor.

. . . the dichotomy between field and theory will disappear. The instructor's role will shift from talking about effective teaching to the rigorous challenge of demonstrating effective teaching. . . It will be the responsibility of the education instructor to help prospective teachers discover what their teaching intentions should be and then

create training situations in which behavior gradually matches intentions with practice. (Flanders, 1963, p. 260)

There was probably no more influential source among educational researchers than the Handbook of Research on Teaching (edited by N. L. Gage, 1963). This single volume summarized much of the previous work in teacher education, teaching behavior, systematic observation, and experimental designs. Several of the main researchers in their fields pointed to the shortcomings of research on teaching up to 1963, and then went on to give what they felt was the proper direction for future research.

Certainly there is no more obvious approach to research on teaching than direct observation of the behavior of teachers while they teach and pupils while they learn. (Medley and Mitzel, 1963, p. 247)

. . . the concepts in current use are less abstract and are pointed more directly toward behavioral referents; research workers are less likely to ask an observer to make a global judgement about the effectiveness of the teacher. Rather, they now ask him to record physical movement of the teacher in the room or the dominant intent of individual statements of teachers and children, and to relate these operations to an organizing concept like classroom control or climate. (Withall and Lewis, 1963, p. 710)

A great increase of interest in improving experimental designs followed after the suggestions of Campbell and Stanley (1963). They elaborated desirable experimental designs and appropriate statistical procedures which were very influential in the decade that followed.

They also stressed that for the complex analysis of teaching situations, multivariate analysis should be employed. At the same time, computer programs capable of handling multivariate analysis became increasingly available and, therefore, the researcher no longer found it necessary to have a detailed knowledge of computational techniques in order to use multivariate analysis.

From 1963 on, there was a shift in teacher education research from subjective evaluations and correlational studies toward true experimental studies that used more sophisticated observation systems based on objective counting of teacher-pupil interactions, complex experimental designs, and complex statistical analysis of data with the aid of computer programs. There was also a renewed interest in developing theories to direct educational research. Writers such as Gage (1963), Goodlad (1962), Howard (1963), Wattenberg (1963), and Woodring (1964) called for a balance between theory and practice. They saw a need for conceptual frameworks by which to plan programs for developing and evaluating fundamental teaching skills.

All educational programs presumably rest upon some sort of psychological theory, but, in the case of recent reform movements, the theory is implied more often than stated. Many of the new programs being tried, and the changes being urged, are planned and sponsored by individuals or groups who give scant attention to theories of learning. . . (Woodring, 1964, p. 286)

By 1966, a few teacher training studies had been tried using observation systems, true experimental designs, and appropriate statistical analyses, but much still remained to be tried. Lesser and Schueler (1966) recognized the scarcity of such research and pointed to the need for more research on media usage in teacher education. They felt that media research must focus not only on the methods used in teaching, but also on the nature of the subject matter and skills to be learned by prospective teachers.

In 1967, Schueler and Lesser again pressed for better definitions of skills and precise descriptions of experimental and control conditions. Their book, Teacher Education and the New Media (1967) repeatedly called for careful prescription of experimental conditions and attention to detail, so that productive results and replications might be found. They also described the great potential of media for teacher education, that they felt could lead to great improvements.

A greater number of experimental studies began to appear in the literature during 1967 and increased for several years thereafter. By 1970, many studies of teacher training were attempting to use media to help teachers develop specific skills, and researchers were tending to repeatedly use a few techniques.

Four techniques -- T-groups, simulated skill training, interaction analysis, and microteaching -- have singly or in some combination provided innovations for preservice and inservice programs in

education. These techniques emphasize teaching behavior because it is conceptualized, performed, and information about the performance is made available to the actor. (Flanders, 1970, p. 347)

Many of the experiments tried during the years 1966-1974 were unique because they:

1. attempted to modify teaching behaviors by using paradigms adopted from psychological experimentation;
2. used controlled laboratory-like conditions for training, rather than the regular classroom;
3. and used videotape recordings for control of presentation and feedback conditions.

These experiments became so dominant that many universities began to use the procedures in training teachers before the full import of the studies had been verified. They probably were influenced by the way researchers confidently wrote about their procedures as though they were established as the way to train teachers.

The use of the videotape camera and recorder and the development of microteaching have prepared the way for the application of behavior modification techniques to teacher training. (McDonald, 1973, p. 57)

Since 1973, there has been a great decrease in the number of teacher training experiments. This has closely paralleled an increase in the use of interaction analysis and microteaching by teacher education institutions, and it has paralleled a great decrease

in funds from the federal government for teacher training and educational research. It appears that teacher educators have been willing to accept microteaching and interaction analysis as ways for training teachers without a thorough analysis of the exact procedural elements that are effective for particular skills.

Classroom Teaching Behaviors

During the late 1950s and throughout the 1960s, the accelerated interest in analyzing teaching behavior led to conflicts over what behaviors to analyze and whether the information gathered was productive or relevant to teaching. Some researchers maintained that behaviors must be described, analyzed, and trained for only after their effectiveness could be shown in terms of student behavior and achievement. Travers (1971) thought that the teacher behavior research community was not yet capable of formulating operational definitions, let alone being in a position to develop effective teaching patterns and theories about instruction. However, the dominant position taken by most of those involved in teacher behavior research and teacher training followed the ideas of Gage (1963) in determining appropriate teaching behaviors.

Let us first at least mention the reasons for turning away from "effects on pupil achievement" as a criterion: (1) to avoid the inevitable confounding of such criteria with scientifically insoluble

questions of values, . . . (2) to obtain variables of lesser complexity; (3) to circumvent the difficulties of measuring socially desirable but elusive outcomes of education; and (4) to tie research more cleanly to variables that could be attributed to teachers and teaching as against home, community, and pupils' heredity. For all these reasons, research workers have looked away from criteria involved with effectiveness, defined as teachers' effects on pupils' achievement of educational objectives. (Gage, 1963_b, p. 120)

According to Biddle (1964), Gage (1963), and Ryans (1963), there is no single criterion against which a list of teacher behaviors can be validated. There is no way to determine if a classification system provides a true analysis of what goes on in classrooms. There are many descriptive words that could be applied to describing and analyzing teacher behavior, and no adequate conceptual system has been developed to formulate the skills that teachers need. Most of the researchers and teacher trainers have not been able to wait for such a system, but have gone ahead with the job of identifying and testing various skills in hopes of empirically working out which ones are effective.

Technical Skills Approach

Gage (1963_b) suggested that investigators focus upon specific aspects of the teacher's task rather than on all parts of teaching at once. Discrete skills which can be observed in classrooms were selected and put into well defined components that could be taught,

practiced, and evaluated in ways not possible with teaching viewed in the larger chunks that occur over a period of an hour or a day. The skills were not selected on the basis of any particular theory, but were selected on a rough content analysis approach:

1. They were general skills that could be used independently of the content being taught. (McDonald, 1973, p. 55)
2. They were related to curriculum objectives and often based on Bloom's taxonomy. (McDonald and Koran, 1969, p. 28)
3. They were skills that were observed as part of the classroom behavior of experienced teachers.
4. It was felt that any teacher probably needed the skills in his repertoire.
5. Beginning teachers generally had difficulty in performing the behaviors. (McDonald and Allen, 1967, p. 24)

The technical skills were generally of two kinds: eliciting behaviors (such as probing questioning), and reinforcers (such as praising student responses). They were also behavioral dyads that were observable, easily counted teacher responses linked to a specified and also easily counted student behavior (such as student answers question). Teaching was viewed as a complex of skills that could be identified, learned, and practiced separately, and then

integrated into various teaching strategies. The task of the teacher educator was to present the skill, give opportunities for practice, and provide feedback (usually with audiotapes or videotapes).

Systematic Observation Approach

As early as 1939, Anderson worked on observing the socially integrative behavior of teachers in their contacts with children. Withall (1956) developed a climate index to observe the behaviors of teachers and children in the classroom. Finally, Flanders (1960) built his interaction analysis system for observing teacher-student interaction. With these observation systems and others that followed, it became possible to quantitatively analyze certain dimensions of classroom behavior with sufficient objectivity for scientific analysis. Typically, behaviors are recorded in the form of tallies, checks, or other marks which code them into predefined categories and yield information about which behaviors occurred, or how often, during the period of observation.

Exploitation of this new methodology was greatly facilitated by the increased availability of federal funds, by the development of high speed computers and inexpensive videotape equipment, and by advances in statistical methodology, all happening at about the same time. (Medley, 1972, p. 437)

With the development of systematic observation instruments, rudimentary and primitive as they were, the instructional theorist

was armed with a tool for objectively describing the cause-effect relationships of teacher-pupil interaction in the classroom. The instruments were developed primarily to describe and analyze what goes on in classrooms, and they generally focused on the verbal behaviors of teachers and students. Most of the instruments seem to be based on assumptions that were clearly stated by Medley and Mitzel (1963_b, pp. 79-81):

1. The quantitative approach is the most promising because the modern method of science is quantitative.
2. It is necessary to study behavior as it occurs in the classroom setting.
3. Any effect the teacher has on the pupils is mediated by some overt behavior of the teacher and it is capable of being seen or heard by an observer.
4. Each behavior of a teacher has a purpose (conscious or unconscious).
5. What the teacher does is an important factor in determining what pupils learn. This does not rule out the pupils' capacities or school and neighborhood environment as important factors.
6. Once effective patterns of teacher behavior are identified, it will be possible to teach prospective teachers how to

exhibit them without undergoing any basic personality change.

Almost from the beginning developments of observation instruments, the potential use in teacher training was recognized. The use of observation systems for training has been opposed on two counts. First, the particular behaviors (e. g. , certain question types and reinforcement patterns) identified and defined in the instruments have not been proven to be related significantly to student achievement. In the second place, it may be objected that to base teacher training on what currently happens in classrooms may stifle educational progress. However, Smith (1967) argues for the use of observation systems to determine what teachers do and to help prospective teachers analyze their own progress in training.

. . . it should be noted that certain acts are performed by teachers as they carry on their work and that most of these acts are identified and described in the various observation systems. To make the teacher in training aware of the acts he will perform, to help him analyze them and see what they involve, and possibly lead him to execute them more skillfully, is to make him an alert teacher. . . (Smith, 1967, p. 70)

Even though the behaviors identified by the various observation systems have not been related empirically to measures of student achievement, many teacher educators have found them useful for designing alternative teaching tactics and for suggesting instructional

objectives previously overlooked. The availability of observation systems with their specific behavioral descriptions has led many teacher trainers to try to train prospective teachers to use some of those behaviors. In teacher training studies, observation systems have generally been used in one or more of three ways to:

1. provide the teacher with model descriptions of behaviors and strategies that he is urged to try in his teaching;
2. give the teacher a set of procedures he can use to categorize the teaching behaviors that he or another performs;
3. and provide the teacher with feedback on his behavior. (Rosenshine and Furst, 1973)

The observation system that has probably had the greatest impact on educational thought and research is Flanders' interaction analysis system. Since 1963, teacher trainers have attempted to help teachers learn the ten categories of this system or one of the systems based on it. In the Flanders' system, and most of the others used in teacher training, all teacher behaviors are classified as either direct or indirect. Direct statements are those that tend to minimize the freedom of the student to respond. Indirect statements maximize the freedom of students to respond. The system also provides for

categorizing of student talk and for periods of silence or confusion. Although the system was not intended to prescribe which behaviors should be used, it has usually been interpreted by teacher trainers as advocating more indirect behavior for teachers. Generally, teacher trainers have attempted to get teachers to use more of the indirect behaviors and less of the direct behaviors. Figure 2.1 provides a summary and definitions of the ten categories of Flanders' system.

Figure 2.1 - Definitions of Flanders' Interaction Analysis Categories (from Edmund Amidon and Ned Flanders, The Role of the Teacher in the Classroom, 1963)

Teacher Talk	Indirect Influence	1. <u>Accepts Feeling</u> : accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. <u>Praises or Encourages</u> : praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uh huh?" or "go on" are included.
		3. <u>Accepts or Uses Ideas of Student</u> : clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
		4. <u>Asks Questions</u> : asking a question about content or procedure with the intent that a student answer.

Figure 2.1 - Definitions of Flanders' Interaction Analysis Categories (contd.)

Teacher Talk	<p>Direct Influence</p> <ol style="list-style-type: none"> <li>5. <u>Lectures</u>: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions. <li>6. <u>Gives Directions</u>: directions, commands, or orders with which a student is expected to comply. <li>7. <u>Criticizes or Justifies Authority</u>: statements, intended to change student behavior from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.
Student Talk	<ol style="list-style-type: none"> <li>8. <u>Student Talk, Response</u>: talk by students in response to teacher. Teacher initiates the contact or solicits student statement. <li>9. <u>Student Talk, Initiations</u>: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
	<ol style="list-style-type: none"> <li>10. <u>Silence or Confusion</u>: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

The Microteaching Paradigm

In 1963, a team of teacher educators at Stanford University began to develop a concept in teacher training that has had far reaching effects. Microteaching began as a demonstration lesson to show trainees how complex it could be in the classroom (Allen and Ryan, 1969, p. 11). The lesson succeeded in pointing out difficulties, but didn't provide enough answers to help the teachers begin to cope with the problems. Eventually, the team developed descriptions of a few skills that seemed to relate to common classroom practices and problems. Essentially, the team used a task analysis and Gage's (1963_b) suggestion of focusing on specific aspects of the teacher's task rather than on all parts of teaching at once.

The decision as to what skills should be developed in the clinic were not made in light of any set of rules about what good teaching consists of or what teachers need to know, but resulted from the discussions and debates of the microteaching staff. In the last analysis, the skills that were chosen as the clinic's objectives were those that we felt would be of most use to beginners and that we felt could be effectively trained for in the clinic. (Allen and Ryan, 1969, p. 14)

The Stanford Teacher Education Program staff sought to identify and build training protocols for each skill. They tried to provide the beginning teachers with a variety of skills so that once they were in their own classrooms they would be able to call on those skills as

they saw fit. The following are some of the general skills that they felt could be applied at many levels and for teaching many different subjects:

1. Set induction
2. Stimulus variation
3. Closure
4. Silence and nonverbal cues
5. Reinforcement of student participation
6. Fluency in asking questions
7. Probing questions
8. Higher-order questions
9. Divergent questions
10. Recognizing attending behavior
11. Illustrating and use of examples
12. Lecturing
13. Planned repetition
14. Completeness of communication

(Allen and Ryan, 1969, p. 15)

These skills were each defined in clear operational terms, and then the trainees were given descriptions and examples of each. Eventually, the team developed a seven-step paradigm to help the beginning teachers learn the skills:

1. An instructional model is shown by oral instructions, written directions, live demonstrations, videotape examples or a combination of these.
2. The trainee plans a short lesson to incorporate the skill.
3. He teaches the five-minute lesson to six peers or students while being recorded on audiotape or videotape.
4. He receives ten minutes of feedback on how well he has performed the skill, from the students, the supervisor, and the videotape or audiotape record of the teaching.
5. The trainee then has 15 minutes to replan the lesson.
6. He reteaches the lesson.
7. He receives feedback again.

(Allen and Ryan, 1969, p. 27)

Many variations of the microteaching paradigm have been tried, and most of the research analyzed for the present study came from this background. Allen and Ryan (1969, p. 116) felt that the most interesting aspects of learning from microteaching centered on the use of models and its relationship to the social learning work of Bandura. His theory and the many questions it raised about modeling allowed numerous possibilities for research, using the microteaching paradigm.

The whole structure of the microteaching process can be manipulated in order to answer some fundamental

questions about sequencing and timing of practice, modeling, and feedback stages in the learning process. . . . The sequence of practice, modeling, and feedback sessions can be permuted so that empirical data may be gathered; from these data, one can build and evaluate models of the human learning process which incorporate those three elements. (Allen and Ryan, 1969, p. 117)

Social Learning Theory

There has been a need for theory to guide all educational research, but especially for developing a theory to guide research and analysis of teacher education studies. A valuable theory would be one that organized existing data in the field and produced hypotheses for further research.

At the present state of knowledge in research on teaching, and in all social and behavioral science, the primary criterion for evaluation of theory is usefulness, not truthfulness. . . . And these theories are expected to provide a system into which both new data and new hypotheses can fit. (Snow, 1973, p. 103)

The theory that was most instrumental in the development of microteaching and has guided much of the subsequent teacher training research, was the social learning theory described by Albert Bandura and his associates. The basic elements of his theory have even guided much of the teacher training research that has used Flanders' interaction analysis system. Most of those studies have not been based on any explicit theoretical base, but Amidon and

Hough (1967) alude to modeling and feedback as essential parts of the training process. This indicates that most of the interaction studies are implicitly based on observational learning.

For a teacher to improve his teaching three factors should probably be present: (a) the teacher should want to improve, (b) the teacher should have a model of the kind of teaching behavior that he wants to develop and (c) the teacher should get feedback regarding his progress toward the development of those teaching behaviors which he has conceptualized as his goal. Research on the training of teachers that has involved the use of interaction analysis has indicated that the second and third conditions necessary for change mentioned above are produced by interaction analysis. Not only do the category system and the matrix help teachers conceptualize the often abstract and nebulous phenomenon of patterns of verbal interaction, but in addition, when used as an observational system, interaction analysis provides the teacher with a means for receiving immediate feedback regarding his verbal teaching behavior. (Amidon and Hough, 1967, p. 252)

A theory of imitation was first presented in a formal way by Miller and Dollard (1941). They explained it as a type of instrumental conditioning in which the observer is reinforced each time he successfully matches a model's behavior. However, their theory left unexplained the evidence that imitative learning took place even before reinforcement was administered.

Mowrer (1960) developed a sensory feedback theory of imitation in which he postulated that if the observer is repeatedly led to associate the model's behavior with the rewards administered to the

observer by the model, the observer would gradually develop a positive value toward the behavior exhibited.

According to Bandura (1969), one of the fundamental means by which new modes of behavior are acquired and existing patterns modified is through the influence of modeling and vicarious processes. Bandura's work differs from the shaping and instrumental conditioning underlying previous theories of imitation in the distinction he makes between learning and performance. Neither direct nor vicarious reinforcement is necessary for observational learning to occur. The role of reinforcement is limited to its effect on performance by motivating the observer to pay attention to the modeling stimulus. He suggests that observational learning is a multiprocess approach. The effectiveness of observational learning depends primarily upon the transformation and retention of verbal and imaginal codes during initial observation of modeled responses.

A review of Bandura and Walters (1963), Bandura (1969), and Bandura (1971) revealed a very complex theory based mostly on research with young children. In order for the theory to be a useful guide for research and analysis of studies already done, all of the relevant assumptions, postulates, and propositions needed to be collected and sorted. Unfortunately, Bandura and his associates did not formalize the social learning theory. Therefore, it was

necessary for the present investigator to examine the three main resources given above and categorize Bandura's assertions into closely-related assumptions, postulates, and propositions:

Basic Definitions:

1. Observational learning - has occurred when a behavior that has zero or near zero probability of occurrence (given appropriate stimulus conditions) occurs after the observance of a model performing those behaviors. Observational learning includes all of the phenomena generally described by a variety of terms. Among those most common in usage are modeling, imitation, identification, copying, vicarious learning, social learning, role-playing, and simulation.
2. Modeling events - are behavioral demonstrations which can be provided through a variety of forms, including:
 - a. Symbolic - written instructions
- oral instructions
 - b. Perceptual - pictorial demonstration (film and videotape)
- live demonstration

Assumption I:

Virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of another person's behavior and its consequences:

1. Even when the observer does not reproduce the model's response during acquisition.
2. Even when no reinforcement is provided to the model or observer.
3. Even when the first observer response does not occur for weeks or months.

Postulates to Assumption I:

1. Postulate A - Innovative behavior, generalized behavioral orientations and principles for generating novel combinations of responses can be transmitted to observers through exposure to modeled events.
2. Postulate B - Even though most of the elements of the behavior may already be present in the response repertoire of the individual, if the particular combination of components in the learned response is unique, it is a unique behavior.
3. Postulate C - Acquisition of matching responses and entire behavioral repertoires are influenced in identical ways by the same determinants.
4. Postulate D - The major function of modeling events is to transmit information to the observer about how response

elements must be organized to produce required patterns of behavior.

5. Postulate E - The behavior displayed by models varies on a number of stimulus dimensions which differ in content, complexity, and discriminability.
6. Postulate F - Greatest performance gains are attained by observers when desired behaviors are clearly specified by the model rather than inferred from a few examples.
7. Postulate G - Modeling events should encourage the observer to respond, describe the appropriate responses, and indicate the sequence of performance.
8. Postulate H - Observation of a model can have three different effects on the observer:
 - a. Modeling Effect - observer acquires new responses.
 - b. Inhibitory-Disinhibitory Effect - strengthening or weakening responses already in observer's repertory.
 - c. Eliciting Effect - observer responds in ways previously learned because the model's responses act as a "releaser" for responses in observer's

repertory which are usually not encouraged by social reinforces.

9. Postulate I - Observers abstract common attributes exemplified in diverse modeled responses and formulate a principle for generating similar patterns of behavior, achieved through vicarious discrimination learning in which the model's responses are selectively reinforced (language acquisition is a good example).
10. Postulate J - Complex patterns of behavior must be reduced to small subunits of behavior, each of which is established through modeling in a carefully graduated sequence.

Assumption II:

Observational learning requires that the observer attend closely to cues, select relevant events, and accurately perceive cues provided by the model's responses (discriminative observation).

Postulates to Assumption II:

1. Postulate A - Close attendance of the observer to cues provided by the model depends on certain modeling variables:
 - a. Physical and acquired distinctiveness of the model.

- b. Affective valence (social position) of the model.
 - c. Complexity of modeled events.
 - d. Perceived functional value of modeled events.
2. Postulate B - Close attendance of the observer to cues provided by the model depends on certain observer variables:
- a. Observer's sensory capacities.
 - b. Observer's anticipation of reinforcement (motivation).
 - c. Observer's emotional arousal level.
 - d. Past reinforcement patterns for the observer's attendance to models.
 - e. Perceptual set.
3. Postulate C - Accurate stimulus discrimination is a pre-condition for observational learning.
4. Postulate D - Discrimination training (cueing correct and incorrect responses of models) may greatly accelerate learning from models.
5. Postulate E - The behavior of powerful models (and supervisors) will be attended to because their behavior is likely to have high utilitarian value. This would include persons who are recognized experts or those who have a high socio-economic standing.

Assumption III:

Observational learning does not require performance for learning to take place, but depends on certain retentional processes to mediate the cues provided by the model.

Postulates to Assumption III:

1. Postulate A - Observational learning entails symbolic coding and central organization of the modeled events.
2. Postulate B - Observers function as active agents who transform, classify, and organize modeled events into easily remembered patterns and sequences.
3. Postulate C - Observers abstract common attributes exemplified in diverse modeled responses and formulate a rule for generating similar patterns of behavior.
4. Postulate D - Modeled events are cognitively retained by the observer in a verbal or imaginal code of the observed sequence.
5. Postulate E - Learning and retention are facilitated by such codes because they carry a great deal of information in an easily stored form.
6. Postulate F - These memory codes serve as guides for subsequent reproduction of matching responses as they are transformed from symbolic forms to motor equivalents.

7. Postulate G - The basic guidance function of coded events is the same regardless of whether the behavior is conveyed through words, pictures, or actions.
8. Postulate H - Symbolic rehearsal (vicarious practice) and motor rehearsal facilitate the observer's learning by providing opportunities for the observer to reorganize and recode modeled events.

Assumption IV:

Observational learning alone is not sufficient to produce faultless performances.

Postulates to Assumption IV:

1. Postulate A - The observer must be provided with opportunities for practice under conditions which produce rewarding consequences.
2. Postulate B - Performance of already acquired responses depends greatly upon the nature of reinforcing consequences to the model and to the observer.
3. Postulate C - Performance is limited by certain characteristics of the observer:
 - a. Physical capabilities
 - b. Availability of responses in symbolic code
 - c. Accuracy feedback (neural)

4. Postulate D - Performance of matching responses is mainly governed by anticipated outcomes based on previous consequences that were:
 - a. Directly encountered.
 - b. Vicariously experienced.
 - c. Self-administered.
5. Postulate E - The observer must rely on proprioceptive feedback and verbal reports of onlookers in order to make adjustments in his responses in line with the modeled responses.
6. Postulate F - The effectiveness of social reinforcers can be limited by the individual's lack of possession of certain physical attributes that the society sets as high in value:
 - a. Athletic build.
 - b. Features of beauty.

Proposition 1:

There are seven essential factors for developing new response patterns:

1. Models must be competent to display desired behavior.
2. Models must be likely to be emulated.
3. Advocated behavior patterns must be appropriately rewarded.

4. New reinforcement contingencies must be introduced into the social system to favor adoption and continued performance of new behavioral patterns.
5. Immediate benefits and casual relationships need to be established for the new behaviors.
6. Persons who adopt new patterns of behavior need to be protected from maltreatment.
7. Addition of group reinforcement is desirable.

Proposition 2:

The combined use of modeling and reinforcement procedures is probably the most efficacious method of transmitting, eliciting, and maintaining social response patterns.

Proposition 3:

Some negative consequences that are likely to serve as barriers to change:

1. Required expenditures of time, energy, and resources.
2. Personal reluctance to exchange existing behaviors for new ones of uncertain consequences.
3. Conventional behavior patterns are fortified by belief systems and codes of consequences for departure from sanctioned practices.

4. People in authority positions who have vested interests in preserving traditional behavior patterns.

Proposition 4:

Regression (reverting to a pattern of behavioral characteristics of an earlier stage of development) is most likely to occur if:

1. Appropriate and inappropriate responses differ relatively little in strength.
2. Inappropriate responses have received prolonged intermittent reinforcement.
3. Current reinforcement schedules are inadequate for maintaining appropriate behavior.
4. The new behavior pattern is positively reinforced without regard to the quality of reproduction.

Proposition 5:

Observational learning will rarely be activated into overt performance if negative sanctions or unfavorable incentive conditions are dominant in the social environment.

Proposition 6:

Observers generally exhibit novel responses in the same class as the model's, but representing amalgams of the behavior of different models.

Proposition 7:

Responses will not be restricted to treatment settings if reinforcement is provided by different people in a variety of situations.

Proposition 8:

Response patterns tend to generalize to situations other than those in which they were learned.

Proposition 9:

Once learned, a behavior is more stable and more resistant to extinction if it has been acquired on an intermittent schedule of reinforcement.

Proposition 10:

Performances that contain many motor or verbal factors will usually require some overt practice.

III. PROCEDURES OF THE STUDY

This chapter presents the procedures used in collecting, analyzing, and synthesizing teacher training experiments. Details of the methods used to find all relevant studies are described, followed by the steps used to determine which studies actually fit the limitations imposed. Then, details of the analysis and synthesis of findings are discussed.

The main purpose of this study was to analyze experimental studies concerned with training teachers to use specific behaviors. The analysis and synthesis of the studies was done in terms of the assumptions, postulates, and propositions of Bandura's social learning theory.

Locating and Obtaining Training Studies

During 1974 and 1975, time was spent in finding and obtaining relevant studies. The first step was determining the available sources. The Educational Resources Information Center (ERIC) files made a logical place to start, since they contain most of the published and unpublished educational research outside of doctoral dissertations. Contact was made with the Education Library at Indiana University, where all of ERIC files are cataloged on computer tapes. In June, 1974, a computer search of the Research in

Education (RIE) and Current Index to Journals in Education (CIJE)

files was initiated by using the library's PROBE system. A request was made for all studies conducted since 1955 that had the following descriptors:

1. Research
2. Teacher Education
3. Teacher Behavior
4. Teaching Skills
5. Teaching Methods

The last condition was that each entry had to meet both conditions 1. and 2. above, plus be listed under at least one of the three other descriptors.

The result of the search was a computer print-out of several hundred titles. The computer list of titles for RIE sources was examined, and every title that gave any indication of being an experiment in teacher education was cut off the list, pasted on a 4" x 6" card, and put in order by file number. For every study on the cards, the abstract was also located in the ERIC index to RIE at the library of Southern Illinois University at Edwardsville. All of the studies which met the following limitations were then purchased on microfiche from ERIC Document Production Service of Bethesda, Maryland:

1. the study had to be experimental and be a study of teacher training;

2. it had to use a treatment that included some modeling, practice, feedback, or a combination;
3. the training had to be directed toward some specific teaching behavior;
4. an observation system had to be used to collect information about the subjects' behavior;
5. inferential statistics had to be used in testing the hypotheses.

The computer list of titles for CIJE sources was examined and every title that gave any indication of being an experiment in teacher education was cut off the list, pasted on a 4" x 6" card, and grouped according to the host journals and the year. Then, every article was looked up at one of several university libraries, and the studies that met the above five criteria were photocopied for later detailed analysis. Libraries at the following college and universities were used to locate and copy the studies:

1. Greenville College, Greenville, Illinois;
2. Southern Illinois University, Carbondale, Illinois;
3. Southern Illinois University, Edwardsville, Illinois;
4. Michigan State University, East Lansing, Michigan;
5. Wayne State University, Detroit, Michigan.

A few studies could not be located at any of the sources because

none of them subscribed to a particular journal or an issue was not on the shelf. However, all study titles which seemed at all promising were located eventually.

Certain journals were more likely than others to have articles about teacher training studies, and there was some concern that the PROBE computer search might have missed a few important studies. Therefore, a systematic search of every issue (1963 through 1974) was made for the following journals:

1. Journal of Teacher Education
2. Journal of Educational Psychology
3. Journal of Experimental Psychology
4. Journal of Research in Science Teaching
5. Science Education
6. School Science and Mathematics
7. Teachers College Record
8. Theory Into Practice
9. Social Education
10. Review of Educational Research
11. International Review of Education
12. Journal of Educational Research
13. Educational Leadership
14. Educational Researcher

15. Educational Technology
16. AV Communication Review
17. American Educational Research Journal
18. Journal of Abnormal and Social Psychology (1963-64)
and Journal of Personality and Social Psychology (1965-74)
19. Phi Delta Kappan

The articles located through this issue-by-issue search were cross-checked with the list received from the PROBE computer search of CIJE. Less than a dozen studies had been missed by the computer search, and it was probably due to strangely worded titles for articles. Regardless of the few missed by the computer, the personal search did locate all of the experimental studies on teacher training from the important sources.

In order to find the doctoral dissertations on teacher training, a personal visit was made to Xerox University Microfilms at Ann Arbor, Michigan. A detailed description of the kind of studies needed was placed with the person in charge of computer searches of their DATRIX II system. They provided a print-out of dissertation titles which contained any of the following word combinations and were completed during the years 1960 through 1973:

1. Teaching and Behavior
2. Teaching and Skills

3. Teaching and Behaviors
4. Teachers and Behavior
5. Teachers and Skills
6. Teachers and Behaviors
7. Teacher and Behavior
8. Teacher and Skills
9. Teacher and Behaviors

Every title was then located in Dissertation Abstracts International (DAI) at the Southern Illinois University, Edwardsville, Library. The abstract of each study was examined to determine which ones met the following limitations:

1. The study had to be experimental and be a study of teacher training.
2. It had to use a treatment that included some modeling, practice, feedback, or a combination of them.
3. The training had to be directed toward some specific teaching behavior.
4. An observation system had to be used to collect information about the subjects' behavior.
5. Inferential statistics had to be used in testing the hypotheses.

While examining the abstracts of studies given in the PROBE

print-out, abstracts of other studies were checked to see if any had been missed in the computer search. A few additional studies were found this way, so every issue of DAI was checked from 1960 through 1974 under the following descriptors:

1. Teacher Education
2. Teacher Behavior
3. Teaching Skills

The studies which met the five limitations were cross-checked against the studies already obtained on microfiche from ERIC and copied from journals, to determine whether any doctoral dissertations were already purchased from these sources. The remaining dissertations were obtained from Xerox University Microfilms in softcover or microfilm format.

In order to find studies that might have been published only in books, the card catalogues of the five college and university libraries were checked for books on teacher education, teacher training, and teacher behaviors. Each book was examined for experimental studies and the bibliographies were checked for references to other sources. The studies thus located were cross-checked with the list of studies already obtained from ERIC, journals, and dissertations. The additional studies found this way were photocopied and included with the rest for reading and analysis.

Analysis of the Studies

After all of the studies had been collected, each study was first read to determine whether it was a well-designed, true experimental study of teacher training that could be analyzed by using Bandura's theory. The following limitations were used to select the appropriate studies for analysis:

1. The study had to test some principle of social learning theory in the training of teachers. The independent variable for at least one of the experimental groups had to include some form of modeling.
2. An operationally defined teaching behavior (or skill) or group of defined behaviors had to be the dependent variable.
3. The study had to use one of the three experiment designs described by Campbell and Stanley (1963) or some multi-group variation of them.
4. A systematic observation system had to be used in collecting data on the teaching behavior of the subjects. Studies were omitted if they were only concerned with dependent variables, such as attitudes, self-concepts, perceptions, knowledges, and skills tested by paper and pencil instruments. This was primarily because such variables are

not directly observable in the classroom, and they are not the types of behavior to which social learning theory applies.

5. The subjects' teaching behaviors had to be observed in a regular classroom or some "micro" classroom setting where a small group of students or peers were the subjects of instruction.
6. Inferential statistical analysis of data appropriate for the design had to be included in the report, including the type of test, acceptance level of at least .05, and details on the data analyzed. This also required that there be at least six subjects in each comparison group.
7. The training procedures had to be very clearly described so that the particular types of modeling, practice, and feedback could be determined.
8. The treatments tested had to be more than just a gross comparison of some poorly defined "experimental" treatment with no treatment or a "traditional" procedure.

During 1976 and 1977, time was spent in reading the studies, eliminating those which did not meet the limitations, and analyzing certain details of each study which did meet the limitations. For each study that did not meet the limitations, the following were

recorded on a Form Y9, Unisort Analysis Card obtained from the Burroughs Corporation: year of the study, the source, and the major weaknesses that caused its elimination from the analysis. These cards were later sorted to find the number of weaknesses of each type and from each year and source. As each acceptable study was read, a data sheet was filled in including all of the information shown in Figure 3.1.

Treatment Conditions

Comparison of treatment conditions was difficult because the authors of the different studies used a variety of terms and ways of presenting their training protocols. It was necessary to standardize the descriptions of the different types of modeling, practice, and feedback used in order to be able to make any comparison of findings. Therefore, terminology from Bandura's studies was used to describe the modeling, practice, and feedback variations. Most of the terms and their definitions were decided upon after examining the first few studies; however, as the analysis progressed, it became necessary to extend the list somewhat as studies introduced new variables not covered previously.

The result was 32 different treatment conditions which were used in many combinations to describe the training protocols of the studies. Each treatment condition was coded numerically with one set of numbers for the experimental group, and another set of

Figure 3.1 - Information Recorded on Data Sheets

1. Author, Title, and Source:
2. Statement of the Problem: including the theoretical framework used, if any, and whether the study was an explicit replication of a previous study.
3. Hypotheses of the Study:
4. Desired Behaviors and Treatments Employed: including the operational definitions of the behaviors and a complete description of the training protocols for experimental and control groups. Especially watched for were the types of treatments which tested different elements of the observational learning paradigm:
 - a. The type of modeling provided to subjects.
 - b. The type and location of practice.
 - c. The type of feedback used.
5. Experimental Design: including the 3 true-experimental designs described by Campbell and Stanley (1963) and their extensions described by Huck, Cormier and Bounds (1974, pp. 270-300).
 - a. Type: including any special means used to provide control of internal and external validity.
 - b. Sample Description: including characteristics of the subjects, sample size, and the means of assigning to groups.
 - c. Context: grade levels, subject of instruction, and socio-economic class of pupils.
 - d. Length of Treatment:
 - e. Criterion Instruments: including any training for observers and their interrater reliability and the behaviors categorized and observed by the observation system. Also any measures of student outcomes.
 - f. Statistics: including the type of test for inference, parameters tested and level of acceptance.
6. Findings: including all significant and nonsignificant differences found and whether the researcher reported findings on all hypotheses.

numbers to code the same conditions if they were used by the comparison group (see Table 3.1 following the definitions). The treatment conditions were defined in the following ways:

1. Modeling Conditions - media and means of presenting the desired behaviors to subjects.
 - a. Symbolic Written - included written directions, definitions of behaviors, matrices (such as Flanders') and transcripts of teacher-student interactions.
 - b. Symbolic Verbal - included lectures, admonitions to use the behavior, verbal directions, and interpretation of behaviors.
 - c. Perceptual Audio - audiotape presentation of teacher-student interaction and directions for use of behaviors.
 - d. Perceptual Video - videotape presentation of teacher-student interaction and directions for use of behaviors.
 - e. Live, Group - when several members of the peer group demonstrate behaviors.
 - f. Live, Individual - when an instructor or peer demonstrates the behaviors.
 - g. Cueing Provided - included a supervisor or peer pointing out when the model is using the desired behavior, or written directions and examples that label the

behaviors, and videotape and audiotape examples with behaviors identified in audio or visual ways.

- h. Model Uses Same Content as Subjects Use in Practice - this included situations where the subjects read the model responses to students, taught the same lesson, or just used the same topic to plan their own lesson.
 - i. Positive Instances of Behavior - only the desired responses were modeled and encouraged.
 - j. Negative Instances of Behavior - only the undesirable responses were modeled.
 - k. Positive and Negative Instances of Behavior - the desirable and undesirable responses were shown, and usually the differences were cued in some way.
2. Practice Conditions - situations provided for the subjects in which they could rehearse the modeled responses.
- a. Vicarious Practice - included coding the behavior of models, using some observation system, or coding their own behavior from audiotape or videotape.
 - b. Microteaching - the subjects taught a short lesson to a small group of children or peers; included role-playing in seminars, teaching in a special laboratory

room equipped with videotape, or teaching in a regular classroom (if it was a short lesson with a small group, usually four to eight students).

- c. Classroom - the subjects taught full periods with a whole class in a regular classroom, in a public or private school at the elementary or secondary level.
 - d. Cycled - the same behaviors were attempted at least twice, with a replan session allowed between teaching sessions. The lesson may or may not have been the same from one session to the next.
 - e. Peers as Students - peers were used as students in a microteaching situation.
 - f. Children as Students - this could be in either a classroom or a microteaching situation.
 - g. Massed Practice - the subject only had one practice session or had all of the practice sessions within 24 hours.
 - h. Distributed Practice - the subject had more than one practice session distributed over several days or weeks.
3. Feedback Conditions - media and means of helping subjects see, hear, or recognize their teaching behaviors.

- a. Symbolic Written - included written comments and printed matrices from observation systems such as Flanders'.
- b. Perceptual Audio - audiotapes of the subject's own performance.
- c. Perceptual Video - videotapes of the subject's own performance.
- d. Peer, Group - included a group of peers commenting on and discussion the subject's performance and critiquing the subject's interaction analysis matrix.
- e. Peer, Individual - included an individual peer's comments on performance or matrix and holding up cards with words of reinforcement during the subject's performance.
- f. Self - whenever a subject examined a matrix of his performance, viewed a videotape, or heard an audiotape of himself without comments from anyone else.
- g. Supervisor - included comments about the subject's performance, suggestions for replanning, and pointing out when appropriate behaviors were used on the subject's videotape or audiotape.

- h. Cueing Provided - included comments by a supervisor or peer, visual or audio displays on a tape of the subject's performance, or a printed matrix which helped the subject see which behaviors he used.
 - i. Immediate - feedback was provided within 24 hours.
 - j. Delayed - feedback was provided after 24 hours or more had elapsed since the subject's performance.
4. Other Comparison Conditions
- a. Control (no treatment) - the comparison group had no treatment other than continued classroom teaching.
 - b. Control (placebo) - the comparison group received some treatment over a comparable time. These included seminars, discussion of student teaching problems or general skills of teaching, and same treatment conditions as the experimental group, but on a different teaching behavior.
 - c. Pretest - the pretest (before any treatment) for the experimental group was compared with their posttest to determine whether significant gains were made on the dependent variable.

The complete sequence of all treatment conditions for each experimental group and comparison group was then coded according

Table 3.1 - Treatment Conditions and Their Numerical Codes

	Numerical Code for Experimental Group	Numerical Code for Comparison Group	Treatment Conditions
Modeling Conditions	1	31	Symbolic written
	2	32	Symbolic verbal
	3	33	Perceptual audio
	4	34	Perceptual video
	5	35	Live, group
	6	36	Live, individual
	7	37	Cueing provided
	8	38	Model uses same content as subjects use in practice
	9	39	Positive instances of behavior
	10	40	Negative instances of behavior
	11	41	Positive and negative instances of behavior
Practice Conditions	12	42	Vicarious practice
	13	43	Microteaching
	14	44	Classroom
	15	45	Cycled
	16	46	Peers as students
	17	47	Children as students
Feedback Conditions	18	48	Symbolic written
	19	49	Perceptual audio
	20	50	Perceptual video
	21	51	Peer, group
	22	52	Peer, individual
	23	53	Self
	24	54	Supervisor
	25	55	Cueing provided
	26	56	Immediate
	27	57	Delayed
	28	58	Massed practice
	29	59	Distributed practice
		30	Control (no treatment)
		60	Control (placebo treatment)
		61	Pretest

to the numbers in Table 3.1 and punched on an IBM data processing card for each finding. In addition, several other kinds of information were punched on a second card:

1. the author's name and the year
2. the behavior trained for
3. the main treatment condition being tested for that finding
4. the significance of the finding.

Preparation of Matrices

After all of the studies had been analyzed and two IBM cards punched for each finding, a cross-tabulation analysis was made for the treatments and teaching behaviors. The program used was from the Statistical Package for the Social Sciences (SPSS), Norman Nie, et al. (1975), that was on the computer facilities at Southern Illinois University, Edwardsville. Then, all of the cards were sorted into groups by treatment and subgroups by behavior.

From the cross-tabulation and resulting groups of cards, a two-dimensional matrix was prepared to show each type of treatment along the horizontal dimension and each teaching behavior along the vertical dimension (see Table 4.2). The findings that were sorted by the computer were then recorded in the appropriate cells of the matrix.

Following the preparation of the large matrix, several smaller submatrices were prepared to show not only the number of significant findings, but also the author of each finding. These submatrices (such as all of the cells for modeling conditions and questioning behaviors, Table 5.3) were prepared to help with the more specific comparison of treatments and behaviors.

Means for Syntheses

All of the individual findings in each column of a submatrix (e. g. , written modeling for higher-order questioning) were then compared with each of the assumptions, postulates, and propositions of Bandura's theory. This comparison was done in order to determine which of Bandura's assumptions might have been tested and whether the findings had supported or contradicted the assumption.

The submatrices and the comparison of assumptions with findings were then examined for patterns. First, the matrices were examined for treatments and behaviors which have been repeatedly tested and found to produce consistent changes. Then, the findings which supported or contradicted assumptions of Bandura's theory were inspected to see which of the ideas were well supported by the studies.

Each of the studies that met the limitations and was analyzed yielded a large number of pieces of information besides the

treatment, behavior, and findings. Therefore, a Form Y9, Unisort Analysis Card was used to record the following important information for each analyzed study:

1. the year in which it was reported;
2. the source in which it was found;
3. its theoretical orientation;
4. the modeling conditions tried;
5. the practice conditions tried;
6. the feedback conditions tried;
7. length of the treatment;
8. the major kinds of behaviors for training;
9. sample characteristics;
10. statistical tests used;
11. design of the study;
12. the criterion instruments used;
13. the criterion setting;
14. and weaknesses in design or procedures.

The Unisort cards were later sorted to determine patterns within and relationships between the 14 types of information shown above. This analysis was the basis for the general results presented in Chapter IV.

IV. GENERAL RESULTS

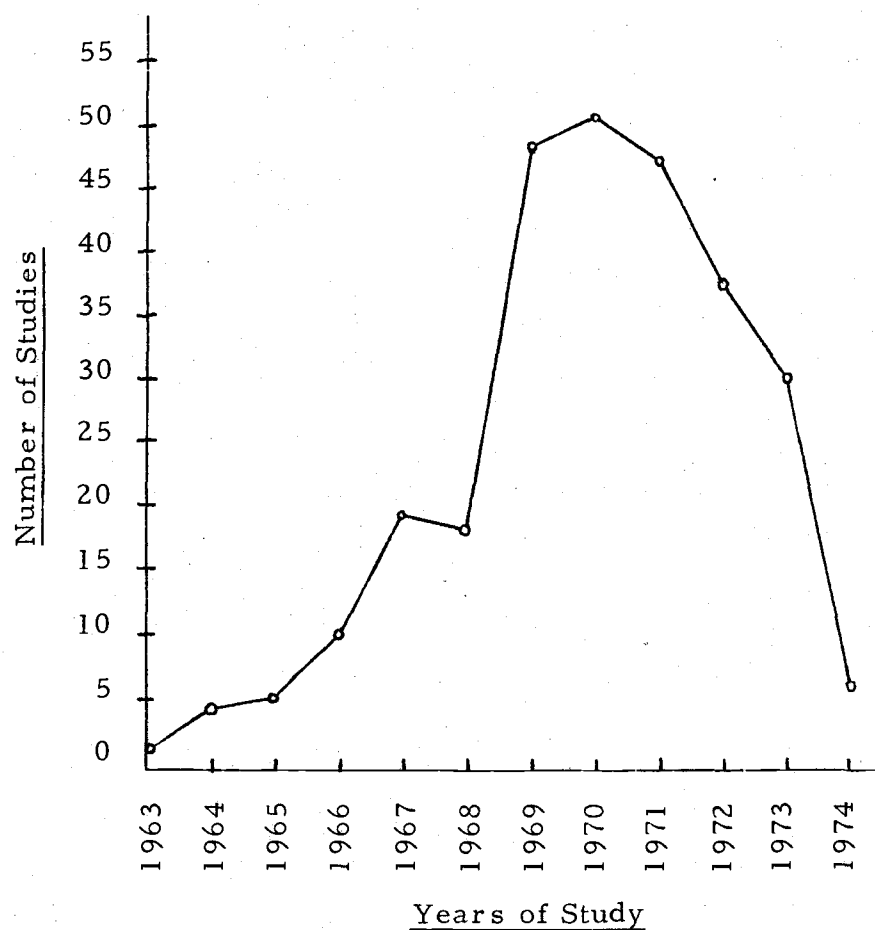
In this chapter, several types of analyses are presented. The distributions by year and source are presented for all teacher training studies, excluded studies, and analyzed studies. This is followed by an analysis of the characteristics of the analyzed studies which includes theoretical orientation, modeling conditions, practice conditions, feedback conditions, designs, subjects, statistics, criterion settings, instruments, and weaknesses. An overall distribution of treatments by behavior is presented on a two-dimensional matrix in order to show the patterns of research studies and their specific findings.

Distribution of Studies

Over two thousand teacher education studies were located, however, most were found to be field studies or correlational studies. Only 276 were experimental studies concerned with training teachers in classroom skills. Figure 4.1 shows the distribution of these studies over the 1963-1974 period.

No studies of this kind were found prior to 1963, and only 11 studies were reported prior to 1966. It is probably no accident that the first experiments reported in teacher training for classroom skills comes in 1963. Flanders' (1963) report in the Journal of

Figure 4.1 - Distribution of the 276 Studies



<u>Years</u>	<u>No. of Studies</u>	<u>Percent of Studies</u>
1963-1965	11	4.0
1966-1968	47	17.0
1969-1971	146	53.0
1972-1974	72	26.0
<u>Source</u>		
Doctoral Dis- sertations	105	38.0
ERIC - RIE	130	47.1
Journals	37	13.4
Books	4	1.5

Teacher Education and Gage's notion of "micro-effectiveness" in the Handbook of Research on Teaching (1963) seemed to be the beginning for numerous attempts to experimentally determine effective means for training teachers to use operationally defined behaviors.

The peak years for these studies were in the period of 1969-1971. In those three years, 53.0% of all the studies were reported, and then there was a rapid decline in the number of studies through 1974. The most drastic drop in number occurred after 1973.

All 276 studies were carefully analyzed. Of these, 220 had weaknesses which eliminated them from the final analysis. Some studies had a single major weakness (such as not using any systematic observation of teaching behavior), while others had as many as six weaknesses. The following are major weaknesses which caused the investigator to eliminate studies from the present analysis:

1. Gross comparison between a broad treatment group and a control group.
2. No modeling involved in any of the treatments.
3. The model was not specifically and clearly described.
4. No specific teaching behavior was trained for.
5. No operational definition of teaching behaviors.
6. Poor protocol description, such that the exact training procedure could not be determined.

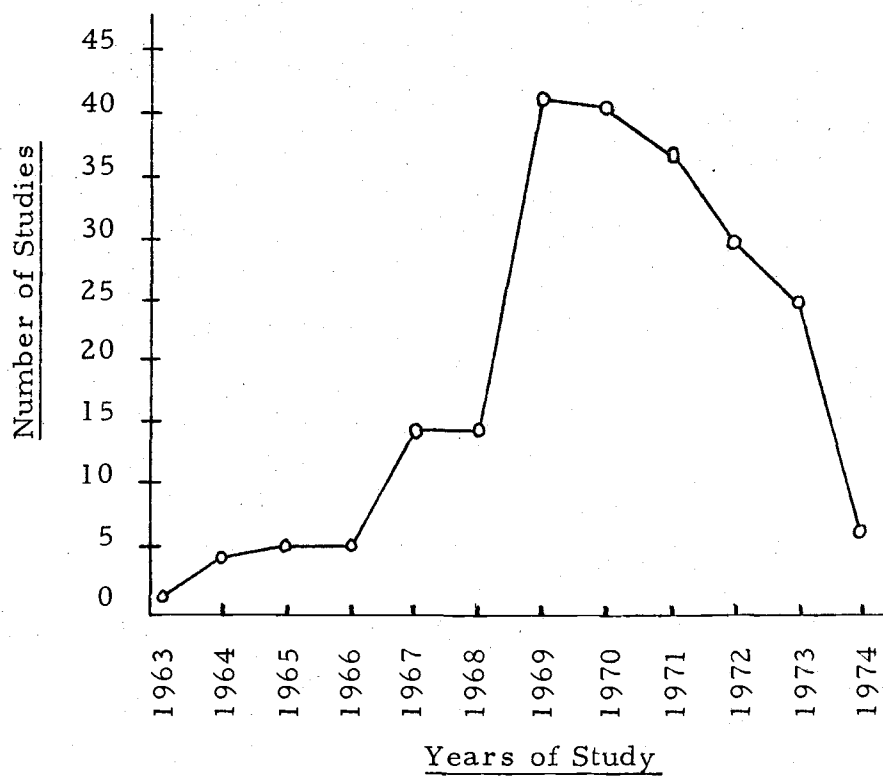
7. Failure to control the conditions of the treatment sufficiently, so that it was likely that the protocol varied from subject to subject within treatment groups.
8. No comparison group.
9. Treatment and comparison groups of less than six subjects.
10. Failure to randomize the assignment of subjects to experimental and comparison groups.
11. No systematic observation system used.
12. Inappropriate statistics used.

Figure 4.2 shows the distribution of the 220 excluded studies by year, by source, and by major weaknesses.

The distribution of studies excluded followed the same basic pattern as the distribution of the total of 276 studies. The only exception was that 1969 was the peak year for excluded studies, whereas 1970 was the peak year for total studies.

Over 85% of the studies came from ERIC - RIE sources and doctoral dissertations, whereas fewer than 15% were reported in journals and books. The pattern was much the same for both excluded and included studies (also see Figure 4.3), except that the percentage coming from ERIC and doctoral dissertations was even higher among the 56 included studies. This indicates that a large number of studies are not readily available to the majority of researchers.

Figure 4.2 - Distribution of 220 Excluded Studies



<u>Years</u>	<u>No. of Studies</u>	<u>Percent of Studies</u>
1963-1965	11	5.0
1966-1968	33	15.0
1969-1971	117	53.2
1972-1974	59	26.8

<u>Source</u>		
Doctoral Dis-	75	34.1
ERIC - RIE	105	47.7
Journals	36	16.4
Books	4	1.8

Table 4.1 - Weaknesses of Excluded Studies

<u>Weaknesses</u>	<u>No. of Studies</u>
1. Gross comparison	43
2. No modeling	55
3. Model not specific	37
4. No specific behavior trained for	31
5. No operational definition of behavior	13
6. Poor protocol description	43
7. Failure to control treatment	21
8. No comparison group	44
9. Small number of subjects	27
10. Failure to randomize	35
11. No systematic observation	100
12. Inappropriate statistics	21

Even though a few of the doctoral dissertations and ERIC reports were also reported in journals and books at a later time, they are recorded here under their first reported date. For whatever reasons, most of the data from doctoral dissertations and ERIC reports never found their way into accessible journals and books.

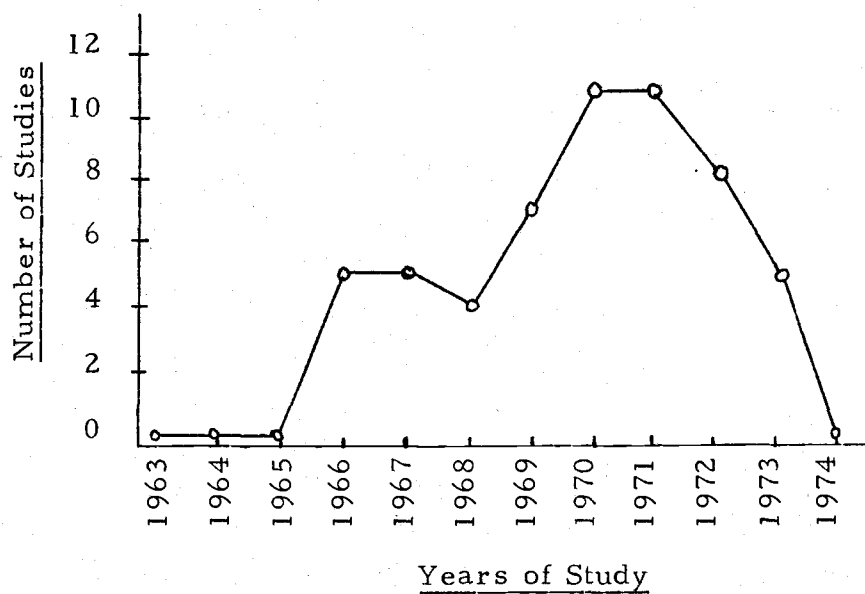
Three major areas of weakness were found among teacher training studies: (1) failure to have a clear and specific focus in the training procedures; (2) failure to use criterion instruments sensitive to specific, observable teaching behaviors; and (3) poor design and statistical procedures. The first area of weakness involved the specific weaknesses 1-6, listed in Table 4.1. The large number of studies which tried to compare some curricular approach or some poorly described "inquiry-oriented" training procedure helps one realize why so many past reviews of research have failed to provide direction for teacher educators. The most frequently occurring weakness in teacher training studies was the failure to use a systematic observation system for a criterion instrument (number 11 in Table 4.1). Too often the investigators were training teachers to be more "effective" or more "positive in attitude" and relied on paper and pencil instruments or rating scales as criterion measures, all the while ignoring the specific teaching behaviors occurring in the classroom. Usually, the vague focus

and weak criterion instruments were linked together in the same studies.

With the adequate guidelines on design provided by Campbell and Stanley (1963), it was surprising to find that investigators persisted in certain poor procedures (numbers 8, 9, 10, and 12 in Table 4.1). Even though it can be very difficult to randomly select subjects for study, it should be standard procedure to randomly assign subjects to treatment or match subjects before assignment; yet 16% of the excluded studies failed to use either method of assignment. Twenty percent of the excluded studies had no comparison group, and several of them gave a posttest only to the experimental subjects; yet the investigators tried to generalize their findings to larger teacher populations. The most common statistical error was the use of one t-test to compare pretest and posttest means for the experimental group, and then a second t-test to compare pretest and posttest means for the control group.

The distribution of the 56 studies follows the same overall pattern as the total 276 studies. However, certain interesting differences were found. Although 11 studies were reported in the early period of 1963-1965, none of them were strong enough in reporting and design to merit inclusion in the final analysis. As the number of

Figure 4.3 - Distribution of 56 Analyzed Studies



<u>Years</u>	<u>No. of Studies</u>	<u>Percent of Studies</u>
1963-1965	0	0.0
1966-1968	14	25.0
1969-1971	29	51.8
1972-1974	13	23.2
<u>Source</u>		
Doctoral Dis- sertations	30	53.6
ERIC - RIE	25	44.6
Journals	1	1.8
Books	0	0.0

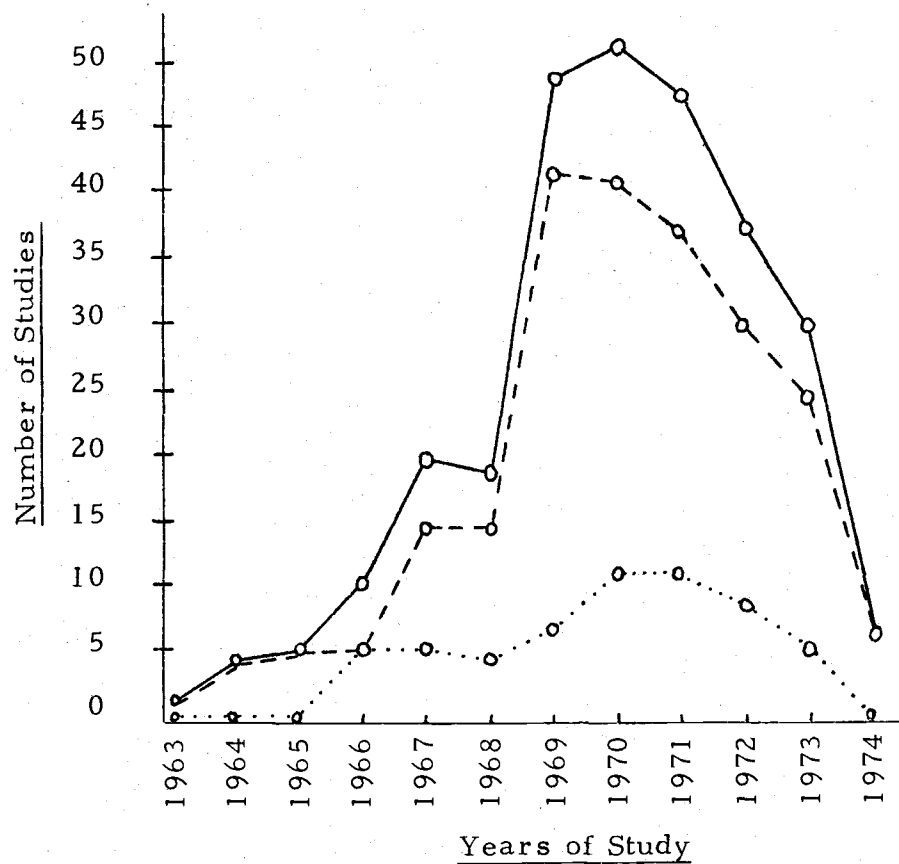
total studies dropped to six by 1974, again, none were strong enough to be included.

The peak period for the 276 total studies was 1969-1971; however, the peak for the 56 analyzed studies was skewed to slightly follow the 1970 peak of the total studies, such that the highest number of analyzed studies occurred in 1970 and 1971 (see Figure 4.4). All of this indicates that for this particular research effort, a higher proportion of the better defined studies tended to come somewhat after the beginning of these efforts and also to peak slightly after the total number of studies began to decline.

For all of the effort that went into teacher training research over those years, the number of well designed studies is disappointingly small. However, the well designed studies should not be ignored because of their number, and it is the aim of the rest of this chapter and the next two, to point out what can be determined from these studies.

The doctoral dissertations were found to make up 53.6% of the acceptable studies, whereas they made up only 38.0% of the 276 experimental studies concerned with teacher training. Of all the doctoral studies, 28.6% were well enough defined and designed to include in the final analysis. At the same time, only 20% of the

Figure 4.4 - Comparative Distribution of Total,
Excluded and Analyzed Studies



276 Total Studies —————

220 Excluded Studies - - - - -

56 Analyzed Studies

ERIC - RIE studies, 2.7% of the journal studies, and none of the book studies were found to be well defined and designed.

At various times doctoral dissertations have been criticized for their poor design and lack of thoroughness; yet the teacher training studies examined indicate that one is more likely to find well designed and thorough studies among doctoral dissertations than from any other source. This may be due, in part, to the condensed form of reporting that is often demanded for conferences, journals, and books. Thus, the strength of dissertations lies in the thoroughness with which the designs and findings are reported. Complete reporting of design and protocol is essential if other researchers and teacher educators are to benefit from the accumulated findings. Many of the dissertations showed careful design and gave great detail about their protocol and statistical analysis.

Characteristics of the 56 Analyzed Studies

Theoretical Orientation

Altogether, 37 of the studies were based on some theoretical foundation, while 19 of the studies had no discernible theoretical basis. Twenty-six of the studies (46.4%) were explicit about the theoretical framework used. Of these, 81% used Bandura's social learning theory as a framework for setting up their training

protocols. Another 15% used the idea of modeling without specific reference to Bandura, however, the modeling protocols they used were in line with Bandura's theory. Only one study explicitly used operant conditioning as a theoretical basis.

Eleven of the studies (19.6%) implied a particular theoretical orientation even though the words, "social learning," "modeling," or "operant conditioning" were not used. Seven studies were implicitly based on modeling of teacher behaviors, and four studies were implicitly based on reinforcing desirable teaching behaviors as they occurred, and thus fall in line with operant conditioning theory.

All of the studies were testing some of the elements of Bandura's social learning theory regardless of their theoretical orientation. Every study had at least one experimental group which observed some model portraying desired behaviors. Often, the investigators did not recognize or make note of the fact that a model was provided. This was especially true of studies that used Flanders' interaction analysis system, which usually did not make any reference to a theoretical base. But, the presentation of the categories and their desirability did constitute a model which cued the teachers on the type of behavior desired.

Modeling Conditions

In every study, the models provided were described in enough detail that the essential elements could be reproduced by other investigators. Most of the studies compared some modeling treatment with another as well as with a comparison group that received no model. Symbolic written and perceptual video models were most frequently tried, with 49 of the studies using written models alone or in combination with other modeling, and 35 studies using video models alone or, most frequently, in combination with written models. Symbolic-verbal models were used in 18 studies; perceptual-audio models in 7 studies; live-group models in 8 studies; and live-individual models in 8 studies.

Most of the studies went beyond simple presentation of teaching behaviors. Forty-two of the studies used some form of cueing to help highlight salient features of the modeled behaviors. Twenty-eight studies involved positive and negative instances of behaviors in what could be termed a mixed model, whereas 28 studies tried using only positive instances of behaviors, and one study compared groups that were given either positive instances only or negative instances only. Three studies controlled the content of the subjects' practice sessions so that they taught the identical content that they observed the model teach.

Practice Conditions

Practice consisted of three major types: microteaching, classroom, and vicarious. Microteaching variations were used in 34 studies under the following conditions:

1. Nineteen used peers as students.
2. Twenty-three used children as students.
3. Eight used peers and children as students at different times.
4. Nineteen gave subjects one chance to practice.
5. Fifteen gave subjects more than one practice session with some type of feedback between sessions.
6. Seven also gave subjects practice in a classroom.

Classroom practice was provided in 20 studies with the following variations:

1. All 20 used children as students.
2. Seven also had microteaching practice using peers as students.
3. Four gave subjects more than one practice session, but 16 gave subjects only a single practice session.

Vicarious practice was provided in 19 different studies, of which 10 gave only vicarious practice and 9 included opportunities to teach to peers or children.

Feedback Conditions

Many different feedback conditions were used in various combinations. Perceptual video feedback was the single most common condition. Twenty-five studies used video feedback in the following ways:

1. In 18 studies, some subjects received video feedback by themselves with no assist by supervisors or peers.
2. In 15 studies, some subjects received supervisory cueing while viewing themselves on videotape.
3. In 6 studies, some subjects received both video and symbolic written feedback.
4. In 3 studies, some subjects received both video and audio-tape feedback.

Symbolic written feedback was used in 13 studies in the following combinations:

1. In 8 studies, some subjects received written feedback by themselves. This was primarily in the form of interaction analysis matrices.
2. In 6 studies, some subjects received a combination of video and written feedback.
3. In 4 studies, some subjects received a combination of audio and written feedback.

Perceptual audio feedback was used in 10 studies in the following combinations:

1. In 6 studies, some subjects received audio feedback by themselves.
2. In 3 studies, some subjects received audio and video feedback by themselves.
3. In 4 studies, some subjects received audio and written feedback.

Symbolic verbal feedback in the form of supervisor and peer remarks was used in 31 studies for at least some of the subjects. Seventeen of the studies used supervisors to verbally cue feedback provided by video or audio tapes. Eleven of the studies used peers to provide feedback; seven of those used supervisors and peers to provide the feedback and only three studies used just the supervisor as a means of feedback.

Most of the treatments used some combination of modeling, practice, and feedback; but the total length of these treatments varied widely, with the majority being fairly short. Thirty-six of the studies had total treatments that lasted less than ten hours; 17 studies had treatments that lasted for ten to thirty hours; and only four studies tried treatments of more than thirty hours.

Design, Subjects and Statistics

All of the studies used one of the three "true experimental designs," as defined by Campbell and Stanley (1963), or they used a multigroup extension of one of those three designs. Thirty-six studies used a multigroup extension, while 15 studies used one experimental group in comparison with a control group, and five studies compared one experimental group with a group that received a placebo treatment. Forty-two of the studies gave a pretest and a posttest to their subjects, and 14 studies gave only a posttest.

The subjects used in these 56 studies came from all levels of precollege teaching, and almost all content areas were represented in at least one study. Twenty-eight of the investigators used only secondary subjects, and in 24 of these studies the subjects were preservice teachers, while in four of the studies the subjects were inservice teachers. Twenty-two of the investigators used only elementary subjects, and in 15 studies the subjects were preservice teachers, while in seven studies the subjects were inservice teachers. Seven studies included both secondary and elementary subjects, and in two of the studies the subjects were preservice teachers, while in five of the studies the subjects were inservice teachers.

All of the studies used inferential statistics with analysis of variance being the most common statistical procedure. Thirty-one

studies used ANOVA programs, and 15 studies used analysis of covariance programs to test hypotheses. Eight studies used t-tests and 7 studies used nonparametric tests in addition to one of the three above-mentioned parametric tests.

Criterion Settings and Instruments

All of the pretests and posttests took place in regular classrooms or in a microteaching situation. Thirty of the studies used the regular classroom of the subjects, whether the subject was an inservice teacher or a preservice student teacher. The other 26 studies used the microteaching format, with peers serving as the students in 10 studies, and elementary or secondary students in 16 studies.

The content taught by all subjects was controlled in 14 studies, so that everyone, regardless of treatment, taught the same lesson during their pretest and posttest. Five of these studies did the criterion testing in a regular classroom, while nine studies used a microteaching format (six with pupils and three with peers). Nine of these studies involved higher-order questioning as the behavior of training.

Weaknesses

There were certain weaknesses found, even in these relatively

well designed studies. In 20 of the studies the observers were blinded as to the treatment received by the subject they were viewing. Thirty-six of the studies did not report any blinding procedures, although some of them used observers who were not involved in the training procedures, and thus such observers may not have been aware of each subject's treatment. Eleven studies used observation periods of ten minutes or less in pretest and posttest observation of subjects. This shorter interval would make it difficult to really determine a reliable or representative sample of each subject's use of the desired teaching behaviors. Six studies had experimental groups that consisted of less than ten subjects. When small groups are used, it is more likely that no significant differences will be found when, in fact, a difference exists.

Even when the best 56 studies were sorted out from all the rest, there remained problems that could have been eliminated. However, at least four of the studies (White, 1968; Cornell, 1969; Millett, 1969; and Allen, 1967) were found to provide observer blinding, control of content during pretest and posttest, and use of pupils in the criterion setting.

Distribution of Treatments and Behaviors

The 56 studies had varying numbers of treatment groups

and teaching behaviors that were desired. Some studies, such as Orme (1966), had six groups, and others, such as Lohman (1966), attempted to determine the effects of a treatment on as many as 23 different measures of teaching behavior. In such cases, a reviewer should not analyze and report the results of each study as though one treatment had been tried to train for one teaching behavior. Such an analysis would be as futile as the experimental studies which attempt to make gross comparison between two poorly defined "styles" of teaching. Therefore, the unit used in reporting results here could not reasonably be the study but rather the individual findings of each study.

A total of 476 findings were distributed among the 56 studies. The number of findings per study ranged from one finding in Douce (1971) to 40 findings in Wolfe (1971), with a mean of 8.35 findings per study. The large number of findings for some studies is not surprising in view of recent advances in statistics, experimental design, and especially in computer programming for multivariate analyses. Although the number of findings in a study does not necessarily indicate a well designed study, most of the thoroughly designed and reported studies among the 56 did have multiple treatments, multiple behaviors, and a complex statistical analysis of their data.

The 476 findings were each labeled in four ways: (1) the

author and date of the study, (2) the treatment involved, (3) the operationally defined teaching behavior, and (4) whether the treatment resulted in a significant change in the teaching behavior. These findings were then recorded on a two-dimensional matrix with 75 different teaching behaviors along one dimension, and 27 different treatments along the other dimension (see Table 4.2). The 75 teaching behaviors were found to fit into eight major groups of behavior, each having some elements of interaction in common. Although there were over 70 different treatment comparisons, they were grouped into 27 treatments by the conditions the author made the independent variable between the treatments. These 27 treatments were found to align themselves with three different processes in Bandura's observational learning paradigm: modeling; retention and reproduction processes (practice); and motivation processes (feedback).

The 2025 cells of the matrix shown in Table 4.2 represent specific treatment-behavior combinations which could have been tested by investigators. Only 252 cells actually contained any findings. The many large open spaces show the many areas that have yet to be investigated.

Most of the findings cluster around a few behaviors, such as higher-order questioning, which involved trying only 16 of the 27 possible treatments. Yet, some of those 16 treatments were tried

[illegible]

several times, so that conclusions about the viability of certain training procedures could be based on more than the findings of a single study. Most of the protocols were tested against a variety of other protocols as well as compared with placebo treatments and controls with no treatment. This added to the strength of certain findings when they were compared to similar results within those clusters. The specific treatments and comparisons will be discussed in detail in Chapters V and VI.

The findings were not distributed equally among the 75 teaching behaviors. One hundred thirty-eight of the findings were on nine different questioning behaviors, with all but 17 of those findings related to higher-order and probing questioning. It was found that 27 of the studies (47.4%) and 121 of the findings (25.4%) were concentrated on these two teaching behaviors. One hundred six of the findings were on 22 different indirect teaching behaviors, with 60 of these findings (56.6%) concentrated on the first four categories of indirect verbal behavior. Of the remaining 232 findings, 72 were on direct teaching behaviors; 59 on indirect/direct ratios as measures of teaching behaviors; 50 on measures of student behavior; and 51 on 21 assorted behaviors.

The findings by treatment were mostly concentrated in the varieties of modeling with 332 of the findings (69.75%), and 254 of

these involved only five of the modeling protocols. The practice variations and feedback variations had only 27 and 117 findings, respectively. Seventeen of the findings for practice involved tests of microteaching and relatively little has been done by investigators to determine the desirability of other more common types of practice. No studies tried to find out if classroom practice is better than no practice when coupled with some form of modeling and feedback.

The totals at the bottom of each column indicate that a few treatments were predominantly used in training teachers. Treatments, such as written modeling, were used in several studies and yielded a good number of findings, while others, such as written and supervisor feedback, were used in one or two studies and gave few findings for analysis of that particular treatment. Some treatments (such as written, verbal, and live modeling -- column five) show very mixed results across the broad range of behaviors for which they were tried; but as one looks at certain behaviors (such as accepts and uses student ideas), it is apparent that in four out of five findings this treatment was successful in altering teacher behavior. The same treatment seemed to have uncertain effects on the teacher use of criticism of student and justifying authority. The other treatments which indicate predominant success across a broad

range of behaviors are: written modeling; written and verbal modeling; and video, written, verbal and live modeling.

Certain treatments showed very little promise for altering teacher behavior. Microteaching consistently yielded nonsignificant results across the behaviors for which it was tried, and in two findings microteaching was significantly less effective than the comparison treatment. Video and written feedback (column 26) and video and supervisor feedback (column 27) also yielded nonsignificant results across several behaviors. In Chapters V and VI, these findings are analyzed in greater detail and related to social learning theory to try to understand the possible reasons for so many nonsignificant findings resulting from these treatments that are commonly used at universities and colleges across the United States.

V. QUESTIONING BEHAVIORS

In this chapter, the findings from 29 studies are presented and examined to determine which treatments were effective in providing teachers with greater skill in nine different questioning behaviors. One hundred thirty-eight findings are presented in a two-dimensional matrix similar to the one used in Chapter IV (Table 4.2), but dealing with just the questioning behavior part of that table. This will be accompanied by a table of basic information about each of the studies' design, subjects, contexts, criterion instrument and setting, and type of statistical analysis.

The first part of this chapter will present the definitions of the nine questioning behaviors. Then, each treatment will be discussed and related to each questioning behavior. This will be followed by a discussion of the treatments in terms of social learning theory in order to aid in the interpretation of statistically nonsignificant findings as well as the significant differences.

Definitions of Questioning Behaviors

In 1956, Benjamin S. Bloom and others published their now famous Taxonomy of Educational Objectives. This taxonomy has had a considerable impact on educational thought because it provides

teachers and investigators with a hierarchy of categories with which to think about cognitive outcomes of classroom teaching. It has stimulated various kinds of research on teaching, including experimental studies, to determine the most effective means for inducing teachers to use certain levels of the cognitive domain in their questioning strategies.

After a review of statements concerning educational objectives about knowledge, intellectual abilities, and skills, Bloom and his associates listed them in terms of the complexity of behavior specified, and they developed a hierarchy containing six major classes. Each of the classes is defined in such a way that the behaviors in one class are based on the behaviors in the preceding classes. Figure 5.1 presents the major elements of this classification scheme.

A distinction is made in the taxonomy between knowledge and the other classes of intellectual skill. Knowledge is defined, ". . . as little more than the remembering of the idea or phenomenon in a form very close to that in which it was originally encountered." (Bloom et al., 1956, p. 29) On this basis, the other classes are usually referred to as "higher-level" or "higher-order."

This taxonomy has been used by several investigators to describe not only student responses, but also to describe the cognitive level of teacher questions. The cognitive level of a question

Figure 5.1 - The Taxonomy of Educational Objectives
in the Cognitive Domain (Adapted from
Bloom et al., 1956, pp. 201-207)

1.00 Knowledge

- 1.10 Knowledge of specifics
- 1.20 Knowledge of ways and means of dealing with specifics
- 1.30 Knowledge of the universals and abstractions in a field

2.00 Comprehension

- 2.10 Translation
- 2.20 Interpretation
- 2.30 Extrapolation

3.00 Application

4.00 Analysis

- 4.10 Analysis of elements
- 4.20 Analysis of relationships
- 4.30 Analysis of organizational principles

5.00 Synthesis

- 5.10 Production of a unique communication
- 5.20 Production of a plan, or proposed set of operations
- 5.30 Derivation of a set of abstract relations

6.00 Evaluation

- 6.10 Judgments in terms of internal evidence
- 6.20 Judgments in terms of external criteria

is determined by the presumed level of response that is required in order for a student to answer the question.

Higher-Order Questions

Most of the studies which experiment with training for questioning skills have tried to get the trainees to use more higher-order questions (HOQ). However, they have varied in the operational definitions which they developed from the Bloom taxonomy. Thirteen of the studies analyzed gave their definition as: the teacher asks a question which requires the student to answer at a level above knowledge in the taxonomy. Rogers and Davis (1970) defined the HOQ as: a question which requires student response at the analysis, synthesis, or evaluation levels. Cornell (1969) defined the HOQ as: a question which requires a student response at the evaluation level only. Konetski (1970) sought to help teachers develop questions which required students to give divergent and evaluative responses as opposed to memory-convergent responses. Allen (1967) and Schmalz (1972) gave their definition of the HOQ as: the teacher asks a question which requires the student to develop a rule or discover a principle.

All of the above definitions were included as higher-order questions because the authors defined and named them as HOQ's. Along with the above definitions, the following three also seemed to

fit into the Bloom taxonomy and were therefore included among the studies training for HOQ, even though the authors did not call them higher-order questions:

1. Koran (1970) trained teachers to use "inquiry questions," which required students to:

- a. give answers not available through recall only;
- b. engage in the complex cognitive processes of induction, deduction, or problem-solving;
- c. and give answers which were divergent in nature.

These "inquiry questions" fit the previous HOQ definitions because they go beyond the knowledge level and would involve all of the levels above knowledge in order for students to engage in induction, deduction, and problem-solving.

2. Ward (1970) trained teachers to use what he called "probing questions" which required original thinking, in that the student answer had to:

- a. be open-ended by going beyond the factual level, and the teacher intent had to allow for more than one right answer;
- b. be based on their opinion or provide some comparison or evaluation of ideas;

These "probing questions" fit the definitions of HOQ because they require going beyond the knowledge level and involve the levels of analysis and evaluation in the Bloom taxonomy.

3. McDonald and Koran (1969) trained teachers to use "analytical questions" which required students to be involved in thinking at the levels of analysis, synthesis, and evaluation in the Bloom taxonomy. The students were required to respond by:
 - a. giving a semantic definition, or
 - b. identifying hypotheses, or
 - c. identifying unstated assumptions, or
 - d. distinguishing factual from nonfactual statements, or
 - e. identifying conclusions.

Probing Questions

This class of skills does not seem to have the kind of background that was found for higher-order questions. Probing was identified and defined as a basic questioning technique by McDonald and Allen (1967). But it has not had the broad uses claimed for it that has been claimed for Bloom's taxonomy. This is primarily due to the fact that it is defined within certain narrow limits.

Probing questions can only follow a student response and

confine the teacher to asking a question which calls for the student to go beyond first-answer responses. The teacher may probe a student response by means of one or more categories of probing, which are termed: clarification, critical awareness, refocus, prompting, and redirect. The categories of probing are based on the teacher's goal when asking a question and are defined in the following ways:

1. Clarification - the teacher asks the student for more information or meaning.
2. Critical awareness - the teacher asks the student to justify his answer or to reflect on it.
3. Refocus - the teacher asks the student to relate his answer to another idea or topic.
4. Prompting - the teacher has probed in one of the other categories, but the student cannot or does not answer. So the teacher gives a hint, rephrases the previous question, or asks for an example, in order to help the student respond.
5. Redirect - the teacher asks a second student to respond to the first student's response. The teacher changes the direction of interaction from one student to another.

Two basic distinctions have been made about probing as a

dependent variable by McDonald and Allen (1967). First, each of the categories of probing acts as a discrete dependent variable. The intercorrelations between categories is so low that differential levels of significance may be expected on the different categories. There are actually six dependent variables which can be considered in any analysis of occurrences of probing. Second, there is a definite ceiling effect on the frequency of occurrence of probing. The teacher can only probe following a student response, and total student responses can vary independently of the treatment to the teacher. Therefore, the investigators usually consider the mean number of probes in relation to the number of nonprobes in their statistical analysis.

Gall (1972) and Goodwin (1971) also trained teachers to use probing questions; however, their categories were described differently from those previously given by McDonald and Allen (1967). The following are the categories used by Gall and Goodwin along with comparisons to the categories used by McDonald and Allen:

1. Information - the teacher question requires the student to give more information. (This is the same as clarification.)
2. Justification - (The same as critical awareness.)
3. Explanation - requires the student to explain what he

meant by his previous answer.

4. Analysis - requires the student to analyze or criticize the response of another student. (This is basically the same as redirect.)
5. Extension - requires the student to extend his own previous response by giving a more comprehensive answer and at a higher cognitive level.

Gall et al. (1971) trained mathematics teachers to use "Diagnostic Questions" which require the student who has given a verbal answer or written answer to a mathematics problem, to explain how he got the answer. Although Gall did not call these probing questions, they actually fit the categories of clarification and critical awareness. Therefore, for this analysis, "Diagnostic Questions" are included as probing questions.

Other Types of Questioning Skills

Several of the questioning skills to be defined here are not actually specific types of questions, but are positive or negative teacher behaviors which may enhance or diminish the effectiveness of the questions asked by the teacher. Friebe and Kallenbach (1969) and Peterson (1973) trained teachers to use what they believed to be a positive teaching behavior: pause after a question. This skill involved increasing the length of time allowed between the question

and the call for a student response. The purpose for the pause is to allow the student time to organize a better response.

Friebel and Kallenbach also sought to diminish three negative behaviors which they felt would inhibit discussion following a teacher's question:

1. Repeating the question - following a teacher's question, the teacher repeats the question before getting any student response.
2. Answer own question - the teacher asks a question and before getting any student response, the teacher provides his own answer.
3. Repeating student response - the teacher asks a question, a student responds, and then the teacher repeats the student's response.

Birch (1969) trained teachers to develop a questioning strategy which encourages students to respond and extend their responses.

This strategy involves four types of questioning and is measured in the form of a ratio. The ratio is the number of leading and probing questions divided by the number of rhetorical and basic questions:

1. Leading questions - are teacher questions which require

a "right answer," or contain cues to the answer, or prescribe a desired approach to developing an answer.

2. Probing questions - are teacher open-ended questions which broaden the field of consideration, or which structure the activity of student inquiry, or which invite exploration of relationships, but do not indicate the nature or approach to the answer.
3. Rhetorical questions - are teacher questions for which the teacher supplies her own answer, or the teacher does not expect (or demand) an answer, or are used to restructure, redirect, or refocus the lesson.
4. Basic questions - are teacher questions which call for facts read, heard, or discussed in class and which ask who, what, where, when, how much, or how many.

Studies Analyzed

Twenty-nine studies dealt with teacher training for nine different questioning behaviors. Most, but not all, were based on Bloom's taxonomy of educational objectives. Table 5.1 provides a complete list of the studies and deals with the theoretical orientation, design, subjects, length of treatment, contexts, criterion instrument,

Table 5.1 - Studies of Questioning Behaviors

Studies Analyzed	Theoretical Orientation	Design	Subjects	Length of Treatment	Contexts	Criterion Instrument	Criterion Setting	Method of Gathering Data	Statistical Analysis
1. Allen, <i>et al.</i> , 67	Bandura's social learning theory	Multi-group pre and posttest	120 secondary teachers	< 10 hours	All subjects except foreign languages and physical education	Investigator made and based on Bloom's taxonomy	Microteaching with pupils and content controlled	Transcripts from audiotapes with observers blinded	Analysis of variance and Wilcoxon Matched Pairs Signed-Rank Test
2. Birch, 69	Dissonance theory	Multi-group pre and posttest	40 student teachers	10 - 30 hours	Grades 3-6, social studies	"Guided Self Analysis"	Microteaching with pupils	Live observation	Multivariate analysis of variance
3. Claus, 69	Bandura's social learning theory	Multi-group pre and posttest	40 student teachers	< 10 hours	Elementary grades	Based on Bloom's taxonomy	Microteaching with peers	Observation of videotapes	Two-way analysis of variance
4. Cornell, 69	Bandura's social learning theory	Posttest only with a control group	63 experienced teachers (at least 7 years)	< 10 hours	4th grade	Based on Bloom's taxonomy	Microteaching with pupils and content controlled	Random-order observation of audiotapes with observer blinded	Mann-Whitney U-test
5. Cosman, 73	Modeling, Bandura implied	Multi-group pre and posttest	18 student teachers	< 10 hours	2nd, 3rd, and 4th grades	"Questioning Strategies Evaluation of Instructor Effectiveness," based on Bloom	Microteaching with peers	Observation of audiotapes	Analysis of variance
6. Douce, 72	No theory	Pre and posttest with a control group	20 in-service teachers	10 - 30 hours	Grades 1-10, social studies	Investigator made and based on Bloom's taxonomy	Classroom with pupils	Typescripts from audiotapes	Analysis of variance
7. Friebe and Kallenbach, 69	Modeling, Bandura implied	Pre and posttest with a control group	33 student teachers	10 - 30 hours	Elementary grades	Investigator made and based in part on Bloom's taxonomy	Classroom with pupils	Observation of videotapes with observer blinded	Analysis of covariance
8. Gall, <i>et al.</i> , 71	Modeling, Bandura implied	Multi-group pre and posttest	35 in-service teachers	10 - 30 hours	3rd and 4th grades	Investigator made	Microteaching with pupils and content controlled	Live observation	Analysis of covariance with t-test
9. Gall, <i>et al.</i> , 72	Bandura's social learning theory	Multi-group pre and posttest	78 in-service teachers	10 - 30 hours	Grades 4-8	Investigator made	Classroom with pupils and content controlled	Typescripts from audiotapes with observer blinded	Analysis of covariance
10. Goodwin, 71	Modeling, Bandura implied	Multi-group pre and posttest	30 intern teachers	< 10 hours	All were female, secondary English or social studies majors	Investigator made	Classroom with pupils	Observation of audiotapes	Analysis of variance
11. Guffy, 71	Bandura's social learning theory	Multi-group posttest only	30 student teachers	< 10 hours	Elementary grades	Investigator made and based on Bloom's taxonomy	Classroom with pupils and content controlled	Observation of videotapes and audiotapes	T-test
12. Hamilton, 73	Bandura's social learning theory	Multi-group pre and posttest	60 graduate students	< 10 hours	All were enrolled in a course in Ed. Psych. and taught lessons to peers	Investigator made	Microteaching with peers	Observation of videotapes	Analysis of covariance and composite rank test
13. Illingworth, 71	Modeling, Bandura implied	Multi-group pre and posttest	32 preservice teachers	< 10 hours	Secondary, mathematics	Investigator made and based on Bloom's taxonomy	Microteaching with peers and content controlled	Observation of videotapes	Repeated measures, analysis of variance and Duncan's New Multiple Range Test
14. Johnson, 72	Modeling, Bandura implied	Pre and posttest with a control group	32 preservice teachers	10 - 30 hours	Elementary majors, but no teaching experience	"Questioning Strategies Observation System" based on Bloom's taxonomy	Microteaching with peers	Live observation with observers blinded	Analysis of variance and t-tests
15. Kissock, 71	Modeling, Bandura implied	Multi-group pre and posttest (Solomon 4 group)	69 preservice teachers	10 - 30 hours	Secondary majors in first education course	Investigator made based on Bloom's taxonomy	Microteaching with pupils	Observation of audiotapes with observers blinded	Analysis of variance, one-way and multivariate
16. Konetski, 70	No theory	Multi-group pre and posttest	90 preservice teachers	< 10 hours	Secondary level, science	Investigator made	Microteaching with peers and content controlled	Observation of audiotapes	Analysis of variance and t-tests
17. Koran, 70	Bandura's social learning theory	Multi-group pre and posttest (Solomon 4 group)	118 preservice teachers	< 10 hours	Secondary level, all subjects except foreign language	Investigator made and based on Gagné's basic processes	Microteaching with pupils	Observation of videotapes	Analysis of covariance
18. McDonald, Allen and Orme, 67	Operant conditioning	Multi-group pre and posttest	85 secondary interns in student teaching	< 10 hours	Secondary, English, mathematics, and social studies	Investigator made	Classroom with pupils	Observation of videotapes with observers blinded	Analysis of covariance
19. McDonald and Koran, 69	Bandura's social learning theory	Multi-group pre and posttest	121 secondary interns	< 10 hours	10th and 11th grades, all subjects except foreign language and physical education	Investigator made	Microteaching with pupils	Written transcripts with observers blinded	Analysis of variance and Newman-Keuls Procedure
20. Marazza, 72	No theory	Multi-group pre and posttest	30 student teachers	10 - 30 hours	Secondary level, all subjects	"Cognitive Classification System" of Clegg and Manson (1970)	Classroom with pupils	Observation of audiotapes with observers blinded	Analysis of covariance and Newman-Keuls Procedure
21. Meehan, 70	No theory	Multi-group posttest only	119 preservice teachers	< 10 hours	Secondary level, language arts	"Verbal Interaction Analysis" of Gallagher and Aschner (1963)	Microteaching with pupils and content controlled	Observation of videotapes	Analysis of variance and t-tests
22. Morse, <i>et al.</i> , 70	No theory	Multi-group pre and posttest	39 preservice teachers	< 10 hours	Secondary level, in first education course	Investigator made	Microteaching with peers	Observation of audiotapes	Analysis of covariance
23. Orme, 66	Bandura's social learning theory	Multi-group pre and posttest	108 secondary interns	< 10 hours	Secondary level, all subjects	Investigator made	Microteaching with pupils	Observation of videotapes with observers blinded	Analysis of covariance
24. Orme, 70	Bandura's social learning theory	Multi-group pre and posttest	40 preservice teachers	< 10 hours	5th grade	Investigator made	Microteaching with pupils	Observation of videotapes with observers blinded	Analysis of covariance and t-tests; also multiple analysis of variance on posttests
25. Peterson, 73	Modeling, Bandura implied	2 group comparison posttest only	24 student teachers	< 10 hours	Elementary level	Investigator made	Classroom with pupils	Observation of videotapes	Analysis of variance
26. Rogers and Davis, 70	Modeling, Bandura implied	Pre and posttest with a control group	20 student teachers	10 - 30 hours	5th grade, low socio-economic level	"Teacher Oral Question Observation Schedule" Davis and Tinsley (1967)	Classroom with pupils and content controlled	Live observation	Analysis of variance
27. Schmalz, 72	Modeling, Bandura implied	Pre and posttest with a control group	27 preservice teachers	< 10 hours	Grades 5-8, mathematics	Investigator made	Microteaching with pupils	Transcripts from audiotapes	Analysis of variance
28. Sweeney, 68	Operant conditioning	Multi-group posttest only	40 student teachers	> 30 hours	Secondary level, science and social studies	"Reciprocal Category System" by Richard Ober	Classroom with pupils	Live observation	Analysis of variance and Duncan's New Multiple Range Test and a Sign Test
29. Ward, 70	No theory	Multi-group pre and posttest	78 experienced teachers	< 10 hours	Grades 1-6, released time for participation	Investigator made	Microteaching with pupils	Observation of videotapes	Chi-square

criterion setting, method of gathering data, and the statistical analysis for each study.

The theoretical orientation of most of these 29 studies was either explicitly based on Bandura's social learning theory or implicitly based on it through discussion and use of modeling as a means of training teachers. Only six studies had no apparent theoretical framework; one study (Sweeney, 1968) was explicitly based on operant conditioning; and one study (Birch, 1969) was explicitly based on a dissonance theory.

Twenty-two of the studies used a multiple-group design. All of these studies used either a pretest and posttest or a posttest only. The statistical analyses in almost every study was analysis of variance or analysis of covariance, and in every case the analysis appeared to be appropriate for the design.

The subjects came from many geographic areas of the United States and involved elementary and secondary teachers. Six different degrees of experience were identified in these studies. They included preservice, interns, student teachers, graduate students, in-service, and experienced teachers. All basic content areas taught in public schools were represented in at least one study, by either the actual use in a classroom, or by the major of the preservice subject.

Most of the criterion instruments were investigator made and

in some way based on the taxonomy by Bloom, et al. The settings had variations from microteaching with peers and no content control, to public school classrooms with actual students and content controlled during pretest and posttest teaching sessions. Only four studies relied on live observation to collect data. The other 25 used audiotapes, videotapes, or typescripts from audiotapes for data collection, and then the observer rated the teacher behaviors from those sources.

Table 5.2 shows that experienced, in-service teachers were the subjects in only five of the 29 studies, and in only two of these studies was the classroom used as the setting for the criterion testing. This is probably a reflection of the fact that for most investigators it is more convenient to use preservice subjects in the more accessible microteaching laboratory. Sixteen of the studies used this more convenient combination, and this situation tends to limit the generalizability of findings. It would probably be more desirable to at least use the classroom setting with preservice subjects, as eight of the studies did.

Model Variations and Questioning Behaviors

A wide variety of models have been tried in training teachers to use three different questioning behaviors. In almost all instances,

Table 5.2 - Listing of Studies; Experience by Criterion Setting

Level of Experience	Classroom	Microteaching
In-service teachers	Douce, 1972 Gall, <u>et al.</u> , 1972	Cornell, 1969 Gall, <u>et al.</u> , 1971 Ward, 1970
Preservice	Friebel and Kallenbach, 1969 Goodwin, 1971 Guffy, 1971 McDonald, Allen, and Orme, 1967 Marazza, 1972 Peterson, 1973 Rogers and Davis, 1970 Sweeney, 1968	Allen, <u>et al.</u> , 1967 Birch, 1969 Claus, 1969 Cosman, 1973 Hamilton, 1973 Illingworth, 1971 Johnson, 1972 Kissock, 1971 Konetski, 1970 Koran, 1970 McDonald and Koran, 1969 Meehan, 1970 Morse, <u>et al.</u> , 1970 Orme, 1966 Orme, 1970 Schmalz, 1972

Table 5.3 - Findings for Model Variations and Questioning Behaviors

Question. Behavior	Model Variations								
	Written Model	Written and Verbal Model	Written and Audio Model	Video Model	Video and Written Model	Video & Written & Live Model	Video, Written Verbal, Live	Content Varied	Row Totals
Higher-Order Questioning	Allen 67 ₁	+ Cosman 73 ₁	+ Cornell 69	0 Allen 67 ₅	+ Allen 67 ₁₀	0	Rogers 70 + & Davis	Marazza 73 ₃	0 14 St.
	Allen 67 ₂	+ Cosman 73 ₂	0	Allen 67 ₆	+ Allen 67 ₁₁	+		Meehan 70 ₃	0
	Allen 67 ₃	+ Marazza 73 ₁	+	Allen 67 ₇	+ Gall 72 ₃	+		Sweeney 68	0 23 +
	Allen 67 ₄	+ Marazza 73 ₂	+	Allen 67 ₈	+ Gall 72 ₄	0			
	Douce 72	0 Meehan 70 ₁	+	Allen 67 ₉	0 Guffy 71 ₁	+			16 0
	Koran 70 ₁	0 Meehan 70 ₂	0	Claus 69 ₁	+ Guffy 71 ₂	+			
	Gall 72 ₁	+		McDonald	+ Guffy 71 ₃	+			
	McDonald	+		& Koran 69 ₂	Johnson 72	0			
	& Koran 69 ₁			McDonald	+ Koran 70 ₂	0			
				& Koran 69 ₃	Koran 70 ₃	0			
Probing Questioning	Gall 72 ₂	+ McDonald	+	Gall, et al. 71 ₁	+ Gall 72 ₅	0	Hamilton 73 ₆ + Orme 70 ₃ +		7 St.
	Goodwin 71 ₁	+ & Allen		Gall, et al. 71 ₂	+ Gall 72 ₆	(-)			26 +
	Goodwin 71 ₂	+ & Orme 67 ₁			Hamilton 73 ₁	+			
	Orme 66 ₁	+ McDonald	+		Hamilton 73 ₂	+			10 0
	Orme 66 ₂	+ & Allen			Hamilton 73 ₃	+			
		& Orme 67 ₂			Hamilton 73 ₄	+			1 (-)
		McDonald	+		Hamilton 73 ₅	0			
		& Allen			Orme 66 ₃	+			
		& Orme 67 ₃			Orme 66 ₄	+			
					Orme 66 ₅	+			
					Orme 66 ₆	+			
					Orme 66 ₇	+			
					Orme 66 ₈	+			
					Orme 66 ₉	0			
					Orme 66 ₁₀	+			
					Orme 66 ₁₁	0			
					Orme 66 ₁₂	0			
					Orme 66 ₁₃	0			
					Orme 66 ₁₄	+			
					Orme 66 ₁₅	0			
					Orme 66 ₁₆	0			
Questioning Strategies				Birch 69 ₁	0 Birch 69 ₃	+			1 St.
				Birch 69 ₂	0 Birch 69 ₄	0			1 +
					Birch 69 ₅	0			4 0
Col.	7 Studies	4 Studies	1 Study	5 Studies	9 Studies	2 Studies	1 Study	3 Studies	50 +
Total	11 + 2 0	7 + 2 0	1 0	9 + 3 0	20 + 19 0 1 (-)	2 +	1 +	3 0	30 0 1 (-)

Table 5.4 - Treatment Conditions and Their Numerical Codes

	Numerical Code for Experimental Group	Numerical Code for Comparison Group	Treatment Conditions
Modeling Conditions	1	31	Symbolic written
	2	32	Symbolic verbal
	3	33	Perceptual audio
	4	34	Perceptual video
	5	35	Live, group
	6	36	Live, individual
	7	37	Cueing provided
	8	38	Model uses same content as subjects use in practice
	9	39	Positive instances of behavior
	10	40	Negative instances of behavior
	11	41	Positive and negative instances of behavior
Practice Conditions	12	42	Vicarious practice
	13	43	Microteaching
	14	44	Classroom
	15	45	Cycled
	16	46	Peers as students
	17	47	Children as students
Feedback Conditions	18	48	Symbolic written
	19	49	Perceptual audio
	20	50	Perceptual video
	21	51	Peer, group
	22	52	Peer, individual
	23	53	Self
	24	54	Supervisor
	25	55	Cueing provided
	26	56	Immediate
	27	57	Delayed
	28	58	Massed practice
	29	59	Distributed practice
		30	Control (no treatment)
		60	Control (placebo treatment)
		61	Pretest

the modeling has been used in combination with some type of practice and feedback. The treatments have been compared with treatments which differed only in the model presented, pretests, control groups, and placebo treatments. The 81 findings are summarized in Table 5.3, which is a two-dimensional matrix that compares specific treatments with the particular behavior trained for in each study. At the same time, the significance of each findings is reported with + indicating a significant gain in the behavior of the experimental group over the performance of the comparison group, \emptyset indicating no significant difference between groups, and (-) indicating that the experimental group performed significantly lower than the comparison group on the behavior.

Each cell of the matrix which contains any findings has the specific treatment comparisons presented and a discussion of the findings will follow. The discussion includes relationships to Bandura's social learning theory and contradictory findings as well as supportive ones.

Every finding represents comparison of two different sets of treatment conditions. There were 29 different conditions possible for the comparison groups. All of these were defined in Chapter III, but are presented here in Table 5.4 and assigned a numerical code so that the complete treatment conditions can be shown in an abbreviated

form for each finding within each cell of the matrix. The same numerical code for treatment conditions will be used in discussing the rest of the findings related to questioning behaviors and also for all of the findings in Chapter VI.

Written Models

Seven different studies used symbolic written models in training teachers to use more HOQ's and probing questions. Column one of Table 5.3 contains the 13 findings and identifies the studies they are associated with.

The Written Model-HOQ Cell of the matrix contains eight findings which had the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Allen, <u>et al.</u> , 67 ₁	+	1+7+9+13+15+16+20 +23+25	61
Allen, <u>et al.</u> , 67 ₂	+	1+7+8+9+13+15+16 +20+23+25	61
Allen, <u>et al.</u> , 67 ₃	+	1+7+11+13+15+16+20 +23+25	61
Allen, <u>et al.</u> , 67 ₄	+	1+7+8+11+13+15+16 +20+23+25	61
Gall, <u>et al.</u> , 72 ₁	+	1+7+9+13+15+17+20 +23	30
McDonald and Koran, 69 ₁	+	1+7+9+13+15+17	43+45+47
Koran, 70 ₁	∅	1+7+9	30
Douce, 72	∅	1+11+12+13+16+24+25	30

For six of the eight comparisons, written modeling was significantly effective in changing the teachers' behavior toward greater use of HOQ. Allen and associates found that a carefully, cued, written model along with microteaching practice and cued video feedback helped the subjects increase their HOQ on the posttest over the level they exhibited on their pretest. Gall found that a carefully cued written model along with microteaching and video feedback increased HOQ compared to a control group. He also found that the students who were in the classes of the in-service teachers who were experimental subjects responded more and had more long responses.

McDonald and Koran found that the cued written model and microteaching practice with no feedback was sufficient to make significant gains in HOQ when compared to a group that had only the microteaching practice. This seems to support the idea that the critical difference was the cued written model. They also found that the experimental subjects made gains in three other measures of HOQ abilities over the performance of the comparison group:

1. They used more of the five different categories of HOQ.
2. They used more high quality HOQ.

3. They used fewer questions that were not HOQ.

Two studies produced findings which seem to contradict the idea that written models could produce significantly more HOQ. Koran found that a cued written positive model of HOQ produced no significant gain over the control group that had no treatment. However, Koran did not allow for any practice sessions, and if this finding is compared with McDonald and Koran's previous findings, it may indicate that a model without practice is not sufficient for successful performance of the complex set of behaviors which are required in order to use HOQ's.

Douce found no significant gain in HOQ for experimental subjects over the performance of a control group. Although the experimental subjects in this case were given one practice session and cued supervisor feedback, the model was actually a very weak one. There was no cueing of the exact type of behavior desired and the written model presented positive and negative instances of the questioning behavior. The fact that there were many negative examples and that the written model did not clearly specify what behaviors should be performed, may have confused the subjects about which levels of questioning they were expected to perform.

All of these findings, except Koran (1970) directly support

postulate F of assumption I of Bandura's social learning theory; the greatest performance gains are attained by observers when desired behaviors are clearly specified by the model rather than inferred from a few examples. The nonsignificant finding by Douce (1972) also helps support this postulate because the experimental group was shown a mixed model (positive and negative examples) with no cues of the specific behaviors desired. Of the five studies, Douce's was the only one not explicitly based on Bandura's theory or on any other theoretical framework. This may help account for the nonsignificant finding.

Koran's finding, along with that of McDonald and Koran, combine to support assumption IV and its postulate A: observational learning alone is not sufficient to produce faultless performances, but the observer must be provided with opportunities for practice under conditions which are rewarding. Even though the subjects in Koran's study may have symbolically acquired the desired behaviors, they had no opportunity to demonstrate these behaviors prior to the posttest. The subjects in McDonald and Koran's study had two opportunities to prepare, rehearse, and perform the behaviors with children before the posttest. They had those occasions to act out the behaviors that they symbolically acquired from a specific transcript of an actual teaching situation. This study indicates

that practice without a specific model to follow, is significantly less effective than practice preceded by a specific cued model.

The Written Model-Probing Questioning Cell of the matrix contains five findings which had the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Orme, 66 ₁	+	1+9+13+15+17+20+23	61
Orme, 66 ₂	+	1+9+13+15+17+20+24 +25	61
Goodwin, 71 ₁	+	1+7+9	30
Goodwin, 71 ₂	+	1+7+9+12	30
Gall, <u>et al.</u> , 72 ₂	+	1+7+9+13+15+17+20 +23	30

For all five of the comparisons, written modeling was found to be significantly effective in changing the teachers' behavior toward greater use of probing questions. Orme found that a written model along with cycled microteaching practice and video feedback (with or without a supervisor's cues) helped the subjects increase their use of probing questions over the level they exhibited on the pretest. He also found that there was an increase in the number of student answers for the experimental teachers' microclasses.

Goodwin found that a cued, positive written model presentation

was sufficient to increase the number of probing questions compared to a control group. He found that the same treatment with vicarious practice resulted in significant gains in the use of probing questions. However, he found that there was no significant difference between the two experimental groups, which would indicate that the vicarious practice made little or no contribution in the acquisition and performance of probing questions. In the examination of written models and HOQ, it was found from Koran (1970) and McDonald and Koran (1969), that microteaching practice was an aid in the training. This difference in findings for HOQ and probing questioning helps support the continuing need for investigators and reviewers to examine specific treatment-behavior links. Perhaps not all behaviors should be trained for in identical ways.

Gall found that cued written modeling combined with cycled microteaching practice and video feedback resulted in gains in probing questioning. The students in the experimental subjects classes responded more and had more long responses than the students in control classes.

All of these findings tend to support assumption I of Bandura's theory and lend support in particular to postulate F: learning of social behaviors can occur on a vicarious basis through observation of another person's behavior, and the greatest performance gains

are attained when desired behaviors are clearly specified by the model.

Written and Verbal Models

Four different studies used symbolic written and verbal models in combination in training teachers to use more HOQ's and probing questions. Three of the studies were concerned with HOQ, and one study dealt with probing questioning. Column two of Table 5.3 contains the list of studies and the nine findings from those studies.

The Written, Verbal Model-HOQ Cell of the matrix contains six findings which had the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Cosman, 73 ₁	+	1+2+7+11+12+13+14 +16+17+18+21+22+25	61
Cosman, 73 ₂	∅	1+2+7+11+12+13+14 +16+17+18+21+22+25	30
Marazza, 73 ₁	+	1+2+7+11+12+14+15 +17+19+23+25+29	60
Marazza, 73 ₂	+	1+2+7+11+12+14+15 +17+19+23+25+29	60
Meehan, 70 ₁	+	1+2+7+11+12	60
Meehan, 70 ₂	∅	1+2+7+11+12	60

Four of the six comparisons indicated that written and verbal modeling was effective in changing the teachers' behavior toward greater use of HOQ. Cosman found that a cued model along with microteaching practice, classroom practice, and cued peer feedback helped the student teachers significantly increase their HOQ on the posttest over the level they exhibited on the pretest. When he compared the same experimental group with a control group at the end of student teaching, he found no significant differences between the groups on change in number of HOQ. However, there were some obvious reasons for this nonsignificant finding:

1. The experimental group made large gains in HOQ during the training period, such that over 50% of their questions became HOQ (a 90% increase).
2. The experimental group averaged a 53% drop in the number of knowledge level questions.
3. The pretest used for comparing the experimental and control groups was given after the experimental group had had their training. Therefore, they made no significant increase during student teaching, and Cosman reported that no significant change had taken place when compared to the controls.

Cosman's study presents an example of inadequate statistical

analysis because he failed to test for significant differences after training, but before student teaching. This inadequacy made the study a doubtful one for inclusion in this analysis. It is unfortunate that he did not do a more thorough job of comparing the experimental and control groups, however, the study was included because of the obviously significant change in HOQ from pre to posttraining measures.

Marazza treated two experimental groups of student teachers by giving them cued written and verbal models along with vicarious practice, distributed classroom practice, and cued audio feedback. One group was given modeling on questioning strategies and Flander's interaction analysis categories, while the other experimental group had modeling of Flander's categories only. However, both groups used significantly more HOQ than a control group that had a placebo seminar. Meehan tried a similar training strategy. She gave each experimental group a cued written and verbal model along with vicarious practice, but no feedback. One group was given modeling on Bloom's cognitive levels while the other group had modeling on Krathwohl's affective levels. She found that the group given modeling on the cognitive levels used significantly more HOQ than the control group which had a placebo seminar. The group given modeling on affective levels showed no significant gain over the placebo group.

All of these findings, except Cosman's, clearly support assumption I of Bandura's theory and lend support to postulate F. With the previously discussed limitations of Cosman's findings, his data still falls in line with the other studies reported here.

The Written, Verbal Model-Probing Questioning Cell of the matrix contains only three findings, all from one study. The three findings had the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald, Allen, and Orme, 67 ₁	+	1+2+7+9+14+15+17 +20+24+25+26+28	61
McDonald, Allen, and Orme, 67 ₂	+	1+2+7+9+14+15+17 +20+24+25+26+29	61
McDonald, Allen, and Orme, 67 ₃	+	1+2+7+8+14+15+17 +20+24+25+27+29	61

McDonald, Allen, and Orme found that a cued written and verbal model, along with cycled classroom practice and video feedback with supervisor cues was significantly effective in increasing the number of probing questions when compared with the pretest for each group. The three treatment groups received essentially the same treatments, except for variations in the distribution of practice and the immediacy of feedback. It turned out that there were no significant differences between the three groups, but these comparisons will be discussed further when practice and feedback variations are analyzed later in

this chapter. The three significant findings of this study tend to support the general assumption that social behaviors can be learned through observation of specific models (assumption I and postulate F of Bandura's theory).

Written and Audio Models

There was only one study in this column. Cornell attempted to change HOQ skill of experienced teachers using a noncued, positive, written and audio model, along with cycled microteaching practice and audio feedback. The specific treatment comparison was as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Cornell, 69	Ø	1+3+8+9+13+15+17 +19+23	60

Cornell found that the experimental group did not use significantly more HOQ than the comparison group which used the same content in the posttest. There were several factors which probably contributed to this finding which seems to contradict assumption I of Bandura's theory:

1. The model was given without any reference to Bloom's taxonomy or discussion of the exact type of question desired. According to postulate F, the fact that there

was no cueing should limit the gains in performance.

This is an example of a nonsignificant finding which actually lends support to the theory.

2. The investigator found that the teachers' questioning techniques were generally poor, and yet he was trying to train them to use evaluation questions, which are supposed to demand the highest cognitive level of development.
3. The content was specified for every subject, and it was the same as that used by the model. It turned out that the content was very controversial, since it dealt with civil disobedience and the training occurred within a year after rioting had taken place in the area. This may have made the elementary teachers reluctant to ask the children what they thought about the rightness or value of disobeying the law.

Video Models

Column four of Table 5.3 contains 12 findings from three different studies which used perceptual video models in training teachers to use more HOQ's, one study which used a video model to train teachers to use more probing questions, and one study that

used a video model to train teachers to use questioning strategies.

The Video Model-HOQ Cell of the matrix contains eight findings which had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Allen, <u>et al.</u> , 67 ₅	+	4+7+9+13+15+16+20 +23+25	61
Allen, <u>et al.</u> , 67 ₆	+	4+7+8+9+13+15+16 +20+23+25	61
Allen, <u>et al.</u> , 67 ₇	+	4+7+11+13+15+16 +20+23+25	61
Allen, <u>et al.</u> , 67 ₈	+	4+7+8+11+13+15+16 +20+23+25	61
Allen, <u>et al.</u> , 67 ₉	Ø	4+7+8+11+13+15+16 +20+23+25	31+37+38+41+43 +45+46+50+53+55
Claus, 69	+	4+7+9+13+15+16+20 +24+25	34+39+43+45+46 +50+54+55
McDonald and Koran, 69 ₂	+	4+7+8+13+15+17	43+45+47
McDonald and Koran, 69 ₃	+	4+7+9+13+15+17	31+37+39+43+45 +47

For seven of the eight comparisons, video modeling was found to be significantly effective in changing teachers' behavior toward greater use of HOQ. Allen and associates found that a carefully cued, video model, along with microteaching practice and cued video feedback, helped the teachers increase their HOQ on the posttest over

the level they exhibited on their pretest. Claus found that presentation of a cued video model was more effective than an uncued video model, even though both groups were shown positive models along with cycled microteaching practice and video feedback with supervisor cueing. She also found that 60% of all questions by all subjects were memory dependent and that cued model subjects increased both higher-order and lower-order questions, while noncued subjects decreased in total questions and lower-order questions.

McDonald and Koran found that a cued video model combined with cycled microteaching practice was more effective than cycled microteaching practice alone, and more effective than a cued written model with cycled microteaching practice. Allen and associates had a finding which does not agree with McDonald and Koran's study. Allen found that there was no significant difference between video modeling and written modeling in producing change in HOQ when the subjects are also provided with cycled microteaching practice and cued video feedback. Although the two studies did not both find the video model to be superior to the written model, they did both find that a clear, cued model was superior to no modeling.

All of these findings support assumption I of Bandura's theory that social behaviors can be learned from observation of specific

models. All of the experimental groups received cued modeling, and the significant increases brought about support postulate F of assumption I. In particular, Claus' finding showed that greatest performance gains are attained by observers when desired behaviors are clearly specified (cued) by the model rather than inferred by examples.

The Video Model-Probing Questioning Cell of the matrix contains two significant findings from one study by Gall, et al. (1971). The specific treatment comparisons were as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Gall, <u>et al.</u> , 71 ₁	+	4+7+9+13+15+17+19 +23	30
Gall, <u>et al.</u> , 71 ₂	+	4+7+9+13+15+17+20 +23	30

Gall and associates found that a cued video model, along with cycled microteaching practice and video or audio feedback, helped the subjects significantly increase their use of probing questions more than the control groups which received no treatment. These findings support assumption I of Bandura's theory.

The Video Model-Questioning Strategies Cell of the matrix contains two findings of no significant differences from one study by

Birch (1969). The specific treatment comparisons were as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Birch, 69 ₁	Ø	4+9	30
Birch, 69 ₂	Ø	4+9+14+15+17	30

Birch found that a video model without practice or feedback produced no significant change in questioning strategies when compared to the performances of a control group. This finding tends to support assumption IV and postulate A of Bandura's theory.

Observational learning alone is not sufficient to produce faultless performances, but the observer must also have opportunities for practice under conditions which produce rewarding consequences. However, this does not entirely account for Birch's other finding where cycled classroom practice was provided. The classroom practice may not have provided rewarding consequences for the student teachers, and this would be in line with postulate A. More likely, the problem with this treatment lay in the fact that no cues were provided during modeling, and this nonsignificant finding could be expected according to assumption I, postulate F.

Video and Written Models

Column five of Table 5.3 has 41 findings from nine different studies. This was the most widely tested treatment for changing

questioning behaviors. Five studies and 12 findings were concerned with HOQ; four studies and 25 findings were concerned with probing questioning; and one study with three findings dealt with questioning strategies.

The Video, Written Model-HOQ Cell of the matrix contains 12 findings which had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Allen, 67 ₁₀	∅	1+4+7+9+13+15+16 +20+23+25 (train- ing)	31+34+37+41+43 +46+50+53+55 (training)
Allen, 67 ₁₁	+	1+4+7+9+13+15+16 +20+23+25 (post- test)	31+34+37+41+43 +46+50+53+55 (posttest)
Gall, <u>et al.</u> , 72 ₃	+	1+4+7+9+13+15+17 +20+23	30
Gall, <u>et al.</u> , 72 ₄	∅	1+4+7+9+13+15+17 +20+23	31+37+39+43+45 +47+50+53
Guffy, 71 ₁	+	1+4+7+8+9+13+16 +20+24+25+28	43+46+50+53+58
Guffy, 71 ₂	+	1+4+7+8+9+13+14 +16+17+20+24 +25+29	43+44+46+47+50 +53+59
Guffy, 71 ₃	+	1+4+7+8+9+13+14 +16+17+20+24 +25+29	30 (ten weeks of student teaching)
Johnson, 72	∅	1+4+7+11+12	32+34+37+41+42

The Video, Written Model-HOQ Cell (continued)

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Koran, 70 ₂	Ø	1+4+7+9	60
Koran, 70 ₃	Ø	1+4+7+10	60
Koran, 70 ₄	Ø	1+4+7+9	31+37+39
Koran, 70 ₅	Ø	1+4+7+9	31+34+37+40

Five of the 12 findings, from three different studies, showed significant effects when video and written models were used in teacher training for HOQ. However, two of the nonsignificant findings are strongly linked to the significant findings. Allen and associates found a positive-only model was not significantly different in effectiveness from a mixed model on three microteaching sessions during the training period, but the positive-only model subjects used more HOQ than the mixed model subjects on the after-training post-test. Gall and associates found that a cued, positive written and video model, along with cycled microteaching practice and video feedback, helped the experimental subjects use more HOQ when compared with a control group; but they found no significant difference when they compared the experimental group with a group of subjects which had the same treatment minus only the video part of the modeling.

Guffy found that a positive, cued written and video model, along with microteaching practice and video feedback with supervisor cueing, helped the subjects use more HOQ than a comparison group which only had microteaching practice and video feedback without supervisor cueing. He found that the same comparison made after ten weeks of student teaching showed the experimental subjects still using significantly more HOQ. When this experimental group was compared with a group that had only ten weeks of student teaching and no other treatment, he found that the experimental group used more HOQ and also used fewer lower-order questions, while finding no significant difference in the number of total questions used. Guffy's findings are very interesting because they show not only a significant effect for modeling after training, but also after ten weeks of student teaching, during which there was no experimental intervention.

The five significant findings all support assumption I and postulate F of Bandura's theory. In each case, a specific cued model was presented, and in Guffy's findings the experimental group used more HOQ even though the comparison group had practice and feedback. This also gives support to proposition two of Bandura's theory, that the combined use of modeling and reinforcement procedures is probably the most efficacious method of

transmitting, eliciting, and maintaining social response patterns. Allen's second finding and Guffy's second and third findings support proposition eight, that response patterns tend to generalize to situations other than those in which they were learned. Allen's findings showed that a positive model was not more effective than a mixed model during training tests, but that after training the positive-only modeled group performed significantly better when they had to transfer the HOQ skills to a new situation.

Johnson found that a mixed, cued written and video model, along with vicarious practice, produced no significant increase in HOQ when compared with a group that received a mixed, cued verbal and video model with vicarious practice. He also found that neither group made any significant gain in the number of HOQ from pretest to posttest. These findings tend to support assumption IV and postulate A because the only practice for either group was coding type-scripts. There were no opportunities for either group to practice using the questioning skills, and the presentation of the different types of questions was not sufficient to produce a change in performance on the posttest.

Koran's four findings of no significant differences between groups also support assumption IV and postulate A. None of the groups had any practice sessions, and even though they had

specifically cued positive or negative models, they made no significant gain in HOQ when compared with placebo groups and when compared with each other. He also found that none of the four groups made any significant gain in HOQ from pretest to posttest. Koran's findings may also lend support to assumption III and postulate H. The subjects probably needed some symbolic and motor rehearsal in order to reorganize and recode the modeled events.

The Video, Written Model-Probing Questioning Cell of the matrix contains 25 findings from four studies which had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Gall, <u>et al.</u> , 72 ₅	Ø	1+4+7+9+14+15+17 +20+23	30
Gall, <u>et al.</u> , 72 ₆	(-)	1+4+7+9+13+15+17 +20+23	31+37+39+43+45 +47+50+53
Hamilton, 73 ₁	+	1+4+7+9+13+15+16 +20+24+25	61
Hamilton, 73 ₂	+	1+4+7+9+13+15+16 +20+24+25	31+34+39+43+45 +46+50+53
Hamilton, 73 ₃	+	1+4+7+9+13+15+16 +20+23+25	61
Hamilton, 73 ₄	+	1+4+7+9+13+15+16 +20+23+25	31+34+39+43+45 +46+50+53
Hamilton, 73 ₅	Ø	1+4+9+13+15+16 +20+23	61

The Video, Written Model-Probing Questioning Cell (continued)

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Orme, 66 ₃	+	1+4+9+13+15+17 +20+23	61
Orme, 66 ₄	+	1+4+9+13+15+17 +20+24+25	61
Orme, 66 ₅	+	1+4+7+9+13+15+17 +20+23	61
Orme, 66 ₆	+	1+4+7+9+13+15+17 +20+24+25	61
Orme, 66 ₇	+	1+4+7+9+13+15+17 +20+24+25	31+39+43+45+47 +50+53
Orme, 66 ₈	+	1+4+7+9+13+15+17 +20+24+25	31+39+43+45+47 +50+54+55
Orme, 66 ₉	∅	1+4+7+9+13+15+17 +20+24+25	31+34+39+43+45 +47+50+53
Orme, 66 ₁₀	+	1+4+7+9+13+15+17 +20+24+25	31+34+39+43+45 +47+50+54+55
Orme, 66 ₁₁	∅	1+4+7+9+13+15+17 +20+23	31+34+39+43+45 +47+50+54+55
Orme, 66 ₁₂	∅	1+4+7+9+13+15+17 +20+23	31+34+39+43+45 +47+50+53
Orme, 66 ₁₃	∅	1+4+7+9+13+15+17 +20+23	31+39+43+45+47 +50+54+55
Orme, 66 ₁₄	+	1+4+7+9+13+15+17 +20+23	31+39+43+45+47 +50+53
Orme, 66 ₁₅	∅	1+4+9+13+15+17 +20+24+25	31+39+43+45+47 +50+54+55

The Video, Written Model-Probing Questioning Cell (continued)

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Orme, 66 ₁₆	∅	1+4+9+13+15+17 +20+24+25	31+39+43+45+47 +50+53
Orme, 66 ₁₇	∅	1+4+9+13+15+17 +20+23	31+39+43+45+47 +50+54+55
Orme, 66 ₁₈	+	1+4+9+13+15+17 +20+23	31+39+43+45+47 +50+53
Orme, 70 ₁	+	1+4+7+11+13+15 +17+20+24+25	43+45+47
Orme, 70 ₂	∅	1+4+7+11+12+24 +25	43+45+47

Gall and associates found that there was no significant difference in the mean number of probing questions between the experimental group and a control group. They also found that the written and video model used significantly fewer probing questions than the written-only model. These findings made it appear that written and video modeling was not effective for probing questioning, but in actuality, all of the very specific modeling presented to the subjects was only on discriminating, writing, and using HOQ. Since the experimental group did not actually receive modeling on probing questioning, the lack of significant differences, or a significant difference in favor of the written model-only group, is not surprising.

All five of Hamilton's findings tend to give support to Bandura's

assumption I, postulate F; and assumption II, postulate D. He found that a cued, positive, written, and video model, along with microteaching practice and cued video feedback, helped the subjects use more probing questions than they used on their pretest, and they used more probing questions than a comparison group which received no cueing during modeling or feedback. These significant differences support the need for clearly specified behaviors and cueing of correct responses of the models. Hamilton found that the group which received an uncued written and video model, along with microteaching practice and uncued video feedback, did not use more probing questions than on their pretest. This finding also supports assumption I, postulate F; and assumption II, postulate D.

Orme's 1966 study had six experimental groups, and four of the groups were shown both a written and a video model. In his statistical analysis, he compared these groups to each other in every possible combination, so there are a large number of findings for this one study. With so large a number and variety of comparisons there are several findings which are somewhat contradictory and do not always support Bandura's theory. Some of the comparisons were actually to test differences in feedback only, so they will be presented under discussion of feedback variations later in this chapter.

All of the four groups which observed a written and video model along with cycled microteaching practice and video feedback, used more probing questions when compared with their level of probing on their pretest. Every one of these groups also had an increase in the number of student answers from pretest to posttest. He also found that a cued, positive written and video model, along with cycled microteaching practice and video feedback cued by a supervisor, helped subjects use more probing questions than the two groups which observed a noncued written model, along with cycled microteaching practice and video feedback (findings 7 and 8). These two findings tend to support assumption I and postulate F, and postulate D of assumption II of Bandura's theory because the cued modeling and cued feedback group did receive a more specific set of examples and discrimination training on the model and the subjects' own performances. The same significant differences were found when this group was compared to a group which had a noncued written and video model (finding 10), and when the group with a cued written and video model without cued feedback was compared with the group which had only a noncued written model and noncued feedback (finding 14).

At the same time, Orme's study contained four findings of no significant difference (findings 9, 11, 12, 13) which seem to

contradict the superiority of a cued model and discrimination training. These findings do not support postulate F of assumption I and postulate D of assumption II.

Four of Orme's findings do not support the superiority of a written and video model over the effectiveness of a written model (findings 13, 15, 16, 17). But contradictory to these four findings, two findings did tend to support the superiority of video and written modeling over written modeling (findings 14 and 18).

There seemed to be at least two reasons why some of these findings were contradictory. First, all of the groups made significant gains in probing from pretest to posttest; therefore, all of the forms of modeling were effective. Secondly, the total time for treatment was only one and one-half hours spread over a six-week period. This short of a treatment period probably does not sufficiently allow for differential effects among treatments which each had significant effects on a complex skill, such as probing.

Orme's 1970 study had two experimental groups which were shown both a written and a video model. These two groups were compared with a group that had cycled microteaching practice. He found that the group which had cued written and video modeling, along with cycled microteaching practice and video feedback cued by a supervisor, used significantly more probing questions than a

group which had cycled microteaching practice but no modeling or feedback. They also had more pupil responses than the microteaching practice-only group. The group which had cued written and video modeling, along with experience in coding of three different video models and feedback on the accuracy of their coding, did not use more probing questions than the microteaching practice-only group.

Both of these findings from Orme's 1970 study lend strong support to assumption IV and postulate A of Bandura's theory. Specific modeling and feedback when coupled with cycled practice were sufficient to increase probing questioning more than practice alone. However, specific modeling and feedback without practice in actual performance did not significantly change the probing skill. Therefore, observational learning alone is not sufficient to produce desired changes in performance.

The Video, Written Model-Questioning Strategies Cell of the matrix contains three findings from one study by Birch (1969). These findings were for the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Birch, 69 ₃	+	1+4+7+9+12+14+15 +17+20+23+25+29	30
Birch, 69 ₄	∅	1+4+7+9+12+14+15 +17+20+23+29	30
Birch, 69 ₅	∅	1+4+7+9+12+14+15 +17+29	30

Birch's findings appeared to be contradictory. He found that the subjects who observed a cued written and video model, along with coding practice, cycled classroom practice, and video feedback with self-coding, had a higher ratio of leading-probing questions to rhetorical-basic questions than a control group. This finding would tend to support Bandura's assumptions. However, the other two groups which also had the same specific cued model and classroom practice did not have a different questioning ratio than the controls. The only differences between these three groups were not in the modeling or practice, but in kind of feedback provided. It is unfortunate that the three groups were not directly compared. These findings do not clearly support any of Bandura's assumptions, at least with respect to the questioning strategy that Birch was trying to change among his subjects.

Video, Written and Live Models

Column six of Table 5.3 has just two findings from two different studies. Both of these findings were concerned with the skill of probing questioning, were significant, and had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Hamilton, 73 ₆	+	1+4+6+7+11	61
Orme, 70 ₃	+	1+4+6+7+11	43+45+47

These two studies are closely related because Hamilton set out to replicate part of the two earlier studies by Orme. The experimental treatments reported for these two findings were identical even though the comparison was different. Hamilton found that subjects who observed a written and video model cued by a supervisor, and then observed a peer as that peer taught two lessons and received supervisor cued video feedback, used more probing questions on their posttest than on their pretest. Orme found that subjects with the same experimental treatment used more probing questions than a comparison group that had two microteaching practice sessions without modeling or feedback.

Both of these findings support Bandura's assumption I that learning of social behaviors can occur on a vicarious basis through observation of other person's behavior and its consequences, even when the observer does not reproduce (or practice) the modeled responses during acquisition.

Video, Written, Verbal and Live Models

Column seven of Table 5.3 has just one finding from one study by Rogers and Davis (1970). This finding was just concerned

with higher-order questioning and had the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Rogers and Davis, 70	+	1+2+4+5+7+11+12 +13+15+16+19 +21+25	60

Rogers and Davis found that subjects who observed video models after learning Bloom's categories and discussing the purposes and uses of the varying level of questions, along with coding of questions, microteaching practice, and audio feedback with cueing by peers, used significantly more HOQ than a placebo group that had a seminar on general problems of student teaching. This finding lends support to assumption I of Bandura's theory.

Content Variations in Modeling

Column eight of Table 5.3 has just three findings from three studies. All of these findings were concerned with the skill of higher-order questioning and had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Marazza, 73 ₃	Ø	1+2+7+11+12+14 +15+17+19+23+25 +29	31+32+37+41+42 +44+45+47+49+53 +55+59

Content Variations in Modeling (continued)

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Meehan, 70 ₃	Ø	1+2+7+11+12	31+32+37+41+42
Sweeney, 68	Ø	1+2+5+7+9+13+14 +16+17+29	31+32+35+37+39 +43+44+46+47 +49

Marazza found that both the experimental and the comparison groups used more HOQ than a control group, and that studying Bloom's taxonomy was not a significant additional treatment. Meehan found that experimental subjects who studied the cognitive levels of questioning did not use more HOQ than the comparison subjects who studied the affective levels of questioning. Although she did find that the experimental subjects did use more HOQ than the placebo group. Sweeney found that experimental subjects who studied a specific interaction analysis system did not use more HOQ than the comparison subjects who had the same treatment only they studied general categories of teacher behavior with no reference to a specific analysis system.

None of these findings provide support for any particular assumption or postulate of Bandura's theory. They all seem to indicate that content variations make no significant difference in

learning HOQ as long as specific modeling, practice, and feedback are provided.

Practice Variations and Questioning Behaviors

Four varieties of practice have been tried in training teachers to use seven different questioning behaviors. In every case, practice was not used alone, but in combination with some type of modeling or feedback; however, the treatments compared, differed with respect to the type of practice provided. The 24 findings for practice are summarized in Table 5.5, which is a two-dimensional matrix that compares specific treatments with the particular behaviors trained for in each study. The significance of each finding is reported, with + indicating a significant gain in the behavior of the experimental group over the performance of the comparison group, Ø indicating no significant difference between groups, and (-) indicating that the experimental group performed significantly lower than the comparison group on the behavior.

Microteaching Practice

Five different studies used microteaching practice as a variable in teacher training. Column one of Table 5.5 presents 14 findings and the associated studies.

The Microteaching-HOQ Cell of the matrix contains four

findings which had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Friebel and Kallenbach, 69 ₁	Ø	1+4+7+9+13+14+16 +17+20+23	31+34+37+39+44 +47
Guffy, 71 ₄	(-)	13+14+15+16+17 +20+23	30
Schmalz, 72 ₁	Ø	1+2+4+7+11+13+17 +20+23+25	31+32+34+37+41
Schmalz, 72 ₂	Ø	1+2+4+7+11+13+17 +20+24+25	31+32+34+37+41

The findings of Friebel and Kallenbach (1969) and Schmalz (1972) tend to contradict postulate A of assumption IV of Bandura's theory. In all three comparisons, the addition of microteaching practice and video feedback produced no significant difference in HOQ when compared with a group that had cued modeling only. Apparently, the provision of practice was not significantly more rewarding than modeling alone. However, in Friebel and Kallenbach's comparison, both groups did have some uncontrolled classroom practice during their period of treatment. Therefore, this finding may not actually contradict Bandura's theory, but only show that the addition of microteaching practice to classroom practice does not make any significant difference.

Guffy found that when neither group had any modeling, that

the group which had cycled microteaching practice and uncued video feedback actually used significantly fewer HOQ than the controls which had no treatment. This showed that undirected practice was not valuable in training and may have confused the subjects. Indirectly, this finding tends to support postulate A of assumption I of Bandura's theory.

The Microteaching-Probing Questioning Cell of the matrix contains six findings from three different studies. The findings had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Friebel and Kallenbach, 69 ₂	Ø	1+4+7+9+13+14+16 +17+20+23	31+34+37+39+44 +47
Hamilton, 73 ₇	Ø	1+4+7+9+13+15+16 +20+24+25	31+34+36+37+41
Hamilton, 73 ₈	+	1+4+7+9+13+15+16 +20+24+25	31+34+36+37+41 +42
Hamilton, 73 ₉	Ø	1+4+7+9+13+15+16 +20+23+25	31+34+36+37+41 +42
Orme, 70 ₄	+	1+4+7+11+13+15 +17+20+24+25	31+34+36+37+41
Orme, 70 ₅	+	1+4+7+11+13+15 +17+20+24+25	31+34+37+41+42 +54+55

Orme found that subjects who viewed a cued video and written model, along with cycled microteaching practice and supervisor

cued, video feedback, used more probing questions than the subjects who viewed the same modeling and then observed the experimental subjects during their practice and feedback sessions. Hamilton tried the same comparison (finding 7) and found that there was no significant difference between the two treatment effects. Orme also found that the experimental subjects used more probing questions than the subjects who observed three model tapes and rated their performance (vicarious practice) but had no other practice. Orme also found that in both cases the students in the experimental subjects' microteaching groups responded more than the students in the comparison groups.

Hamilton found that the above experimental treatment helped subjects use more probing questions than a group which observed the same written and video modeling as the experimental subjects (but cued by a transcript of the videotape with directions), and then observed an experimental subject teach and rate the experimental subject's videotape (vicarious practice). Hamilton also found that subjects who observed the written and video modeling with transcript cueing, along with microteaching practice and rating of their own videotapes, did not use probing questions more than subjects who had no direct practice but only observed and rated the experimental subject's practice sessions.

Friebel and Kallenbach found that when both groups observed the same carefully cued, written and video models and had some uncontrolled classroom practice, that the addition of one microteaching practice and video feedback session resulted in no significant difference in the use of probing questions. This finding may not actually contradict postulate A of assumption IV of Bandura's theory, but only show that the addition of microteaching practice to specific modeling and classroom practice does not make any significant difference.

Both of Orme's findings and Hamilton's finding number eight give support to postulate A of assumption IV. Both of Hamilton's findings of no significant difference may not actually represent contradictions because the comparison group in both cases observed the experimental group practicing and receiving feedback, so they had a certain amount of vicarious practice. The vicarious practice may have helped the comparison subjects rehearse, reorganize, and recode the modeled behaviors. This would be in line with postulate H of assumption III.

Microteaching Practice and Other Questioning Behaviors of the matrix contain five findings from one study by Friebel and Kallenbach. The specific treatment comparison was the same as reported for the two previous cells of the matrix. Both groups observed a cued

written and video model and had uncontrolled classroom practice.

The experimental group had the additional treatment of only one microteaching practice session with a viewing of a videotape of the practice session. Friebel and Kallenbach found that there was no significant difference between the two groups' performances on the following questioning behaviors:

1. Pause after teacher question
2. Repeat of teacher question
3. Repeat of student answer
4. Teacher answers own question

They also found that the experimental group used significantly fewer redirecting questions than the comparison group.

All of these findings probably do not contradict postulate A of assumption IV of Bandura's theory because both groups observed a specific model and then had classroom practice. These findings may only show that the addition of one microteaching session to the larger treatment did not make any significant difference.

Vicarious Practice

Three different studies used vicarious practice as a variable between treatments. Column two of Table 5.5 presents three findings and the associated studies.

The Vicarious-HOQ Cell of the matrix contains just one finding which had the following specific treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Ward, 70 ₁	(-)	1+2+4+8+11+12+13 +15+17+20+23+25 +29	31+32+34+37+41 +43+45+47+50 +53+55+59

The only difference between the treatments was that the comparison group had to code the number of each of three types of questions, in addition to the rest of the very specific treatment. Actually, this finding was that the group which also had vicarious practice used significantly fewer HOQ. This would tend to contradict postulate H of assumption III of Bandura's theory. Apparently, the added symbolic rehearsal did not help the subjects learn the modeled behaviors.

The Vicarious-Probing Questioning Cell of the matrix contains two findings from two different studies which had the following specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Goodwin, 71 ₃	Ø	1+7+9+12	31+37+39
Hamilton, 73 ₁₀	(-)	1+4+6+7+11+12	31+34+36+37+41

Goodwin found that the subjects who received a specific, cued written model and rated probing in classrooms of other teachers,

did not use significantly more probing questions than the subjects who only received the cued written model. This finding tends to contradict postulate H of assumption III of Bandura's theory. The added symbolic rehearsal did not make a significant difference in learning to use probing questioning.

Hamilton found that subjects who observed a written, video, and live model which was cued by a supervisor used significantly more probing questions than subjects who observed a written, video, and live model which was cued by a transcript, along with vicarious practice in the form of coding videotapes of another subject. This finding is an example of a significant difference which can not be clearly attributed to one cause, and it does not clearly contradict postulate H of assumption III because the two groups observed different live models, and they had different forms of cueing on all of the modeling. The prestige of the supervisory cueing may have had more impact than transcript cueing. This finding may actually lend support to postulate E of assumption II.

Distributed vs. Massed Practice

Two different studies used the distribution of practice sessions as a variable between treatments. Column three of Table 5.5 presents five findings and the associated studies.

The Distribution-HOQ Cell of the matrix contains four findings

from one study. The specific treatment comparisons were as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Ward, 70 ₂	+	1+2+4+7+11+13+15. +17+20+23+25+29	31+32+34+37+41 +43+45+47+50 +53+55+58
Ward, 70 ₃	∅	1+2+4+7+11+13+15 +17+20+23+25+29	31+32+34+37+41 +42+43+45+47 +50+53+55+58
Ward, 70 ₄	∅	1+2+4+7+11+13+15 +17+19+23+25+29	31+32+34+37+41 +43+45+47+49 +53+55+58
Ward, 70 ₅	∅	1+2+4+7+11+12+13 +15+17+29	31+32+34+37+41 +42+43+45+47 +58

Ward's four findings are contradictory to each other and to proposition nine of Bandura's theory. One finding was that distributed practice produced significantly more HOQ than massed practice when combined with a specific cued model microteaching practice and cued video feedback. The other three findings showed that there was no significant difference in the use of HOQ between groups who had distributed practice and those who had massed practice. All groups were checked again on their use of HOQ after a month of classroom teaching, and no significant differences were found between any of the groups.

There are at least three possible reasons for the conflicting

findings and nonsignificant differences in Ward's study:

1. All of the groups received very specific modeling, and therefore the findings of no significant difference are in line with postulate F of assumption I of Bandura's theory.
2. All of the subjects were experienced teachers, facing the daily routines in their schools; and, according to proposition four, regression to inappropriate behavior is likely if those responses have received prolonged intermittent reinforcement.
3. Perhaps the self-evaluation used for feedback was not enough reinforcement to maintain the appropriate behavior. This is also in line with proposition four.

The Distribution-Probing Questioning Cell of the matrix contains one finding which had the following specific treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald, Allen and Orme, 67 ₄	Ø	1+2+7+9+14+15+17 +20+24+25+26+29	31+32+37+39+44 +45+47+50+54 +55+56+58

McDonald and associates found that when subjects have a specific, cued written model, cycled classroom practice, and

immediate, supervisory cued video feedback that the distribution of practice made no significant difference in the number of probing questions used. This finding tends to be contradictory to proposition nine, but yet in line with postulate F of assumption I.

Content Variations in Practice

There were only two findings from one study by Allen and associates (1967). Both of these findings were concerned with just the HOQ skill in column four of Table 5.5. The specific treatment comparisons were as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Allen, <u>et al.</u> , 67 ₁₂	+	1+4+7+8+11+13+15 +16+20+23+25	31+34+37+41+43 +45+46+50+53+55
Allen, et al., 67 ₁₃	∅	1+4+7+8+11+13+15 +16+20+23+25	31+34+37+41+43 +45+46+50+53+55

Allen and associates found that when the subjects observed a cued written and video model, along with cycled microteaching practice and cued video feedback, they used significantly more HOQ during their practice sessions if they taught the same lesson as the one they observed the model teach. However, on a later posttest when all subjects were told to teach a lesson of their choice, the experimental subjects did not use a significantly different number of HOQ than did the comparison subjects. Both groups used significantly more HOQ

than they did on their pretest, so both treatments were effective.

These findings do not seem to relate directly to any of Bandura's assumptions, but may show that response patterns tend to generalize to situations other than those in which they were learned (proposition 8).

Feedback Variations and Questioning Behaviors

A variety of feedback combinations have been tried in training teachers to use four different questioning behaviors. In most instances, the feedback was used in combination with some type of modeling and practice. However, the findings reported here are for treatments in which the feedback was the independent variable. The 32 findings are summarized in Table 5.5, which appears at the beginning of the discussion on practice variations earlier in this chapter. The matrix compares specific treatments with the particular behaviors trained for in each study. The significance of each finding is reported, with + indicating a significant gain in the behavior of the experimental group over the performance of the comparison group, Ø indicating no significant difference between the two groups, and (-) indicating that the experimental group performed significantly lower than the comparison group on the behavior. Refer back to

Table 5.5 - Findings for Practice and Feedback Variations vs. Questioning Behaviors

Question Behavior	Practice Variations				Feedback Variations					Multiple Variations	Row Totals
	Microteaching	Vicarious	Distributed vs. Massed	Content Variations	Peer	Audio	Audio and Supervisor	Video	Video Supervisor		
Higher-Order Questioning	Friebel and Kallenbach 69 ₁ Guffy 71 ₄ Schmalz 72 ₁ Schmalz 72 ₂	Ward 70 ₁ (-)	Ward 70 ₂ + Ward 70 ₃ ∅ Ward 70 ₄ ∅ Ward 70 ₅ ∅	Allen 67 ₁₂ + Allen 67 ₁₃ ∅	Cosman 73 ₃ ∅	Ward 70 ₆ +		Ward 70 ₇ + Ward 70 ₈ ∅ Ward 70 ₉ ∅ Ward 70 ₁₀ (-)	Claus 69 ₂ ∅ Illingworth 71 ₁ ∅ Illingworth 71 ₂ ∅ Illingworth 71 ₃ ∅ Kissock 71 + Schmalz 72 ₃ ∅	Konetski 70- +	11 St. 6 + 15 ∅ 3 (-)
Probing Questioning	Friebel and Kallenbach 69 ₂ Hamilton 73 ₇ Hamilton 73 ₈ Hamilton 73 ₉ Orme 70 ₄ Orme 70 ₅	Goodwin 71 ₃ ∅ Hamilton 73 ₁₀ (-)	McDonald, Allen and Orme 67 ₄					Gall et al. 71 ₃ ∅	Hamilton 73 ₁₁ + McDonald, Allen & Orme 67 ₅ ∅ McD., Al. & Or. 67 ₆ ∅ Orme 66 ₁₉ ∅ Orme 66 ₂₀ ∅ Orme 66 ₂₁ ∅ Peterson 73 ₁ ∅	Hamilton 73 ₁₂ ∅ Hamilton 73 ₁₃ ∅ Hamilton 73 ₁₄ ∅ Orme 70 ₆ +	7 St. 5 + 15 ∅ 1 (-)
Redirecting Questioning	Friebel and Kallenbach 69 ₃										1 St. 1 (-)
Refocus Questions						Morse 70 ₁ ∅ Morse 70 ₂ ∅ Morse 70 ₃ ∅	Morse 70 ₄ + Morse 70 ₅ + Morse 70 ₆ +				1 St. 3 + 3 ∅
Pause After Questions	Friebel and Kallenbach 69 ₄								Peterson 73 ₂ ∅		2 St. 2 ∅
Repeat of Questions	Friebel and Kallenbach 69 ₅										1 St. 1 ∅
Repeats of Student Answers	Friebel and Kallenbach 69 ₆										1 St. 1 ∅
Teacher Answers Own Quest.	Friebel and Kallenbach 69 ₇										1 St. 1 ∅
Col. Total	5 Studies 3 + 10 ∅ 2 (-)	3 Studies 2 (-) 1 ∅	2 Studies 1 + 4 ∅	1 Study 1 + 1 ∅	1 Study 1 ∅	2 Studies 1 + 3 ∅	1 Study 3 +	2 Studies 1 + 3 ∅ 1 (-)	8 Studies 2 + 12 ∅	3 Studies 2 + 3 ∅	14 + 38 ∅ 5 (-)

Table 5.4 for the numerical code which is used to report the specific treatment conditions for each finding.

Peer Feedback

There was only one finding in column five of Table 5.5 This finding comes from a study by Cosman (1973) which is concerned with just the HOQ skill. The specific treatment comparison was as follows:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Cosman, 73 ₃	Ø	1+2+7+11+12+13+14 +15+16+17+18+21 +22+25	31+32+37+41+42 +43+44+45+46+47

Cosman found that when very specific, cued written and verbal modeling is combined with microteaching and classroom practice, the addition of peer cued feedback does not make any significant difference in the use of HOQ. However, both groups made significant gains in HOQ from pretest to posttest.

This finding may contradict postulate E of assumption IV of Bandura's theory, which propounds that the observer must rely on verbal reports of others in order to make adjustments in his responses in line with the modeled responses. However, there are at least two possible reasons why the subjects did not make

significant increases in HOQ after peer feedback:

1. All of the subjects had already made significant gains in HOQ during their practice sessions. By the time they had completed two practice sessions, the mean number of HOQ for all subjects was 10.5 out of 15 questions asked. The level of HOQ was already very high before peer feedback was attempted in the classroom.
2. Peers may not have been seen as having high prestige, and so the subjects may not have considered their feedback to be valuable.

Audio Feedback

Two different studies used audio feedback as the variable between treatments. Column six of Table 5.5 presents the four findings and the associated studies.

The Audio-HOQ Cell of the matrix contains one finding from Ward's study with the following specific treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Ward, 70 ₆	+	1+2+4+7+11+13+15 +17+19+23+25+29	31+32+34+37+41 +43+45+47+59

Ward found that subjects who heard an audiotape of their teaching and coded the levels of questioning they used, in addition to observing a cued model and having cycled microteaching practice, used significantly more HOQ than the subjects who only observed the cued model and had the microteaching practice without feedback. This finding lends support to proposition two of Bandura's theory because it indicates that the combined use of modeling and reinforcement procedures is probably the most effective method of transmitting a complex questioning behavior.

The Audio-Refocus Questioning Cell of the matrix contains three findings from one study. The study included the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Morse, 70 ₁	Ø	1+2+6+7+9+12+13 +16+19+23+25	31+32+36+37+39 +42+43+46+49+53
Morse, 70 ₂	Ø	1+2+6+7+9+12+13 +16+19+23+25	31+32+36+37+39 +42+43+46
Morse, 70 ₃	Ø	1+2+6+7+9+12+13 +16+19+23	31+32+36+37+39 +42+43+46

Morse found that subjects who received cueing of audio feedback from a written listening guide did not ask significantly more refocus questions than the subjects who listened to their audiotapes without any cueing. He also found that neither of the groups which

received audio feedback used any significantly different number of refocus questions than subjects that had the same modeling and practice but no feedback.

Audio and Supervisor Feedback

The three findings of column seven of Table 5.5 all come from the study by Morse and are concerned only with refocusing questioning. These findings are based on the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Morse, 70 ₄	+	1+2+6+7+9+12+13 +16+19+24+25	31+32+36+37+39 +42+43+46+49+53 +55
Morse, 70 ₅	+	1+2+6+7+9+12+13 +16+19+24+25	31+32+36+37+39 +42+43+46+49+53
Morse, 70 ₆	+	1+2+6+7+9+12+13 +16+19+24+25	31+32+36+37+39 +42+43+46

These findings are closely linked to Morse's three previous ones of no significant differences. The experimental subjects in these three findings received their cueing of the audio feedback from a supervisor. In this study, audio feedback was not the significant factor, but the source of cueing was significant. These findings tend to support postulate B of assumption IV. The performance of already acquired responses (from modeling) depends greatly on the nature of

the reinforcing consequences. It may be that the supervisor was recognized as an expert, and so his cueing and reinforcement was more accurate and more readily accepted than self cueing. This would be in line with postulate E of assumption II of Bandura's theory.

Video Feedback

Two different studies used video feedback as the variable between treatments. Column eight of Table 5.5 presents five findings and the associated studies.

The Video-HOQ Cell of the matrix contains four findings from a study by Ward. The findings represent the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Ward, 70 ₇	+	1+2+4+7+11+13+15 +17+20+23+25+29	31+32+34+37+41 +42+43+45+47+59
Ward, 70 ₈	∅	1+2+4+7+11+12+13 +15+17+20+23+25 +29	31+32+34+37+41 +42+43+45+47+59
Ward, 70 ₉	∅	1+2+4+7+11+13+15 +17+20+23+25+29	31+32+34+37+41 +43+45+47+49+53 +55+59
Ward, 70 ₁₀	(-)	1+2+4+7+11+12+13 +15+17+20+23+25 +29	31+32+34+37+41 +43+45+47+49+53 +55+59

Ward found that subjects who observed their teaching on videotape and coded their levels of questioning, in addition to observing a cued model and having cycled microteaching practice, used significantly more HOQ than the subjects who only observed the cued model and had the microteaching practice without feedback. This finding lends support to proposition two of Bandura's theory because it indicates that the combined use of modeling and reinforcement procedures is probably the most effective method of transmitting a complex questioning behavior. However, another group which had the same treatment as the first experimental group, plus they coded the levels of the model's questioning, did not use a significantly different number of HOQ than the group that received no feedback. This finding contradicts the first one and thus tends to contradict proposition two.

Ward's next two findings compare the use of video feedback with the use of audio feedback. These findings are also contradictory. When neither group of subjects coded the model's questioning, then there was no significant difference between them in the number of HOQ used. This would indicate that either form of feedback is equally effective since they both used significantly more HOQ than the group which had no feedback (findings 6 and 7). However, when the comparison is made between subjects receiving video and audio

feedback, but the video group coded the model's levels of questioning, then the video feedback group used significantly fewer HOQ.

According to postulate B, D, and E of assumption III, learning and retention of modeled behaviors should be facilitated by providing subjects with a coding system and encouraging them to code the model observed. Findings eight and ten of Ward's study seem to contradict these postulates. There is some possibility that since the subjects were experienced, busy classroom teachers, they may have viewed the coding of the video model as extra work and then reacted more negatively to the questioning behaviors that were modeled.

The Video-Probing Questioning Cell of the matrix contains just one finding from Gall's 1971 study. The finding represents the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Gall, <u>et al.</u> , 71 ₃	Ø	4+7+9+13+15+17 +20+23	34+37+39+43+45 +47+49+53

This finding is much the same as Ward's finding nine. When significantly effective cued models and microteaching practice sessions precede the feedback, then it makes no significant difference whether the feedback is audio or video. Bandura's theory does not really predict which specific media of feedback will be

most effective. Gall's three findings at least support proposition two, that modeling and reinforcement procedures are probably the most effective method of changing behaviors.

Video and Supervisor Feedback

Eight different studies examined a combination of video and supervisory feedback as a treatment variable. Column nine of Table 5.5 presents fourteen findings and the associated studies.

The Video, Supervisor-HOQ Cell of the matrix contains six findings from four different studies which have the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Claus, 69 ₂	∅	4+7+9+13+15+16 +20+24+25	34+37+39+43+45 +46+50+53
Illingworth, 71 ₁	∅	1+4+7+9+13+15 +16+20+24+25	31+34+37+39+43 +45+46+50+51 +54+55
Illingworth, 71 ₂	∅	1+4+7+9+13+15 +16+20+24+25	31+34+37+39+43 +45+46+50+51 +55
Illingworth, 71 ₃	∅	1+4+7+9+13+15 +16+20+21+24 +25	31+34+37+39+43 +45+46+50+51 +55
Kissock, 71	+	1+2+4+7+11+13 +15+17+20+24 +25	31+32+34+37+41 +43+47+50+53
Schmalz, 72 ₃	∅	1+2+4+7+11+13 +17+20+24+25	31+32+34+37+41 +43+47+50+53 +55

Claus found that when subjects were shown a video model cued by a supervisor and given microteaching practice that they used significantly more HOQ (finding one, Table 5.3, column four). However, according to the above finding, subsequent cueing of video feedback by the supervisor made no significant differences in HOQ levels. Illingworth and Schmalz also found that when all subjects had received carefully cued models, microteaching practice, and video feedback, it made no significant difference whether the feedback was cued by a supervisor.

Contrary to the findings of Claus, Illingworth, and Schmalz, Kisko found that the subjects who received supervisory cueing used significantly more HOQ. However, the cued group also had four practice sessions with intermittent feedback cued by the supervisor, while the comparison group only had one practice session. Therefore, it is impossible to determine whether the supervisory cueing was the critical factor in this comparison.

Postulate B of assumption IV of Bandura's theory states that the nature of reinforcing consequences to the model and observer greatly determine whether the learned behaviors are performed. Five of these six findings indicate that supervisory cueing is not necessary when video feedback is provided to subjects, and the

sixth finding at least casts some doubt on the effectiveness of supervisory cueing.

The Video, Supervisor-Probing Questioning Cell of the matrix contains seven findings from four different studies which have the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Hamilton, 73 ₁₁	+	1+4+7+9+13+15+16 +20+24+25	31+34+37+39+43+45 +46+50+53+55
McDonald, Allen and Orme, 67 ₅	Ø	1+2+7+9+14+15+17 +20+24+25+26+29	31+32+37+39+44+45 +47+50+54+55+57 +59
McDonald, Allen and Orme, 67 ₆	Ø	1+2+7+9+14+15+17 +20+24+25+26+28	31+32+37+39+44+45 +47+50+54+55+57 +59
Orme, 66 ₁₉	Ø	1+4+7+9+13+15+17 +20+24+25	31+34+37+39+43+45 +47+50+53
Orme, 66 ₂₀	Ø	1+4+9+13+15+17+20 +24+25	31+34+39+43+45+47 +50+53
Orme, 66 ₂₁	Ø	1+9+13+15+17+20+24 +25	31+39+43+45+47+50 +53
Peterson, 73 ₁	Ø	1+4+7+11+13+14+15 +17+20+24+25+29	31+34+37+41+43+44 +47

Hamilton's finding was the only one that indicated that supervisory cueing during video feedback made a significant difference in the number of probing questions used by the subjects. The five findings of McDonald, Allen, and Orme (1967) and Orme (1966) lend

support to the possibility that when the modeling and practice sessions are specific, the addition of supervisory cueing does not make a significant difference in the number of probing questions used by the subjects. These findings, along with those of Claus (1969), Illingworth (1971), and Schmalz (1972) from the previous cell, suggests that supervisors may not be needed during feedback sessions. This possibility has interesting implications for teacher training. If it holds true in future studies, then it may be possible to free teacher educators from hours of supervisory work in microteaching centers and classrooms.

Peterson found that when cued written and video modeling is provided, along with microteaching and classroom practice, the addition of video feedback with supervisory cueing made no significant difference in the number of probing questions used. He also found that it made no significant difference in the length of time the teachers paused after they asked questions. Not only do these findings support the idea that supervisory cueing may be unnecessary, but tends to contradict proposition two of Bandura's theory. In this study, the addition of feedback and reinforcement did not seem to make the learning more effective.

Multiple Variations

Three studies varied more than one of the parts of the training

protocol in comparing treatments. Each of these three studies varied two or more of the three main aspects of the social learning paradigm (modeling, practice, and feedback). Column ten of Table 5.5 presents five findings and their associated studies.

Konetski attempted to train teachers to use more HOQ and tried the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Konetski, 70	+	1+2+7+11+12+13+16 +21+24+25	31+41+54+55

Konetski found that the subjects who received a cued written and verbal model, along with the vicarious practice of writing and coding questions, microteaching practice, and supervisor cued, peer feedback, used significantly more HOQ than the subjects who received the same written model (uncued) and supervisor feedback on their pretest performance. The experimental subjects also used significantly fewer total questions than the comparison subjects. The main differences between the groups were that the experimental subjects were given specific examples of HOQ and then they were given practice in writing HOQ before a microteaching practice session, while the comparison group received only written instructions and examples of HOQ. The fact that the experimental subjects used more HOQ on the posttest lends support to postulates F and G of

assumption I of Bandura's theory. The greatest gains were made among subjects who had the desired question types clearly specified and then were required to write other examples for themselves.

Orme (1970) and Hamilton (1973) attempted similar treatments to train teachers to use more probing questions. They tried the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Orme, 70 ₆	+	1+4+6+7+11	31+34+38+41+42 +54+55
Hamilton, 73 ₁₂	∅	1+4+6+7+11	31+34+37+39+43 +45+46+50+53+55
Hamilton, 73 ₁₃	∅	1+4+6+7+11	31+34+39+43+45 +46+50+53
Hamilton, 73 ₁₄	∅	1+4+6+7+11+12	31+34+39+43+45 +46+50+53

For each of these findings the experimental group received extensive modeling. Orme found that subjects who observed a written and video model cued by a supervisor and then observed a peer during their teaching and feedback sessions cued by a supervisor, used significantly more probing questions than subjects who observed the same model and then rated two more video models. Hamilton compared the same experimental treatment with one in which the modeling was cued by a transcript of the videotape followed by

microteaching practice and video feedback cued by self rating. He found no significant difference between the groups. He also compared the experimental treatment with one in which the subjects observed the modeling without cueing, had microteaching practice and uncued video feedback, but found no significant differences. Even when the experimental group had vicarious practice through rating the videotape of another subject, they did not use a significantly different number of probing questions.

Orme's finding indicates that a well cued model can produce significantly more change in probing than a less well cued model plus vicarious practice. This would lend support to postulate F of assumption I and postulate E of assumption II of Bandura's theory and raise the possibility that supervisory cueing of modeling is more important than having the observer describe and respond to modeled responses (postulate G).

Hamilton's findings indicate that a well cued model and a model with microteaching practice and video feedback are not significantly different in their effects. This would lend support to the possibility that postulate F of assumption I and postulate A of assumption IV are about equally effective in helping subjects learn probing questioning.

Summary

In this chapter, 138 findings from 29 studies have been analyzed and compared with elements of Bandura's theory. An attempt was made to determine what significant effects could be found for different types of modeling, practice, and feedback on nine different questioning skills of teachers in training.

Modeling

A wide variety of comparisons were made with respect to modeling; however, modeling was seldom the only treatment. Usually some form of practice and feedback was included, but the principle aim of the treatment comparisons was to determine the effectiveness of a particular model presentation. The majority of the 81 findings show that modeling, in general, is effective in teaching questioning skills. Most of the 30 findings of no significant differences occurred when two effective modeling forms were compared. These findings only serve to strengthen the general effectiveness of all types of modeling. The following are the major conclusions which were reached from analyzing the 138 specific findings:

1. Written modeling which was cued and followed by microteaching practice was more effective than no treatment or microteaching practice alone.

2. Written and verbal modeling which was cued and followed by practice was more effective than no treatment or a placebo treatment.
3. Uncued written or written and audio modeling was not more effective than no treatment or placebos, even when microteaching practice and feedback was provided.
4. Uncued video modeling was not more effective than no treatment, even when microteaching practice was provided to the experimental group.
5. Cued video modeling with microteaching practice and feedback was more effective than no treatment or uncued video modeling.
6. Cued video and written modeling with microteaching practice was more effective than no treatment, ten weeks of student teaching, microteaching alone, or microteaching with feedback.
7. There were mixed results whenever:
 - a. cued video modeling was compared with cued written modeling;
 - b. cued video and written modeling was compared with cued written modeling;

- c. cued video and written modeling was compared with uncued video and written modeling.
- 8. Cued video, written and live modeling without any practice was more effective than no treatment or microteaching practice alone. The modeling was very specific and recurred several times with the cueing provided by a supervisor.
- 9. If cued written and verbal modeling was provided, along with practice, then certain content variations in the modeling made no significant difference in the HOQ of subjects.
 - a. The addition of the study of Bloom's taxonomy was not effective.
 - b. It made no difference whether cognitive levels or affective levels of questioning were modeled.
 - c. It made no difference whether Flanders' categories or general categories of teaching behavior were modeled.
- 10. Any of the media for modeling were effective if the models were very specific, cueing was provided by a supervisor, and microteaching or classroom practice was included.

Practice

Four varieties of practice were tried as treatment variables; however, practice was not tried as a solitary treatment in any of the

studies. Usually some form of modeling and feedback were provided, but the variable tested was the practice condition. The majority of the 24 findings show that when specific modeling and feedback are provided, the form of practice is not significant. There were only five significant differences in favor of the experimental groups, while there were 16 findings of no significant differences and three findings of significant differences in favor of the comparison groups. The following are the major conclusions which were reached from analyzing the 24 specific findings:

1. When cued modeling was provided for subjects, the addition of microteaching practice was not any more effective than the cued modeling alone for increasing HOQ skill.
2. Microteaching practice and video feedback without any modeling was significantly less effective than no treatment.
3. When modeling was cued by a supervisor, then the addition of microteaching practice was more effective in improving probing than modeling cued by a transcript with no microteaching. The combination of supervisor cueing and microteaching practice seemed to be necessary for significant effects.

4. Vicarious practice in the form of coding the teaching behavior of other teachers was not a significant addition to cued modeling. In fact, it seemed to be a significant detractor to otherwise effective treatments.
5. Distributed practice was not more effective than massed practice when linked with effective cued modeling.
6. Teaching the same lesson as the model during practice sessions was not more effective than the subjects teaching their own lesson during practice.

Feedback

Five varieties of feedback were tried as treatment variables, but always in combination with modeling and usually with some form of practice. The majority of the 32 findings show that when cued modeling and practice are provided, the form of feedback is not significant, as long as some feedback is provided. The occasional exception to that conclusion was found when a supervisor cued the feedback. There were only nine significant differences in favor of the experimental groups, while there were 22 findings of no significant differences, and one finding of a significant difference in favor of the comparison group. The following are the major conclusions

which were reached from analyzing the 32 findings:

1. When cued modeling and practice were provided, peer feedback was not more effective than no feedback.
2. When cued modeling and practice were provided, self cued audio feedback was not clearly more effective than no feedback or uncued audio feedback. However, when the audio feedback was cued by a supervisor, it was more effective than no feedback and uncued audio feedback.
3. With cued modeling and practice, video feedback was not more effective than no feedback or audio feedback. Even when the video feedback was cued by a supervisor, it was not clearly more effective than audio or video feedback alone.

It appears that the most effective combination for training teachers to develop questioning skills would be to provide a very specific model of the behaviors, have a supervisor cue the salient features of the model's behavior, provide cycled microteaching practice, and perceptual feedback with a supervisor cueing and reinforcing the appropriate behaviors. However, the supervisor may not need to be present at feedback sessions. This would free a lot of valuable supervisor time and yet give the trainees an effective treatment. Both higher-order questioning and probing questioning were

significantly developed by the above training procedures, but the other questioning behaviors have not been tested enough to draw any conclusions.

Bandura's Social Learning Theory

Certain assumptions and postulates were tested by the studies reported in this chapter. The specific findings were related to particular postulates throughout the discussion of findings. This section will provide a listing of the assumptions and postulates tested, and the studies which lended support to or contradicted each.

Assumption I: Virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of another person's behavior and its consequences. This assumption was not contradicted by any of the studies and was directly supported by findings of Gall, et al. (1971); Hamilton (1973); Marazza (1973); Meehan (1970); McDonald, Allen and Orme (1967); Orme (1970); and Rogers and Davis (1970).

Postulate A - Innovative behavior, generalized behavioral orientations, and principles for generating novel combinations of responses can be transmitted to observers through exposure to modeled events. This postulate was supported by findings of Goodwin (1971), Guffy (1971), Hamilton (1973), McDonald and Koran (1969), and Orme (1970). However, the findings of Koran (1970)

showed that modeling alone was not sufficient to change the performance of observers.

Postulate F - Greatest performance gains are attained by observers when desired behaviors are clearly specified by the model rather than inferred from a few examples. This postulate was not contradicted by any findings and was directly supported by findings from the following studies:

- | | |
|--------------------------------|---------------------------------------|
| 1. Allen, <u>et al.</u> , 1967 | 8. Hamilton, 1973 |
| 2. Birch, 1969 | 9. Konetski, 1970 |
| 3. Claus, 1969 | 10. McDonald, Allen
and Orme, 1967 |
| 4. Cornell, 1969 | 11. McDonald and Koran,
1969 |
| 5. Douce, 1972 | 12. Orme, 1966 |
| 6. Gall, <u>et al.</u> , 1972 | 13. Orme, 1970 |
| 7. Goodwin, 1971 | |

Assumption II: Observational learning requires that the observer attend closely to cues, select relevant events, and accurately perceive cues provided the model's responses. This assumption was not directly tested in any of the studies, but two of its postulates were supported by several findings.

Postulate D - Discrimination training (cueing correct and incorrect responses of models) may greatly accelerate learning from models. This postulate was not contradicted by any of the studies

and was directly supported by findings of Hamilton (1973), Morse (1970), Orme (1966), and Orme (1970).

Postulate E - The behavior of powerful models (and supervisors) will be attended to because their behavior is likely to have high utilitarian value. This would include persons who are recognized experts or those who have a high socio-economic standing. This postulate was not contradicted and was directly supported by findings of Hamilton (1973) and Morse (1970).

Assumption III: Observational learning does not require performance for learning to take place, but depends on certain retentional processes to mediate the cues provided by the model. This assumption was not directly tested in any of the studies, probably because it would be difficult to examine the retentional processes.

A combination of postulates B, D, and E were tested by Ward (1970), and his findings tend to contradict the idea that observers will classify and organize modeled events into a verbal or imaginal code, and thus facilitate learning of the modeled behavior.

Postulate H - Symbolic rehearsal (vicarious practice) and motor rehearsal facilitate the observer's learning by providing opportunities for the observer to reorganize and code modeled events. The effectiveness of symbolic rehearsal was contradicted by findings of Goodwin (1971), Hamilton (1973), and Ward (1970). The

effectiveness of motor rehearsal was supported by findings of:

- | | |
|-------------------|--------------------------------|
| 1. Birch, 1969 | 4. Koran, 1970 |
| 2. Hamilton, 1973 | 5. McDonald and Koran,
1969 |
| 3. Johnson, 1972 | 6. Orme, 1970 |

Assumption IV: Observational learning is not sufficient to produce faultless performances. This assumption is somewhat contradictory to assumption III and may account for some of the contradictions between findings related to assumption III.

Postulate A - The observer must be provided with opportunities for practice conditions which produce rewarding consequences. The necessity of practice was only weakly contradicted by findings of Friebel and Kallenbach (1969), Hamilton (1973), and Schmalz (1972). It was strongly supported by findings of:

- | | |
|-------------------|--------------------------------|
| 1. Birch, 1969 | 4. Koran, 1970 |
| 2. Hamilton, 1973 | 5. McDonald and Koran,
1969 |
| 3. Johnson, 1972 | 6. Orme, 1970 |

Postulate B - Performance of already acquired responses depends greatly upon the nature of reinforcing consequences to the model and observer. This postulate was not contradicted, but was supported by the findings of Morse (1970).

Postulate E - The observer must rely on proprioceptive

feedback and the verbal reports of onlookers in order to make adjustments in his responses in line with the modeled responses. Two findings of Ward's study (1970) tended to support the necessity of feedback. However, the studies of Cosman (1973), Peterson (1973), and one finding of Ward (1970) contradicted the necessity of feedback when modeling and practice were already provided.

Proposition 2: The combined use of modeling and reinforcement procedures is probably the most efficacious method of transmitting, eliciting, and maintaining social response patterns. This proposition was only partially contradicted by Cosman (1973), Peterson (1973), and Ward (1970); but it was strongly supported by findings of:

- | | |
|-------------------------------|-----------------------------|
| 1. Gall, <u>et al.</u> , 1971 | 6. McDonald and Koran, 1969 |
| 2. Guffy, 1971 | 7. Orme, 1966 |
| 3. Hamilton, 1973 | 8. Orme, 1970 |
| 4. Konetski, 1970 | 9. Rogers and Davis, 1970 |
| 5. Koran, 1970 | 10. Ward, 1970 |

Proposition 4: Regression is most likely to occur if inappropriate responses have received prolonged intermittent reinforcement. This may be supported by some of the findings of Ward (1970).

Proposition 8: Response patterns tend to generalize to

situations other than those in which they were learned. This was supported by findings of Allen, et al. (1967) and Guffy (1971).

VI. INTERACTION BEHAVIORS

In this chapter, the findings from 31 studies are presented and examined to determine which of twenty-two treatments were effective in providing teachers with greater skill in 66 different interaction behaviors. Three hundred thirty-eight findings are presented in four tables similar to the matrices used in Chapter V (Tables 5.3 and 5.5). In addition, a table of basic information about each study includes the design, subjects, contexts, criterion instrument and setting, and type of statistical analysis.

The first part of this chapter presents the definitions of the 66 interaction behaviors. This is followed by a discussion of each treatment and how it differentially relates to the interaction behaviors. Finally, a summary of the effectiveness of the treatments is discussed in terms of Bandura's social learning theory, which was presented in Chapter II.

Definitions of Interaction Behaviors

Most of the 31 studies based their description of interaction behaviors on Flanders' categories, or a modification of those categories. This system for analyzing the social-emotional climate of classrooms has had a considerable impact on educational thought and research. Since the late 1950s, researchers have used Flanders'

ten categories, or modifications of them, to describe what goes on in classrooms. In the 1960s, researchers began to use various means to help teachers learn the categories and attempt to get the teachers to use certain behaviors, or combinations of them, which the researcher felt was important for classroom teaching.

In the Flanders' system, all teacher statements are classified as either indirect or direct. Direct statements are those that tend to minimize the freedom of the student to respond. Indirect statements maximize the freedom of student responses. The system also provides for categorizing student talk and periods of silence or confusion, when behavior cannot be classified as either teacher or student talk. Figure 6.1 provides a summary and definitions of the ten categories for interaction analysis.

From these ten basic categories, Ned Flanders developed a 100 cell matrix to describe the succession of behaviors and to estimate the amount of interdependence between successively coded statements (see Figure 6.2). The ten categories and the matrix has led to spin-offs of many different combinations of categories or cells as measures of teacher and student behaviors in classrooms. The following measures are defined in terms of certain combinations of categories and cells derived from Flanders' system and his

Figure 6.1 - Definitions of Flanders' Interaction Analysis Categories (from Edmund Amidon and Ned Flanders, The Role of the Teacher in the Classroom, 1963)

Teacher Talk	Indirect Influence	1. <u>Accepts Feeling</u> : accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. <u>Praises or Encourages</u> : praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uh huh?" or "go on" are included.
		3. <u>Accepts or Uses Ideas of Student</u> : clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
		4. <u>Asks Questions</u> : asking a question about content or procedure with the intent that a student answer.
	Direct Influence	5. <u>Lectures</u> : giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
		6. <u>Gives Directions</u> : directions, commands, or orders with which a student is expected to comply.
		7. <u>Criticizes or Justifies Authority</u> : statements, intended to change student behavior from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.

Figure 6.1 - Definitions of Flanders' Interaction
Analysis Categories (contd.)

Student Talk	<p>8. <u>Student Talk, Response</u>: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.</p> <p>9. <u>Student Talk, Initiations</u>: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.</p>
	<p>10. <u>Silence or Confusion</u>: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.</p>

Figure 6.2 - Flanders' 100 Cell Matrix (from Edmund Amidon and Ned Flanders, The Role of the Teacher in the Classroom, 1963)

An observer records the verbal behaviors that occur in a classroom by listing, in order, the categories that are observed in three-second intervals. The result is a sequence of numbers which are in this fashion:

2nd pair (10) 1st pair
6
10) 3rd pair
7

Tabulations are then made in a two-dimensional matrix to represent the pairs of numbers from the sequence tallied. Each dimension of the matrix is composed of the ten categories in order, with the first category of each pair given on the vertical dimension and the second category of each pair on the horizontal dimension. Each space in the matrix is a cell and can be designated by a pair of numbers (e. g., 1-1, 3-3, or 8-8).

[illegible]

100 cell matrix:

1. Indirect Influence is the total number of tallies for categories 1-4.
2. Positive Motivation is the total number of tallies for categories 1-3.
3. Extended Indirect Influence is the total number of tallies in the 1-1, 1-2, 1-3, 2-1, 2-2, 2-3, 3-1, 3-2, and 3-3 cells of the matrix.
4. Extended Praise is the total number of tallies in the 2-2 cell of the matrix.
5. Extended Accepting Ideas is the total number of tallies in the 3-3 cell of the matrix.
6. Extended Questioning is the total number of tallies in the 4-4 cell of the matrix.
7. Direct Influence is the total number of tallies for categories 5-7.
8. Extended Direct Influence is the total number of tallies in the 6-6, 6-7, 7-6, 7-7 cells of the matrix.
9. Total Teacher Talk is the total number of tallies for categories 1-7.
10. Extended Teacher Talk is the total number of tallies in the 49 cells, from 1-1 to 7-7 inclusive.

11. I/D Ratio is the ratio of the total tallies for categories 1-4 divided by the total tallies for categories 5-7.
12. i/d ratio is the ratio of the total tallies for categories 1-3 divided by the total tallies for categories 6 and 7.
13. Extended i/d ratio is the ratio of the total tallies in the Extended Indirect Influence area divided by the tallies in the Extended Direct Influence area.
14. T/S Ratio is the ratio of total tallies for categories 1-7 divided by the total tallies for categories 8 and 9.
15. % Indirect Teacher Response is the ratio of the total tallies in cells 8-1, 8-2, 8-3, 9-1, 9-2, and 9-3 divided by the total tallies in the above six cells plus cells 8-6, 8-7, 9-6 and 9-7.
16. Extended Student Initiated Talk is the total number of tallies in the 9-9 cell of the matrix.
17. Total Student Talk is the total number of tallies for categories 8 and 9.
18. Extended Student Talk is the total number of tallies in the 8-8, 8-9, 9-8 and 9-9 cells of the matrix.
19. Flexibility is the number of different cells of the matrix which have at least one tally.

Several other interaction behaviors which are similar to the preceding categories and ratios have been used in the studies. They will be defined here in the order that they appear on Table 4.1.

Bondi (1969) attempted to train teachers to increase their use of Answering Student Questions, which means giving direct answers to student questions regarding content or procedures.

Krumboltz and Goodwin (1966) attempted to get teachers to use a more reinforcing set of behaviors in dealing with students. The Teacher Reinforcing Behavior Index which they used as a measure of teaching behavior was based on a set of 15 ideal and nonideal behaviors. The Index was the sum of the number of tallies for eight ideal behaviors minus the number of tallies for seven nonideal behaviors plus ten. The 15 behaviors were defined as follows:

1. Ideal Behaviors

- a. Teacher rewards pupil's task behavior individually.
- b. Teacher rewards group in which subject is a member for task-oriented behavior.
- c. Teacher rewards pupil's preparatory activity individually.
- d. Teacher rewards group in which subject is a member for preparatory activity.

- e. Teacher provides individual attention through instruction to subject engaged in task activities.
- f. Teacher provides individual attention through instruction to group engaged in preparatory activities in which subject is a member.
- g. Teacher warns subject behaving disruptively.
- h. Teacher warns subject behaving very disruptively.

2. Nonideal Behaviors

- a. Teacher rewards pupil's inattentive behavior individually.
- b. Teacher rewards group in which pupil is a member for inattentive behavior.
- c. Teacher provides individual attention through instruction to subject engaged in inattentive behavior.
- d. Teacher provides a reminder or negative attention to pupil for all pupil behaviors.
- e. Teacher warns subject engaged in either high task, task, or neutral activity.
- f. Teacher admonishes, or punishes the group in which subject is a member of any pupil activities 1-5.

- g. Teacher admonishes or punishes subject for any of the pupil behaviors 1-5.

McDonald and Allen (1967) and Levin (1973) attempted to get teachers to reinforce students more appropriately by providing Positive Reinforcement in which the teacher gives verbal praise, a smile or touch when the student performs a desired behavior.

Bondi (1969) attempted to train teachers to use less Corrective Feedback, which involved the teacher telling a student that his answer is wrong when the correctness of his answer can be established by other than opinions.

Wilde (1972) attempted to train teachers to decrease their Errors in Approval and Disapproval Responses, which involved the teacher giving approval for incorrect work or behavior and giving disapproval for correct work or behavior.

Bartholomew (1970) attempted to train teachers to increase their Investigative Ratio which was the total number of tallies in the categories (teacher questions; teacher poses a problem; teacher accepts ideas, behaviors, and feelings of students; and teacher silent while students work on a problem) divided by all of the above categories, plus teacher lectures, gives directions and rejects student ideas, behaviors, and feelings.

Birch (1969) attempted to train teachers to develop a

Response Strategy which encourages students to raise their level of thinking. This strategy involves three types of teacher response and is measured in the form of a ratio. The ratio is the number of extending responses divided by the number of closure and sustaining responses:

1. Extending - teacher responses which broaden the field of consideration and/or invite exploration of relationships.
 - a. asks for evidence;
 - b. asks for reflection;
 - c. encourages students to give hypotheses;
 - d. asks students to include new data in their analysis;
 - e. and asks for additional elaboration of a student idea.
2. Closure - teacher responses which terminate student thinking. This includes temporary and permanent closure.
 - a. indicates that a topic is inappropriate or off the subject;
 - b. postpones the student's idea or contribution;
 - c. and interrupts, closing off current line of thinking by switching student to another consideration.

3. Sustaining - teacher responses which maintain student thinking at its present level and the teacher does not elaborate or request elaboration. This includes restating student responses, asking for clarification, shifting to a simpler explanation, lowering level of question, acknowledging student response, asks another student to respond or provides the answer to student question.

Birch also sought to have teachers decrease their Teacher-Pupil Extended Talk Ratio to allow for increased pupil participation. The ratio was the average length of all teacher utterances divided by the average length of all pupil utterances.

Millet (1969) attempted to train teachers to increase their elaboration of concepts through what he called Translation Strategies. There were six strategies that teachers could use to put a communication into other forms of communication:

1. by giving directions;
2. asking students for ideas and opinions;
3. accepting ideas and opinions of students;
4. rejecting ideas and opinions of students;
5. probing the students' ideas for further information;
6. and restating or explaining an idea.

Four studies attempted to train for teaching behaviors which did not directly come from the categories of Flanders' system.

1. Hodge (1972) attempted to get teachers to increase their use of six nonverbal approving responses:
 - a. body positioned toward students who are responding;
 - b. arms positioned toward students who are responding;
 - c. hands positioned toward students who are responding;
 - d. head positioned toward students who are responding;
 - e. eyes positioned toward students who are responding;
 - f. smiling toward students who are responding.
2. Raymond (1972) attempted to get teachers to increase in three measures of nonverbal behavior:
 - a. Percent of Time Spent on Nonverbal Behaviors, which included any specific teacher behavior designed to influence learners in a predetermined direction without verbal communication. This may include nods, smiles, frowns, moving toward students or the use of silence.
 - b. Teacher-Initiated Positive Nonverbal Interactions, which was the number of nods, smiles, or moves toward a student followed by a nod or smile.
 - c. Congruent Behaviors were the number of times that

simultaneous verbal and nonverbal teacher behaviors manifested agreement between the two expressions, such that one reinforced the other.

3. Young (1968) attempted to train teachers to increase redundancy in lecturing in order to provide more clarity for the ideas presented. He recorded 14 measures of verbal and nonverbal behavior which seemed to clarify or emphasize presentation of concepts:

- a. Visual Highlighting through:

- (1) use of diagrams;
- (2) writing on blackboard;
- (3) underlining;
- (4) pointing to writing;
- (5) use of visual aids;
- (6) and total of (1) through (5).

- b. Verbal Highlighting through:

- (1) use of teacher examples;
- (2) use of student examples;
- (3) total examples;
- (4) focusing words;
- (5) analogies;
- (6) metaphors;

(7) simple repetition;

(8) and total of (1) through (7).

4. Resnick and Kiss (1970) sought to change the teachers' use of five behaviors involved in diagnostic testing of individual students for acquisition of mathematics concepts. They wanted teachers to increase their use of Distracting Tactics in which the teacher changes the pattern of presenting objects in order to make it more random. They also wanted teachers to decrease their use of four tactics:
 - a. Elimination of Choices for the child so that it increases the probability of a random response being correct.
 - b. Allowing the Child to Eliminate Choices by permitting him to pick up or put aside objects after they were dealt with.
 - c. Cueing the Child by any nonverbal behavior which might influence the child's choice in a task (such as pointing or nodding).
 - d. Prompting the Child by any verbal behavior which might direct the child to choose a certain response.

Studies Analyzed

Thirty-one studies dealt with teacher training for 66 different interaction behaviors, which resulted in 338 findings. This is considerably larger than the nine behaviors and 138 findings in Chapter V. However, most of the 31 studies examined the effects of their treatments over several interrelated behaviors, and this resulted in a large number of findings. Table 6.1 provides a complete list of the studies, along with the theoretical orientation, design, subjects, length of treatment, contexts, criterion instrument, criterion setting, method of gathering data, and the statistical analysis for each study.

Only 13 of the 31 studies were based on Bandura's theory. This was in contrast to 20 of the 29 studies reported in Chapter V which dealt with questioning behaviors. Twelve of the studies of interaction behaviors had no theoretical basis for their training procedures, three were based on operant conditioning, and the rest were based on lesser known theories.

Fifteen of the studies used a multiple-group design, and all of these used either a posttest only, or a pretest and posttest. The statistical analysis in almost every case was analysis of variance or analysis of covariance, and in every study the analysis appeared to be appropriate for the design. In too many instances, the specific multiple comparison procedure used following a significant F ratio

Table 6.1 - Studies of Interaction Behaviors

Studies Analyzed	Theoretical Orientation	Design	Subjects	Length of Treatment	Contexts	Criterion Instrument	Criterion Setting	Method of Gathering Data	Statistical Analysis
1. Amidon, 67	No theory	Multi-group posttest only	36 student teachers	> 30 hours	Secondary, at low socio-economic and middle class levels	"Flanders Interaction Analysis System"	Classroom with pupils	Live observation	Analysis of variance
2. Bartholomew, 70	Bandura's social learning theory	Multi-group pre and posttest	27 experienced teachers	< 10 hours	Secondary, Earth science	"Verbal Interaction Analysis System" by Amidon and Hunter	Microteaching with peers and content controlled	Observation of videotapes	Analysis of variance
3. Birch, 69	Dissonance theory	Multi-group pre and posttest	40 student teachers	10 - 30 hours	Grades 3-6, social studies	"Guided Self Analysis"	Microteaching with pupils	Live observation	Multivariate analysis of variance
4. Bondi and Ober, 69	No theory	2-group comparison posttest only	40 student teachers	> 30 hours	Elementary level	Modified "Flanders' Interaction Analysis System"	Classroom with pupils	Live observation	Analysis of variance
5. Fitzgerald, 71	Bandura's social learning theory	2-group comparison posttest only	52 student teachers	10 - 30 hours	Secondary level, science, mathematics, language arts, social studies	Modified "Flanders' Interaction Analysis System"	Classroom with pupils	Live observation	T-test
6. Gall, <i>et al.</i> , 72	Bandura's social learning theory	Multi-group pre and posttest	78 in-service teachers	10 - 30 hours	Grades 4-8	Investigator made and based on "Flanders' Interaction Analysis System"	Classroom with pupils and content controlled	Typescripts from audiotapes with observers blinded	Analysis of covariance
7. Haefele, 70	Operant conditioning implied	Multi-group pre and posttest	90 in-service teachers	10 - 30 hours	Elementary, all subjects	"Flanders' Interaction Analysis System"	Classroom with pupils	Observation of audiotapes	Analysis of variance and Newman-Keuls Procedure
8. Hodge, 72	No theory	Multi-group posttest only	57 pre-service teachers	< 10 hours	Secondary, mostly female juniors, a variety of subjects	Investigator made	Microteaching with peers	Observation of videotapes	Analysis of variance
9. Hough and Ober, 66	No theory	Multi-group posttest only	252 pre-service teachers	> 30 hours	Secondary, all subjects	Modified "Flanders' Interaction Analysis System"	Microteaching with peers	Live observation	Analysis of variance
10. Jacobs, 71	Bandura's social learning theory	Pre and posttest with a control group	26 experienced teachers	> 30 hours	Elementary and secondary	"Flanders' Interaction Analysis System"	Classroom with pupils	Observation of audiotapes with observers blinded	Analysis of covariance
11. Krumboltz and Goodwin, 66	No theory	Pre and posttest with a control group	14 experienced teachers	10 - 30 hours	2nd grade teachers and their pupils	"Task Orientation Observation Schedule"	Classroom with pupils	Live observation	Analysis of covariance
12. Lange, 70	Bandura's social learning theory	Pre and posttest with a control group	40 student teachers	< 10 hours	Elementary	"Flanders' Interaction Analysis System"	Classroom with pupils and content controlled	Observation of audiotapes	Analysis of variance
13. Levin, 73	Bandura's social learning theory	Pre and posttest with a control group	12 experienced teachers	< 10 hours	Elementary	Investigator made	Classroom with pupils	Live observation	Analysis of variance
14. Lohman, 66	No theory	Posttest only with a control group	60 student teachers	> 30 hours	Secondary, all subjects (a follow-up on subjects in Hough and Ober, 66)	Modified "Flanders' Interaction Analysis System"	Classroom with pupils	Live observation	Analysis of variance with t-test
15. McDonald and Allen, 67	Operant conditioning	Multi-group pre and posttest	71 interns	< 10 hours	Secondary, English, social studies, and mathematics	Investigator made	Classroom with pupils	Observation of videotapes with observers blinded	Analysis of covariance with t-test
16. McFadden, 71	Thorndike's theory (awareness)	Pre and posttest with a control group	27 student teachers	< 10 hours	Elementary, 4th, 5th, and 6th grades (self-contained classes)	"Reciprocal Category System" by Richard Ober	Classroom with pupils	Live observation	Analysis of variance with t-test
17. Millet, 69	Modeling implied	Multi-group posttest only	39 interns	< 10 hours	Secondary, social studies	"Interaction Analysis Guide"	Classroom with pupils	Observation of audiotapes	Analysis of variance
18. Narotsky, 72	No theory	Pre and posttest with a control group	26 student teachers	10 - 30 hours	Elementary	"Flanders' Interaction Analysis System"	Classroom with pupils	Observation of audiotapes with observers blinded	T-test
19. Nichols, 71	No theory	Multi-group posttest only	24 pre-service teachers	< 10 hours	Secondary, social studies	"Flanders' Interaction Analysis System"	Microteaching with peers	Observation of audiotapes with observers blinded	Analysis of variance
20. Parrish, 68	No theory	Pre and posttest with a control group	36 experienced teachers	> 30 hours	Junior high, English and social studies	"Flanders' Interaction Analysis System"	Classroom with pupils	Live observation	Analysis of covariance
21. Peterson, 73	Modeling, Bandura implied	2-group comparison posttest only	24 student teachers	< 10 hours	Elementary level	Investigator made	Classroom with pupils	Observation of videotapes	Analysis of variance
22. Raymond, 72	Bandura's social learning theory	Posttest only with a control group	20 student teachers	< 10 hours	Secondary, science	"Biology Teacher Behavior Inventory"	Classroom with pupils	Observation of videotapes	Mann-Whitney U-test and t-test
23. Resnick and Kiss, 70	Bandura's social learning theory	Multi-group pre and posttest	28 pre-service teachers	< 10 hours	Elementary, 4-6 year olds, mathematics	Investigator made	Microteaching with pupils	Observation of videotapes	Multiple analysis of covariance
24. Simon, 66	No theory	2-group comparison posttest only	28 student teachers	> 30 hours	Secondary, English, social studies, science	"Flanders Interaction Analysis System"	Classroom with pupils	Live observation	Analysis of variance and a signed rank test
25. Sweeney, 68	Operant conditioning	Multi-group posttest only	40 student teachers	> 30 hours	Secondary level, science and social science	"Reciprocal Category System" by Richard Ober	Classroom with pupils	Live observation	Analysis of variance with Duncan's New Multiple Range Test & a Sign Test
26. Werner, 72	Bandura's social learning theory	Multi-group pre and posttest	86 experienced teachers	< 10 hours	Elementary and secondary levels, grades 1-12, English and social studies	Investigator made	Microteaching with pupils	Observation of videotapes	Analysis of covariance
27. White, 68	Bandura's social learning theory	Posttest only with a control group	30 pre-service teachers	< 10 hours	Elementary, language arts	"Flanders' Interaction Analysis System"	Microteaching with pupils	Observation of audiotapes with observers blinded	Mann-Whitney U-test
28. Wilde, 72	No theory	2-group comparison pre and posttest	30 student teachers	< 10 hours	Secondary	"Teacher Observation Form" probably investigator made	Classroom with pupils	Live observation	Analysis of variance
29. Wolfe, 71	Informational theory and cybernetics	Multi-group pre and posttest	28 student teachers	10 - 30 hours	Secondary, social science	"Flanders' Interaction Analysis System"	Microteaching with peers	Observation of videotapes	Analysis of variance, Sheffe test and t-test
30. Wright, 67	No theory	Pre and posttest with a control group	28 experienced teachers	10 - 30 hours	Grades 3-6, heterogeneous groups	"Flanders' Interaction Analysis System"	Classroom with pupils	Observation of audiotapes	T-test
31. Young, 68	Bandura's social learning theory	Multi-group pre and posttest	94 interns	< 10 hours	Secondary, English, social science, mathematics, science	Investigator made	Microteaching with peers	Observation of videotapes	Analysis of covariance followed by Bonferroni T-statistic

was not named, even though it was apparent from the discussions that some procedure had been used.

The subjects were from many geographic areas of the United States and included elementary and secondary teachers at all levels from second grade through high school. Five degrees of experience were identified in these studies, including preservice, student teachers, interns, in-service, and experienced teachers. The subjects were labeled experienced only when the investigator used that term or when years of experience were given in the study. All basic content areas taught in public schools were represented in at least one study by either the actual use in a classroom or by the major of the preservice subject.

In 18 of the studies, Flanders' interaction analysis system, or modifications of it, were used as the criterion instrument. Only eight studies used investigator made instruments, in contrast to the studies on questioning in which 20 used investigator made instruments. Most of the interaction behavior studies observed the teachers in the classroom rather than in microteaching settings. Thirteen studies used live observation, and the rest used observation of audiotapes or videotapes.

It was encouraging to find that a greater proportion of the subjects were experienced and observed in classrooms, than was the case

with the subjects in the questioning studies. Table 6.2 shows that 18 studies used the classroom setting for criterion observations, and seven of those studies used in-service subjects. These conditions should make the findings more generalizable to the broad population of teachers.

Table 6.2 - Listing of Studies; Experience by Criterion Setting

Level of Experience	Classroom	Microteaching
In-service teachers	Gall, et al., 1972 Haefele, 1970 Jacobs, 1971 Krumboltz and Goodwin, 1966 Levin, 1973 Parrish, 1968 Wright, 1967	Bartholomew, 1970 Werner, 1972
Preservice teachers	Amidon, 1967 Bondi and Ober, 1969 Fitzgerald, 1971 Lange, 1970 Lohman, 1966 McDonald and Allen, 1967 McFadden, 1971 Millet, 1969 Narotsky, 1972 Peterson, 1973 Raymond, 1972 Simon, 1966 Sweeney, 1968 Wilde, 1972	Birch, 1969 Hodge, 1972 Hough and Ober, 1966 Nichols, 1971 Resnick and Kiss, 1970 White, 1968 Wolfe, 1971 Young, 1968

Model Variations and Interaction Behaviors

Twelve different modeling procedures have been tried in training teachers to use a wide variety of interaction behaviors. In most instances, the modeling has not been used alone, but in combination with some type of practice and feedback. However, the treatment comparisons were made between treatments which differed only in the type of model presented. Some findings represent comparison with control groups or placebo treatments.

Tables 6.3 and 6.4 present the summary of 225 findings across 46 specific teaching behaviors. In several columns, two to four studies present a large number of the findings for one treatment comparison, and most of the interaction behaviors are interrelated. Therefore, the discussion of findings will not proceed cell by cell in the matrix as it did in Chapter V, but when treatment comparisons are made they will include a list of the behaviors for which the treatment was significant and for which it was not significantly effective. The tables identify the investigators, year of study, and the significance of each finding. The significance is recorded by a + for a significant gain in the behavior of the experimental group over the performance of the comparison group, and a Ø for no significant difference between groups.

Table 6.3 - Findings for Model Variations and Indirect and Direct Interaction Behaviors

Teaching Behaviors		Model Variations											Row Totals
		Written	Written and Verbal	Written and Audio	Written, Verbal & Audio	Written, Verbal & Live	Video	Video and Written	Video and Live	Video, Written and Verbal	Video, Written Verbal and Live	Content Variations	
Indirect Behaviors	Verbal	Accepts Feelings				Amidon 67 Ø Amidon 67 Ø Hough & 66 Ø Ober Lohman 66 Ø				Jacobs 71 Ø Wolfe 71 + Wolfe 71 +	Fitzgerald 71 + Parrish 68 +	Sweeney 68 Ø	8 St. 4 + 6 Ø
		Praise Actions and Behaviors				Amidon 67 + Amidon 67 + Simon 66 + Hough & 66 + Ober Lohman 66 Ø		Werner 72 + Werner 72 +		Jacobs 71 Ø Wolfe 71 Ø Wolfe 71 +	Fitzgerald 71 + Parrish 68 + Wilde 72 +		10 St. 10 + 3 Ø
		Accepts and Uses Student Ideas				Amidon 67 + Amidon 67 + Simon 66 Ø Hough & 66 + Ober Lohman 66 +				Jacobs 71 + Wolfe 71 + Wolfe 71 +	Fitzgerald 71 + Parrish 68 +	Sweeney 68 +	9 St. 10 + 1 Ø
		Asks Questions				Hough & 66 Ø Ober Lohman 66 Ø				Jacobs 71 Ø Wolfe 71 Ø Wolfe 71 Ø	Fitzgerald 71 Ø Parrish 68 Ø	Sweeney 68 Ø	7 St. 8 Ø
		Answers Questions				Hough & 66 Ø Ober							1 St. 1 Ø
		Indirect Influence				Lohman 66 +				Narotsky 72 Ø	Parrish 68 +		3 St. 2 + 1 Ø
		Positive Motivation									Parrish 68 +		1 St. 1 +
		Extended Indirect Influence		Wright 67 +	Haefele 70 +	Haefele 70 + Amidon 67 + Amidon 67 + Simon 66 + Lohman 66 +				Jacobs 71 +	Fitzgerald 71 +		7 St. 9 + 1 Ø
		Extended Praise									Parrish 68 +		1 St. 1 +
		Extended Accepting Ideas				Simon 66 Ø				Jacobs 71 +	Parrish 68 +	Sweeney 68 +	4 St. 3 + 1 Ø
		Extended Questioning								Jacobs 71 +			1 St. 1 +
		Reinforcing Behavior Index								Krumboltz 66 + & Goodwin			1 St. 1 +
		Positive Reinforcement	McDonald 67 Ø & Allen McDonald 67 Ø & Allen			Levin 73 +							2 St. 1 + 2 Ø
	Nonverbal	Body Toward Student							Hodge 72 Ø				1 St. 1 Ø
		Arms Toward Student							Hodge 72 Ø				1 St. 1 Ø
		Hands Toward Student							Hodge 72 +				1 St. 1 +
		Head Toward Student							Hodge 72 Ø				1 St. 1 Ø
		Eyes Toward Student							Hodge 72 Ø				1 St. 1 Ø
		Smiling Toward Student							Hodge 72 +				1 St. 1 +
		Positive Nonverbal Interactions									Raymond 72 +		1 St. 1 +
		% of Time Spent on Nonverbal Interactions									Raymond 72 Ø		1 St. 1 Ø
		Congruent Behaviors					Young 68 Ø				Raymond 72 Ø		2 St. 2 Ø
Direct Behaviors	Lectures					Hough & 66 Ø Ober Lohman 66 +				Jacobs 71 + Wolfe 71 Ø Wolfe 71 +	Fitzgerald 71 + Parrish 68 +		6 St. 5 + 2 Ø
	Gives Directions					Amidon 67 + Amidon 67 + Simon 66 Ø Hough & 66 + Ober Lohman 66 +				Jacobs 71 + Wolfe 71 Ø Wolfe 71 Ø	Fitzgerald 71 + Parrish 68 Ø		8 St. 6 + 4 Ø
	Criticizes or Justifies Authority					Amidon 67 Ø Amidon 67 Ø Simon 66 + Hough & 66 + Ober Lohman 66 Ø		Werner 72 + Werner 72 +		Jacobs 71 + Wolfe 71 Ø Wolfe 71 Ø	Fitzgerald 71 + Parrish 68 + Wilde 72 +	Sweeney 68 Ø	11 St. 8 + 6 Ø
	Corrective Feedback					Hough & 66 + Ober Lohman 66 Ø							2 St. 1 + 1 Ø
	Errors in Approval and Disapproval Responses										Wilde 72 Ø		1 St. 1 Ø
	Direct Influence					Lohman 66 +				Narotsky 72 +			2 St. 2 +
	Extended Direct Influence		Wright 67 +			Amidon 67 Ø Amidon 67 Ø Simon 66 + Lohman 66 +				Jacobs 71 +	Fitzgerald 71 +		6 St. 5 + 2 Ø
	Total Teacher Talk						Birch 69 Ø Birch 69 Ø	Birch 69 + Birch 69 Ø Birch 69 Ø Werner 72 + Werner 72 +		Narotsky 72 Ø		Sweeney 68 Ø	4 St. 3 + 6 Ø
Column Totals		1 Study 2 Ø	1 Study 2 +	1 Study 1 +	1 Study 1 + 1 Ø	5 Studies 25 + 18 Ø	2 Studies 3 Ø	2 Studies 7 + 2 Ø	1 Study 2 + 4 Ø	4 Studies 16 + 13 Ø	4 Studies 20 + 6 Ø	1 Study 2 + 4 Ø	76 + 53 Ø

Table 6.4 - Findings for Model Variations and I/D Ratios and Student Behaviors

Teaching Behaviors		Model Variations												Row
		Written	Written and Verbal	Written and Audio	Written, Verbal and Audio	Written, Verbal and Live	Live	Video	Video and Written	Video and Live	Video, Written and Verbal	Video, Written Verbal and Live	Content Variations	Totals
Indirect/Direct Ratios	I/D Ratio		Wright 67 +	Haefele 70 Ø White 68 +	Haefele 70 Ø Haefele 70 Ø	Amidon 67 + Amidon 67 + Lohman 66 +		Lange 70 +			Jacobs 71 + Narotsky 72 +	Fitzgerald 71 + Parrish 68 +		10 St. 10 + 3 Ø
	i/d ratio		Wright 67 +	Haefele 70 Ø	Haefele 70 Ø Haefele 70 Ø	Amidon 67 + Amidon 67 + Simon 66 + Lohman 66 Ø					Jacobs 71 + Narotsky 72 Ø	Fitzgerald 71 + Parrish 68 +		9 St. 7 + 5 Ø
	Extended i/d ratio					Amidon 67 + Amidon 67 +								1 St. 2 +
	T/S Ratio					Lohman 66 Ø		Birch 69 Ø Birch 69 Ø	Birch 69 Ø Birch 69 Ø Birch 69 Ø		Jacobs 71 +	Fitzgerald 71 +		4 St. 2 + 6 Ø
	% Indirect Teacher Response			Haefele 70 Ø	Haefele 70 Ø Haefele 70 Ø	Simon 66 +						Parrish 68 +		3 St. 2 + 3 Ø
	Investigative Ratio							Bartholomew 70 Ø Bartholomew 70 Ø						1 St. 2 Ø
	Response Strategy							Birch 69 Ø Birch 69 Ø	Birch 69 + Birch 69 Ø Birch 69 Ø					1 St. 1 + 4 Ø
	Teacher-Pupil Extended Talk Ratio							Birch 69 Ø Birch 69 Ø	Birch 69 Ø Birch 69 Ø Birch 69 Ø					1 St. 5 Ø
	Flexibility												Sweeney 68 Ø	1 St. 1 Ø
	Translation Strategies						Millett 69 + Millett 69 Ø	Millett 69 +		Millett 69 + Millett 69 + Millett 69 +				1 St. 5 + 1 Ø
Student Behaviors	Student Talk, Response	Gall, et al., 72 +				Hough 66 + & Ober Lohman 66 +			Gall et al., 72 + Gall et al., 72 Ø		Jacobs 71 Ø Wolfe 71 Ø Wolfe 71 Ø	Fitzgerald 71 Ø Parrish 68 +		7 St. 5 + 5 Ø
	Student Talk, Initiation					Amidon 67 + Amidon 67 + Hough 66 Ø & Ober Lohman 66 +					Jacobs 71 Ø Wolfe 71 + Wolfe 71 +	Fitzgerald 71 + Parrish 68 +	Sweeney 68 Ø	8 St. 7 + 3 Ø
	Silence or Confusion					Hough 66 Ø & Ober					Wolfe 71 Ø Wolfe 71 Ø	Fitzgerald 71 Ø Parrish 68 Ø		4 St. 5 Ø
	Extended Student Initiated Talk	Gall, et al., 72 +							Gall et al., 72 + Gall et al., 72 Ø			Parrish 68 +		2 St. 3 + 1 Ø
	Total Student Talk					Simon 66 Ø					Narotsky 72 Ø	Parrish 68 +		3 St. 1 + 2 Ø
	Extended Student Talk					Simon 66 Ø Lohman 66 Ø					Jacobs 71 Ø	Fitzgerald 71 +	Sweeney 68 +	5 St. 2 + 3 Ø
Column Totals		1 Study 2 +	1 Study 2 +	2 Studies 1 + 3 Ø	1 Study 6 Ø	4 Studies 14 + 7 Ø	1 Study 1 + 1 Ø	4 Studies 2 + 8 Ø	2 Studies 3 + 10 Ø	1 Study 3 +	3 Studies 6 + 9 Ø	2 Studies 12 + 3 Ø	1 Study 1 + 2 Ø	47 + 49 Ø

Every finding represents comparison of two different sets of treatment conditions. There were 29 different treatment conditions possible for every experimental and comparison group. All of these were defined in Chapter III and presented in Table 5.4, where they were assigned a numerical code. This same code will be used in this chapter so that the complete treatment conditions for each group can be shown in an abbreviated form.

Written Models

Two studies used written models. Column one of Tables 6.3 and 6.4 contains the four findings. The studies had the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald and Allen, 67 ₁	Ø	1+7+9+14+15+17+20 +24+25	31+44+45+47+50 +53
McDonald and Allen, 67 ₂	Ø	1+7+9+14+15+17+20 +23	31+44+45+47+50 +53
Gall, <u>et al.</u> , 72	+	1+7+9+13+15+17+20 +23	30

McDonald and Allen found that subjects who had cued written instructions on positive reinforcement procedures, along with classroom practice and self-feedback on videotape, did not use any significantly different number of Positive Reinforcements than subjects

who had written instructions on desirable general teaching skills, along with classroom practice and self-feedback on videotape. Even when the experimental group received additional feedback from a supervisor (finding 1), they did not perform significantly different than the comparison group. These findings tend to support postulate F of assumption I of Bandura's theory. Apparently, the modeling was not specific enough to help the subjects determine the salient features of the behavior.

Gall and associates found that subjects who read cued transcripts of four videotapes and then had microteaching practice with videotape feedback used more HOQ than control subjects. The experimental subjects also had more Student Talk Response, and they had more Extended Student-Initiated Talk than students of control subjects. These findings tend to support postulate A of assumption I of Bandura's theory. Learning can occur from observing the specific behaviors of models.

Written and Verbal Models

One study by Wright (1967) used written and verbal modeling. Column two of Tables 6.3 and 6.4 contains the four findings which resulted from the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Wright, 67	4 +	1+2+7+11+12+14+17 +18+19+24+25+29	44+47+49+54+55 +59

Wright found that subjects who received written and verbal instructions on classifying and interpreting Flanders' system, along with coding practice, classroom practice, and feedback from matrices and audiotapes cued by a supervisor, scored significantly better on four measures than subjects who had no modeling but classroom practice and weakly cued audio feedback. The experimental subjects scored significantly better on the following four measures:

1. Extended Indirect Influence
2. Extended Direct Influence
3. Larger I/D Ratio
4. Larger i/d ratio

These findings tend to support postulate A of assumption I and postulate H of assumption III of Bandura's theory. They support the necessity of clear models and the use of symbolic rehearsal before practice and feedback sessions.

Written and Audio Models

Two studies used written and audio modeling to train for change in four measures of interaction behavior. Column three of

Tables 6.3 and 6.4 contains the four findings which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
White, 68	1 +	1+3+8+9+12	30
Haefele, 70	1 + 3 Ø	1+3+7+11+12	30

White found that subjects who heard an audio model and read a transcript of the model lesson and then read the teacher parts aloud while listening to the tape had a larger I/D Ratio than the control subjects. This finding supports postulate A of assumption I of Bandura's theory. Innovative behavior can be transmitted to observers through exposure to modeled events.

Haefele found that subjects who studied by themselves, a cued booklet, and heard audiotapes which they coded, used more Extended Indirect Influence than the control subjects. However, there was no significant difference between the groups on the following measures:

1. I/D Ratio
2. i/d ratio
3. % Indirect Teacher Response

Haefele's findings are somewhat contradictory, but perhaps all they show is that this treatment is effective for some behaviors and

not for others. There is no reason that a particular treatment should show equal effects across a whole range of behaviors that an investigator can think to test for. The best that can be said is that these findings partially support postulate A of assumption I of Bandura's theory.

Written, Verbal and Audio Models

All eight findings contained in column four of Tables 6.3 and 6.4 come from two treatment comparisons of one study. The following are the specific treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Haefele, 70	1 + 3 \emptyset	1+2+3+7+11+12	30
Haefele, 70	4 \emptyset	1+2+3+7+11+12	31+33+37+41+42

Haefele found that subjects who had verbal instructions from a specialist in addition to self-study of a booklet and audiotapes, used significantly more Extended Indirect Influence than the control subjects. Just as in the previous section, there was no significant difference between groups on I/D Ratio, i/d ratio, or % Indirect Teacher Response. When he compared the two experimental groups, he found that there were no significant differences between the groups

on any of the four measures. These findings may also lend partial support to postulate A of assumption I.

Written, Verbal and Live Models

Five studies used this modeling combination in training subjects, and then they employed a wide variety of measures to test the treatment effects. Column five of Tables 6.3 and 6.4 contains 64 findings spread over 25 behavior measures, which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Amidon, 67	8 + 3 Ø	1+2+5+7+11+12+13 +14+15+16+17+24 +25+29	60
Amidon, 67	8 + 3 Ø	1+2+5+7+11+12+13 +14+15+16+17+24+ +29	60
Hough and Ober, 66	5 + 6 Ø	1+2+5+7+11+12+13 +14+15+16+17+18 +23+25+29	60
Lohman, 66	10 + 8 Ø	1+2+5+7+11+12+13 +14+15+16+17+18 +23+25+29	60
Simon, 66	6 + 5 Ø	1+2+5+7+11+13+14 +15+16+17+18+19 +21+23+25	60
Levin, 73	1 +	1+2+5+7+9+13+14+15 +16+17+24+25+29	30

Amidon found that subjects who were given written and verbal descriptions of Flanders' interaction analysis categories along with live modeling of the behaviors, coding practice, role playing, classroom practice and feedback from a supervisor (cued by an interaction matrix), had greater scores than the placebo group on the following eight measures:

1. Praise Actions and Behaviors
2. Accepts and Uses Student Ideas
3. Extended Indirect Influence
4. Less Giving Directions
5. I/D Ratio
6. i/d ratio
7. Extended i/d ratio
8. Student Talk, Initiation

He found no significant difference on Accepts Feelings, Criticizes or Justifies Authority, and Extended Direct Influence. The same treatment minus feedback cues from an interaction matrix produced the same eleven findings.

Hough and Ober found that subjects who were given written and verbal descriptions of Flanders' interaction analysis categories, along with practice in coding a tape of classroom interaction at a minimum reliability of .60, computing I/D ratios, interpretation of

matrices, microteaching practice, observation in classrooms, and coding of their own teaching, scored significantly better than the placebo group on five measures:

1. Praise Actions and Behaviors
2. Accepts and Uses Student Ideas
3. Less Giving Directions
4. Less Criticism or Justifying Authority
5. Student Talk, Response

He also found no significant differences between the groups on six measures:

1. Accepts Feelings
2. Asks Questions
3. Answers Questions
4. Lectures
5. Student Talk, Initiation
6. Silence of Confusion

Lohman did a follow-up on a sample of the original subjects in Hough and Ober's study. He found that after four to twelve months the experimental subjects did significantly better on the following ten measures:

1. Accepts and Uses Student Ideas
2. Indirect Influence

3. Extended Indirect Influence
4. Less Lecturing
5. Less Giving Directions
6. Less Direct Influence
7. Less Extended Direct Influence
8. I/D Ratio
9. Student Talk, Response
10. Student Talk, Initiation

He also found no significant differences between the groups on eight measures:

1. Accepts Feelings
2. Praise Actions and Behaviors
3. Asks Questions
4. Criticizes or Justifies Authority
5. Corrective Feedback
6. i/d ratio
7. T/S Ratio
8. Extended Student Talk

Simon found that subjects who were given written descriptions and verbal instruction on Flanders' categories and building matrices, along with peer modeling, classroom and microteaching practice, and audiotape feedback, scored significantly better than a placebo

group on the following six interaction measures:

1. Praise Actions and Behaviors
2. Extended Indirect Influence
3. Less Criticism and Justifying Authority
4. Less Extended Direct Influence
5. i/d ratio
6. % Indirect Teacher Response

She also found no significant differences between the groups on five measures:

1. Accepts and Uses Student Ideas
2. Extended Accepting Student Ideas
3. Gives Directions
4. Total Student Talk
5. Extended Student Talk

Levin found that subjects who were given written and verbal instruction on appropriate reinforcement patterns, live modeling by supervisor and peers, microteaching practice and feedback from the supervisor, scored significantly better than control subjects on the use of Positive Reinforcement.

Most of these 65 findings lend partial support to proposition 2 of Bandura's theory. The combined use of specific modeling and reinforcement procedures is probably the best method of transmitting

and maintaining social response patterns. However, these procedures were generally not sufficient to change Acceptance of Feelings, Asking Questions, and Criticism or Justifying Authority.

Lohman's follow-up study gave strong support to proposition 8 because most of the significant differences remained after four to twelve months of teaching. It was encouraging to find that the learned response patterns generalized to broad teaching situations.

Live Models

One study by Millett (1969) used live modeling as a treatment variable. Column six of Table 6.4 contains the two findings which results from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Millett, 69	+	6+9	60
Millett, 69	Ø	6+9	4+9

Millett found that subjects who received live demonstration of Translation Strategies used significantly more of the strategies than a placebo group. When this group was compared with an effective video modeling group, he found no significant differences between them in their use of the strategies. These two findings lend support to postulate A of assumption I of Bandura's theory. In this case, a

single form of modeling without practice or feedback was sufficient to help subjects change their behavior, and live modeling and video modeling seemed to be equally effective.

Video Models

Five studies used video modeling as the treatment variable. Column six of Table 6.3, column seven of Table 6.4, and column one of Table 6.5 contain 27 findings which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Millett, 69	+	4+9	60
Lange, 70	+	4+9	30
Birch, 69	4 \emptyset	4+9	30
Birch, 69	4 \emptyset	4+9+14+15+17+20 +23+29	30
Bartholomew, 70	\emptyset	4+7+9	30
Bartholomew, 70	\emptyset	4+7+9+20+23	50+53
Young, 68	3 + 12 \emptyset	4+7+9+13+15+16 +20+23+25	34+39+43+45+46 +50+53+55

Millett found that subjects who observed a video model of Translation Strategies used significantly more of the strategies than a placebo group. Lange also found that subjects who observed a video model using indirect teaching behaviors significantly changed

Table 6.5 - Findings for Model Variations and Feedback Variations
versus Lecturing and Testing Behaviors

Teaching Behaviors			Model Variations		Feedback Variations		Row Totals
			Video	Video and Verbal	Video	Video and Supervisor	
Redundancy in Lecturing	Visual Highlighting	Use of Diagrams	Young 68 0		Young 68 0		2 0
		Writing on Board	Young 68 0		Young 68 0		2 0
		Underlining	Young 68 0		Young 68 0		2 0
		Pointing to Written Work	Young 68 0		Young 68 0		2 0
		Visual Aids	Young 68 0		Young 68 +		1 + 1 0
		Total Visual Highlighting	Young 68 +		Young 68 +		2 +
	Verbal Highlighting	Use of Teacher Examples	Young 68 0		Young 68 +		1 + 1 0
		Use of Student Examples	Young 68 +		Young 68 +		2 +
		Total Examples	Young 68 0		Young 68 +		1 + 1 0
		Focusing Words	Young 68 0		Young 68 0		2 0
		Analogies	Young 68 0		Young 68 0		2 0
		Metaphors	Young 68 0		Young 68 0		2 0
		Simple Repetition	Young 68 0		Young 68 0		2 0
		Total Verbal Highlighting	Young 68 +		Young 68 +		2 +
Testing Behaviors	Elimination of Student Choices		Resnick 70 + & Kiss 70 +		Resnick 70 0 & Kiss 70 0	2 + 1 0	
	Allowing Student to Eliminate Choices		Resnick 70 + & Kiss 70 +		Resnick 70 0 & Kiss 70 0	2 + 1 0	
	Cueing of Child		Resnick 70 + & Kiss 70 +		Resnick 70 0 & Kiss 70 0	2 + 1 0	
	Prompting Child		Resnick 70 + & Kiss 70 +		Resnick 70 0 & Kiss 70 0	2 + 1 0	
	Increased Distracting Tactics		Resnick 70 + & Kiss 70 +		Resnick 70 0 & Kiss 70 0	2 + 1 0	
Column Totals			1 Study 3 + 11 0	1 Study 10 +	1 Study 6 + 8 0	1 Study 5 0	19 + 24 0

their behavior toward indirect as measured by the I/D Ratio. These findings tend to support assumption I of Bandura's theory and its postulate A. It appeared that modeling alone was sufficient to change behavior which may contradict assumption IV.

Birch and Bartholomew both found that a video model without practice or feedback produced no significant changes in:

1. Total Teacher Talk
2. T/S Ratio
3. Investigative Ratio
4. Response Strategy
5. Teacher-Pupil Extended Talk Ratio

These findings tend to support assumption IV, postulate A, of Bandura's theory. At least for some behaviors, observational learning alone is not sufficient to produce faultless performances. Bartholomew found this was still true even when the subjects had cued modeling and video feedback on their pretest performance.

Birch also found that if the modeling was not cued, the addition of classroom practice and uncued video feedback did not make any significant difference in the behaviors of the subjects. This finding tends to support postulate F of assumption I. The behaviors need to be clearly specified and not just left to inference from a few examples.

Young set out to test the value of cueing the model and found that with microteaching practice and video feedback, cueing the model made a significant difference for only three of the 15 behaviors. However, the significant differences were in Total Visual Highlighting, Use of Student Examples, and Total Verbal Highlighting. These findings lend partial support to postulate F.

Video and Written Models

Three studies used video and written modeling as treatment variables. Column seven of Table 6.3 and column eight of Table 6.4 contain 22 findings which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Gall, <u>et al.</u> , 72	2 +	1+4+7+9+13+15+17 +20+23	30
Gall, <u>et al.</u> , 72	2 Ø	1+4+7+9+13+15+17 +20+23	31+37+39+43 +45+47+50+53
Werner, 72	3 +	1+4+7+9+13+15+17 +19+23+25+29	30
Werner, 72	3 +	1+4+7+9+13+15+17 +19+23+25+29	30
Birch, 69	2 + 2 Ø	1+4+7+9+12+14+15 +17+20+23+25+29	30
Birch, 69	4 Ø	1+4+7+9+12+14+15 +17+20+23+29	30
Birch, 69	4 Ø	1+4+7+9+12+14+15 +17+29	30

Gall found that subjects who observed a cued written and video model, along with microteaching practice and video feedback, used more HOQ than a control group. They also had more Student Talk, Response and Extended Student-Initiated Talk than the controls. He found that there were no significant differences when he compared video and written modeling with written modeling alone. This indicates that video modeling may not be necessary for some skills if the written models are specific enough.

Werner also found that subjects who observed a cued written and video model, along with microteaching practice and video feedback (or audio feedback), performed significantly better than the controls on three measures:

1. Increased Praise of Actions and Behaviors
2. Decreased Criticism and Justification of Authority
3. Decreased Total Teacher Talk

These findings by Gall and Werner all lend support to assumption I and postulate F of Bandura's theory. Learners can acquire new behavior patterns if specific models are provided. They also support proposition 2 because it was really a combination of specific modeling, practice, and accurate feedback which changed the subjects' behavior patterns.

Birch found that subjects who observed a cued written and video

model, along with practice in coding, classroom practice, and coded videotapes of their teaching, scored significantly better than controls on two measures of interaction behavior:

1. Increased Response Strategy
2. Decreased Teacher Talk

However, there were no significant differences between the two groups on T/S Ratio and Teacher-Pupil Extended Talk Ratio. When subjects had the same modeling and practice but no coding of their videotape feedback (or no feedback at all), there were no significant differences on any of the four measures.

Birch's findings tend to support assumption IV and proposition 2 of Bandura's theory. Observational learning alone is not enough even if the model is cued, but practice and specific cueing of feedback is also essential in developing new behavior patterns.

Video and Live Models

Two studies used video and live modeling as treatment variables. Column eight of Table 6.3 and column nine of Table 6.4 contain nine findings for seven behaviors which resulted from the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Millett, 69	+	4+6+9	60
Millett, 69	+	4+6+9	36+39
Millett, 69	+	4+6+9	34+39
Hodge, 72	2 +	4+5+6+7+9+13+16 +21+24+25	60

Millett found subjects who observed video and live modeling used significantly better Translation Strategies than the placebo group, subjects who saw a live model only, and subjects who saw a video model only. These findings not only support assumption I of Bandura's theory, but also indicate that the modeling combination is superior to either live or video forms by themselves.

Hodge's findings lend only partial support to assumption I and postulate A. He found that video and live modeling was only partially effective in helping subjects learn to use certain nonverbal behaviors. He found that they made significant increases in the use of Hands Toward Student and Smiling Toward Student, but no significant differences in:

1. Body Towards Student
2. Arms Towards Student
3. Head Towards Student
4. Eyes Towards Student

Video and Verbal Models

Resnick and Kiss (1970) used video and verbal modeling to train subjects to change five diagnostic testing behaviors. Column two of Table 6.5 contains ten significant findings which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Resnick and Kiss, 70	5 +	1+4+7+11+13+15+17 +20+24+25	43+45+47+50+54 +55
Resnick and Kiss, 70	5 +	2+4+7+11+13+15+17 +20+23	43+45+47+50+54 +55

All of these findings indicate that the cued video and verbal modeling was the significant factor. They found that this modeling plus microteaching practice and video feedback was more effective than just practice and feedback for the following measures:

1. Elimination of Student Choices
2. Allowing Student to Eliminate Choices
3. Cueing of Child
4. Prompting Child
5. Increasing Distracting Tactics

These findings lend strong support to assumption I and its postulate A of Bandura's theory. It also supports postulate D of assumption II and proposition 2.

Video, Written and Verbal Models

Four studies used a combination of video, written, and verbal modeling as a treatment variable over 23 different measures of interaction behavior. Column nine of Table 6.3 and column ten of Table 6.4 contain 44 findings which resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Jacobs, 71	11 + 6 Ø	1+2+4+7+11+12	30
Wolfe, 71	3 + 6 Ø	1+2+4+7+11+13+15 +17+18+20+23+25 +29	43+45+47+48 +53+55+59
Wolfe, 71	5 + 4 Ø	1+2+4+7+11+13+15 +17+18+20+23+25 +29	43+45+47+50 +53+59
Narotsky, 72	2 + 4 Ø	1+2+4+7+11+12+14 +15+17+20+24+25 +29	30
Krumboltz and Goodwin, 66	+	1+2+4+7+9+14+17 +24	60

Jacobs found that subjects who observed cued written, verbal, and video modeling and coded videotapes did significantly better than control subjects on eleven interaction behavior measures:

1. Accepts and Uses Student Ideas
2. Extended Indirect Influence

3. Extended Accepting Student Ideas
4. Extended Questioning
5. Less Lecturing
6. Less Giving Directions
7. Less Criticism or Justifying Authority
8. Less Extended Direct Influence
9. I/D Ratio
10. i/d ratio
11. T/S Ratio

The experimental subjects did not do significantly better on six measures, and they were mostly related to student responses:

1. Accepting Feelings
2. Praise Actions and Behaviors
3. Asking Questions
4. Student Talk, Response
5. Student Talk, Initiation
6. Extended Student Talk

The eleven significant findings of Jacobs give strong support to Bandura's assumption I and its postulate A. Krumboltz and Goodwin's finding in favor of the experimental group who observed a written, verbal, and video model, along with classroom practice and

supervisor feedback, also lends support to assumption I. Narotsky's findings only lend partial support to this assumption because the well cued modeling and feedback only resulted in two significant findings out of six measures:

1. Less Direct Influence (+)
2. Larger I/D Ratio (+)
3. Indirect Influence (\emptyset)
4. Total Teacher Talk (\emptyset)
5. i/d ratio (\emptyset)
6. Total Student Talk (\emptyset)

Wolfe's findings were very mixed but also gave partial support to Bandura's assumption I and postulate A. He found that subjects who observed the modeling, had cycled microteaching practice, and video feedback with cues from an interaction analysis matrix scored significantly better than subjects who had only microteaching practice and uncued video feedback on five of nine measures:

1. Accepts Feelings (+)
2. Praise Actions and Behaviors (+)
3. Accepts and Uses Student Ideas (+)
4. Less Lecture (+)
5. More Student Talk, Initiation (+)
6. Gives Directions (\emptyset)

7. Criticizes or Justifies Authority (\emptyset)
8. Student Talk, Response (\emptyset)
9. Silence or Confusion (\emptyset)

He found when the experimental subjects were compared with a group that had microteaching practice and video feedback cued by an interaction analysis matrix, they did significantly better than the comparison group on only three of the nine measures: Accepts Feelings; Accepts and Uses Student Ideas; and Student Talk, Initiation. However, the fact that the comparison group received interaction analysis matrix in the feedback procedure may have given them enough of a written model so that they could make changes.

Video, Written, Verbal and Live Models

Four studies used this extensive form of modeling as a treatment variable. Column ten of Table 6.3 and column eleven of Table 6.4 contain 41 findings over 27 behavior measures that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Fitzgerald, 71	13 + 3 \emptyset	1+2+4+5+7+11+13 +16+21+24+25	60
Wilde, 72	2 + 1 \emptyset	1+2+4+5+11+13+14+16 +17+18+24+25+29	30
Raymond, 72	1 + 2 \emptyset	1+2+4+5+7+9+13+14+15 +16+17+20+21+24+25	60
Parrish, 68	16 +	1+2+4+5+7+11+12+13 +14+15+16+17	30

Fitzgerald and Wilde's findings give very strong support to proposition two of Bandura's theory. In both studies, the combination of cued, thorough modeling, practice and supervisor cued feedback produced significantly better scores in most of the interaction measures:

1. Wilde, 72

- a. Praise Actions and Behaviors (+)
- b. Less Criticism and Justifying Authority (+)
- c. Errors in Approval and Disapproval Responses (\emptyset)

2. Fitzgerald, 71

- a. Accepts Feelings (+)
- b. Praise Actions and Behaviors (+)
- c. Accepts and Uses Student Ideas (+)
- d. Asks Questions (\emptyset)
- e. Extended Indirect Influence (+)
- f. Less Lecture (+)
- g. Less Giving Directions (+)
- h. Less Criticism and Justifying Authority (+)
- i. Less Extended Direct Influence (+)
- j. I/D Ratio (+)
- k. i/d ratio (+)
- l. T/S Ratio (+)

- m. Student Talk, Response (\emptyset)
- n. Student Talk, Initiation (+)
- o. Silence or Confusion (\emptyset)
- p. Extended Student Talk (+)

In both studies, there were significant changes in every behavior that directly affects the warmth and indirectness of the classroom environment. Asking more questions and getting more student responses to those questions is not really necessary to warming the environment and may actually make it more rigid.

Raymond found that subjects who had this same extensive modeling, practice, and feedback treatment did use more Positive Non-verbal Interactions than a placebo group who had the same treatment but with other teaching skills. This shows that the content of the modeling was the critical factor. However, the % of Time Spent on Nonverbal Interactions and Congruent Behaviors was not significantly different between the two groups. Therefore, her study lends only partial support to proposition two of Bandura's theory.

Raymond also found that there was a significant correlation among all subjects between the number of Positive Nonverbal Interactions and the students' perceptions of teacher effectiveness. It appears this is a behavior that teachers can be trained to use and one

which will positively affect student perceptions of the teaching-learning atmosphere.

Parrish found that subjects who had instructions on Flanders' categories, observed live and filmed models, coded models and had role-playing practice and classroom practice with no specific feedback did significantly better on sixteen of nineteen interaction measures:

1. Accepts Feelings (+)
2. Praise Actions and Behaviors (+)
3. Accepts and Uses Student Ideas (+)
4. Asks Questions (\emptyset)
5. Indirect Influence (+)
6. Positive Motivation (+)
7. Extended Praise (+)
8. Extended Accepting Student Ideas (+)
9. Less Lecturing (+)
10. Gives Directions (\emptyset)
11. Less Criticism and Justifying Authority (+)
12. I/D Ratio (+)
13. i/d ratio (+)
14. % Indirect Teacher Response (+)
15. Student Talk, Response (+)

16. Student Talk, Initiation (+)
17. Silence or Confusion (\emptyset)
18. Extended Student-Initiated Talk (+)
19. Total Student Talk (+)

In every behavior that directly affects the warmth of the classroom environment, the experimental subjects performed significantly better without receiving feedback. These findings lend strong support to Bandura's assumption I, postulate A. These innovative behaviors and combinations were learned from a specific and thorough set of modeling procedures. The fact that the subjects learned Flanders' categories and how to tally and interpret behaviors which they observed, lends support to postulates D and E of assumption III. The categories and coding provided a structure for remembering the behaviors in an easily stored form. Postulate H of assumption III also relates to the coding of the models. This provided the subjects with symbolic rehearsal that probably enhanced the reorganization and recoding of the modeled events.

Content Variations in Modeling

One study by Sweeney (1968) resulted in nine findings reported in column 11 of Table 6.3 and column 12 of Table 6.4. All of the findings were from the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Sweeney, 68	1 + 8 0	1+2+5+7+11+13+14 +16+17+29	31+32+35+37+41+43 +44+46+47+59

All of the subjects received written and verbal instructions, live modeling by peers, role-playing practice, and classroom practice. The experimental subjects received instruction on a revised form of Flanders' categories while the comparison subjects were instructed on the same general areas using three subjective rating scales. The experimental subjects only scored significantly better on Extended Student Talk and there were no significant differences on the following behavior measures:

1. Accepts Feelings
2. Accepts and Uses Student Ideas
3. Extended Accepting Student Ideas
4. Asks Questions
5. Criticizes or Justifies Authority
6. Total Teacher Talk
7. Flexibility
8. Student Talk, Initiation

These findings appear to contradict postulate F of assumption I of Bandura's theory. The more specific examples used in describing and modeling Flanders' categories, for the most part, did not

produce significantly different interaction behaviors than did the use of more general examples with the comparison group. In this study, greater performance gains were not gained by observing more specific examples.

Practice Variations and Interaction Behaviors

Only one study examined the effect of microteaching on two measures of interaction behaviors. Friebel and Kallenbach (1969) tried the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Friebel and Kallenbach, 69	2 Ø	1+4+7+9+13+14+16 +17+20+23	31+34+37+39+44+47

When both groups were given cued video and written modeling and classroom practice, the addition of one microteaching practice session with video self-feedback made no significant differences in Total Teacher Talk and Extended Student Talk. This does not directly test any of Bandura's assumptions, but it does indicate that microteaching is not a significant addition if specific modeling and classroom practice are already available.

Feedback Variations and Interaction Behaviors

Seven feedback variations have been tried in training teachers to use 45 interaction behaviors. In most of the studies, feedback was used in combination with some type of modeling and practice. However, the findings reported here were for treatments in which the feedback was the independent variable. Forty-three of the findings are summarized in Table 6.5 that appears in the discussion on modeling variations. These findings were from only two studies that tested modeling over a large number of unique behaviors. Since the feedback variations were tested over the same behaviors (which were not examined in any other studies), all of the findings for the two studies were put on that one table.

The other 62 findings came from nine different studies that are summarized in Table 6.6. This matrix compares specific feedback treatments with particular behaviors and reports it with the author's last name, year of the study, and the significance. A + indicates a significant gain in favor of the experimental group over the performance of the comparison group, \emptyset indicates no significant difference between the two groups, and (-) indicates that the experimental group performed significantly lower than the comparison group. Refer back to Table 5.4 for the numerical code (1-61) which is used to report the specific treatment conditions for each study.

Table 6.6 - Findings for Feedback Variations and Interaction Behaviors

Teaching Behaviors		Feedback Variations							Multiple Variations	Row Totals
		Written and Peer	Written and Supervisor	Audio	Audio and Supervisor	Video	Video and Written	Video and Supervisor		
Indirect Behaviors	Accepts Feelings					Wolfe 71 Ø	Wolfe 71 Ø McFadden 71 Ø			2 St. 3 Ø
	Praise Actions and Behaviors	Bondi 69 + & Ober				Werner 72 Ø Wolfe 71 (-)	Wolfe 71 Ø			3 St. 1 + 2 Ø 1 (-)
	Accepts and Uses Student Ideas	Bondi 69 + & Ober		Nichols 71 Ø	Nichols 71 Ø Nichols 71 Ø	Wolfe 71 (-)	Wolfe 71 Ø McFadden 71 Ø			4 St. 1 + 5 Ø 1 (-)
	Asks Questions	Bondi 69 + & Ober				Wolfe 71 Ø	Wolfe 71 Ø McFadden 71 Ø			3 St. 1 + 3 Ø
	Answers Questions	Bondi 69 Ø & Ober								1 St. 1 Ø
	Positive Motivation						McFadden 71 Ø			1 St. 1 Ø
	Extended Indirect Influence		Wright 67 Ø Wright 67 Ø							1 St. 2 Ø
	Extended Praise	Bondi 69 + & Ober								1 St. 1 +
	Extended Accepting Ideas	Bondi 69 + & Ober								1 St. 1 +
	Positive Reinforcement							McDonald 67 Ø & Allen	McDonald 67 + & Allen McDonald 67 + & Allen McDonald 67 + & Allen	1 St. 3 + 1 Ø
	Congruent Behaviors					Young 68 Ø				1 St. 1 Ø
Direct Behaviors	Lectures	Bondi 69 + & Ober				Wolfe 71 (-)	Wolfe 71 Ø			2 St. 1 + 1 Ø 1 (-)
	Gives Directions	Bondi 69 + & Ober				Wolfe 71 Ø	Wolfe 71 Ø McFadden 71 +			3 St. 2 + 2 Ø
	Criticizes or Justifies Authority	Bondi 69 + & Ober				Werner 72 Ø Wolfe 71 Ø	McFadden 71 + Wolfe 71 Ø	Peterson 73 Ø		5 St. 2 + 4 Ø
	Corrective Feedback	Bondi 69 + & Ober					McFadden 71 +			2 St. 2 +
	Extended Direct Influence		Wright 67 Ø Wright 67 Ø							1 St. 2 Ø
	Total Teacher Talk					Werner 72 Ø				1 St. 1 Ø
	Extended Teacher Talk						McFadden 71 Ø			1 St. 1 Ø
I/D Ratios	I/D Ratio	Bondi 69 + & Ober	Wright 67 Ø Wright 67 +							2 St. 2 + 1 Ø
	i/d ratio		Wright 67 Ø Wright 67 Ø							1 St. 2 Ø
	T/S Ratio	Bondi 69 Ø & Ober								1 St. 1 Ø
	Investigative Ratio								Bartholomew 70 Ø	1 St. 1 Ø
Student Behaviors	Student Talk, Response	Bondi 69 + & Ober				Wolfe 71 Ø	Wolfe 71 Ø			2 St. 1 + 2 Ø
	Student Talk, Initiation	Bondi 69 + & Ober				Wolfe 71 Ø	Wolfe 71 Ø			2 St. 1 + 2 Ø
	Silence or Confusion	Bondi 69 + & Ober				Wolfe 71 Ø	Wolfe 71 Ø			2 St. 1 + 2 Ø
	Extended Student Talk						McFadden 71 Ø	Peterson 73 Ø		2 St. 2 Ø
Column Totals		1 Study 13 + 2 Ø	1 Study 1 + 7 Ø	1 Study 1 Ø	1 Study 2 Ø	3 Studies 11 Ø 3 (-)	2 Studies 3 + 16 Ø	2 Studies 3 Ø	2 Studies 3 + 1 Ø	20 + 43 Ø 3 (-)

Written and Peer Feedback

One study by Bondi and Ober (1969) used written and peer feedback as a training variable. Column one of Table 6.6 contains the 15 findings that resulted from the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Bondi and Ober, 69	13 + 2 Ø	1+2+7+11+14+15+17 +18+21+25+29	31+32+37+41+44 +45+47+59

Bondi and Ober found that when both groups received written and verbal instruction on Flanders' categories, how to interpret matrices, and how to analyze behavior patterns from a matrix, along with distributed classroom practice, the addition of periodic matrix feedback and peer discussion of the matrix helped the experimental group score significantly better on all measures except Answers Questions and T/S Ratios. On the following 13 measures, the experimental group scored better than the comparison group:

1. Praise Actions and Behaviors
2. Accepts and Uses Student Ideas
3. Asks Questions
4. Extended Praise
5. Extended Accepting Ideas
6. Less Lecturing
7. Less Giving Directions

8. Less Criticism and Justifying Authority
9. Less Corrective Feedback
10. I/D Ratio
11. Student Talk, Response
12. Student Talk, Initiation
13. Silence or Confusion

These findings strongly support postulate E of assumption IV of Bandura's theory. Observational learning alone is not sufficient, but the observer also needs feedback in order to adjust his behaviors into line with the model. These findings also support proposition two because they show that the combined use of modeling and reinforcement is the most effective means of changing a broad range of interaction behaviors.

Written and Supervisor Feedback

One study by Wright (1967) used written and supervisor feedback as a variable. Column two of Table 6.6 contains eight findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Wright, 67	4 \emptyset	1+2+7+11+12+14+17 +18+24+25+29	31+32+37+41+42 +44+47+48+49+53 +55+59
Wright, 67	1 + 3 \emptyset	14+17+18+24+25+29	44+47+49+53+59

Wright found that subjects who had written and verbal instructions on Flanders' categories, how to classify teaching behaviors, and how to interpret matrices, along with classroom practice and feedback from a matrix interpreted by a supervisor, did not score significantly different from a comparison group that had the same modeling and practice, but listened to an audiotape and made their own matrix. There were no differences on the following measures:

1. Extended Indirect Influence
2. Extended Direct Influence
3. I/D Ratio
4. i/d ratio

Both of the groups did significantly better than a group without the modeling (reported earlier in the discussion of modeling variations) on these four measures. This combination of findings indicates that when specific modeling and practice are provided, it does not matter whether a supervisor interprets a feedback matrix or the subject interprets his own.

Wright also found that when subjects did not have modeling, the I/D Ratio was increased if the supervisor interpreted the matrix for the subjects. However, the supervisor's interpretations made no significant difference on the other three measures. These

findings together seem to lend further support to Bandura's assumption I.

Audio Feedback

Nichols (1971) used audio feedback as a treatment variable.

Column three of Table 6.6 contains the one finding that was based on the following treatment comparison:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Nichols, 71	Ø	3+7+9+13+14+15+16 +17+19+23	33+37+39+43+44 +45+46+47

When both groups receive cued audio modeling, cycled micro-teaching practice and classroom practice, it makes no significant difference in Accepting and Using Student Ideas to add on audio self-feedback.

Audio and Supervisor Feedback

Nichols also tried audio feedback with a supervisor cueing and reinforcing the subjects. Column four of Table 6.6 contains the two findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Nichols, 67	Ø	3+7+9+13+14+15+16 +17+19+24+25	33+37+39+43+44 +45+46+47+49+53
Nichols, 67	Ø	3+7+9+13+14+15+16 +17+19+24+25	33+37+39+43+44 +45+46+47

In these comparisons, Nichols found that when both groups receive cued modeling, cycled microteaching practice, and classroom practice, it made no significant difference in Accepting and Using Student Ideas to add on supervisor cued audio feedback. He also found that the addition of supervisory cues did not significantly change the effect of audio feedback. For all three of Nichols' comparisons, the form or presence of feedback made no significant difference when specific modeling and practice were provided. These findings strongly contradict postulate E of Bandura's assumption IV. Feedback did not seem to be necessary in Nichols' study.

Video Feedback

Three studies used video feedback as a treatment variable. Column five of Table 6.6 and column three of Table 6.5 contain the 28 findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Werner, 72	3 Ø	1+4+7+9+13+15+17 +20+23+25+29	31+34+37+39+43 +45+47+49+53+55 +59
Wolfe, 71	7 Ø 3 (-)	13+15+17+20+23+29	43+45+47+48+53 +55+59
Young, 68	6 + 9 Ø	4+7+9+13+15+16+20 +23+25	34+37+39+43+45 +46+50+53

Werner found that when subjects received specific cued written and video modeling, cycled microteaching practice and cued self-feedback, it made no significant difference whether the feedback was audiotape or videotape. The nonsignificant differences were for Praise Actions and Behaviors, Criticize or Justify Authority and Total Teacher Talk. She found that both treatments were more effective than controls on the three behaviors.

Wolfe found when both groups had cycled microteaching practice without any modeling that the group with uncued video feedback scored lower than the comparison group with cued computer printed matrix feedback on Praise Actions and Behaviors, Accepts and Uses Student Ideas, and Lectures. He also found that there were no significant differences between the groups on any of the following measures:

1. Accepts Feelings
2. Asks Questions
3. Gives Directions
4. Criticizes or Justifies Authority
5. Student Talk, Response
6. Student Talk, Initiation
7. Silence or Confusion

However, it was likely that the comparison group received a certain

amount of written modeling from the matrix feedback. This may account for their significant gain in three behaviors over the experimental group.

Young found when both groups received cued video modeling, cycled microteaching practice and video feedback that the group which received supervisor comments on audiotape while they viewed the videotape scored significantly better than the group which viewed their videotapes by themselves on six of the 15 measures:

1. Congruent Behaviors (\emptyset)
2. Use of Diagrams (\emptyset)
3. Writing on Board (\emptyset)
4. Underlining (\emptyset)
5. Pointing to Written Work (\emptyset)
6. Visual Aids (+)
7. Total Visual Highlighting (+)
8. Use of Teacher Examples (+)
9. Use of Student Examples (+)
10. Total Examples (+)
11. Focusing Words (\emptyset)
12. Analogies (\emptyset)
13. Metaphors (\emptyset)

14. Simple Repetition (\emptyset)

15. Total Verbal Highlighting (+)

None of the findings of these three studies directly test any of Bandura's assumptions, but they do help refine what types of feedback may be most helpful in training teachers to use interaction behaviors. Werner's findings indicate that audio and video feedback are equally effective if cued by a handbook. Wolfe's findings partially support the use of matrix feedback over uncued video feedback. Young's findings partially support supervisory cueing of videotape feedback over uncued video feedback.

Video and Written Feedback

Two studies used video and written feedback combinations as a treatment variable. Column six of Table 6.6 contains 19 findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
Wolfe, 71	10 \emptyset	1+2+4+7+11+13+15 +17+18+20+23+25 +29	31+32+34+37+41 +43+45+47+48 +53+55+59
McFadden, 71	3 + 6 \emptyset	1+2+7+11+14+15+17 +18+20+23+25+29	31+32+37+41+44 +45+47+48+53 +55+59

Wolfe found when both groups received cued modeling, cycled microteaching practice, and feedback from a printed matrix that the

addition of video feedback made no significant difference on any of the same ten measures listed in the video feedback discussion.

McFadden made the same comparison and found that video feedback was a significant addition for three of the nine measures:

1. Accepts Feelings (\emptyset)
2. Accepts and Uses Student Ideas (\emptyset)
3. Asks Questions (\emptyset)
4. Positive Motivation (\emptyset)
5. Less Giving Directions (+)
6. Less Criticism and Justifying Authority (+)
7. Less Corrective Feedback (+)
8. Extended Teacher Talk (\emptyset)
9. Extended Student Talk (\emptyset)

Neither of these studies directly tests any of Bandura's assumptions, but they indicate that video feedback is probably not necessary if matrices of interaction are provided to teachers. The exception in McFadden's study appears in the reduction of restrictive and critical behaviors. Perhaps teachers have to see the effects of criticism before they are willing to change those behaviors.

Video and Supervisor Feedback

Three studies used video and supervisor feedback as a training variable. Column four of Table 6.5 and column seven of

Table 6.6 contain the eight findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald and Allen, 67	Ø	1+7+9+14+15+17+20 +24+25	31+37+39+44+45 +47+20+23
Peterson, 73	2 Ø	1+4+7+11+13+14+15 +17+20+24+25+29	31+34+37+41+43 +44+47
Resnick and Kiss, 70	5 Ø	2+4+7+11+13+15+17 +20+24+25	32+34+37+41+43 +45+47+50+53

McDonald and Allen, and Resnick and Kiss found that with cued modeling, practice and video feedback, it made no significant difference whether the feedback was cued by a supervisor. These findings do not directly test any of Bandura's assumptions, but they do help refine what types of feedback may be most helpful in training teachers. In these two studies, cueing of video feedback made no significant difference for the following measures:

1. Positive Reinforcement
2. Elimination of Student Choices
3. Allowing Student to Eliminate Choices
4. Cueing of Child
5. Prompting Child
6. Increased Distracting Tactics

Peterson found that subjects who observed cued written and verbal modeling, had classroom and microteaching practice, and supervisor cued video feedback did not perform significantly different from subjects who had only the modeling and practice. The findings of no significant difference were for Criticizes or Justifies Authority and Extended Student Talk. These findings tend to contradict postulate E of Bandura's assumption IV. From this study, it appears that feedback was not a significant addition to specific modeling and practice. It may be that Peterson's findings also do not support proposition two. Reinforcement may not be needed in combination with modeling.

Multiple Variations and Interaction Behaviors

Two studies contained findings based on comparison of groups that had more than one variation in their training protocols. Column eight of Table 6.6 contains four findings that resulted from the following treatment comparisons:

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald and Allen, 67	+	1+2+7+9+14+15+17 +20+24+25	31+37+39+44+45 +47+50+54+55
McDonald and Allen, 67	+	1+2+7+9+14+15+17 +20+24+25	31+37+39+44+45 +47+50+53

<u>The Study</u>	<u>Finding</u>	<u>Experimental</u>	<u>Comparison</u>
McDonald and Allen, 67	+	1+2+7+9+14+15+17 +20+24+25	31+44+45+47+50 +53
Bartholomew	Ø	4+7+9+20+23	31+37+39

McDonald and Allen found when both groups had a specific written model, cycled classroom practice, and video feedback that verbal instructions from an instructor who pointed out salient cues of the model and how well the subject conformed to the model, made a significant difference in the subjects' use of Positive Reinforcement. This significant difference held true even when the comparison subjects received positive reinforcement during video feedback every time they reinforced their pupils' responses. These findings lend strong support to postulate D of Bandura's assumption II. Observational learning requires that the observer attend closely to cues provided by the model, and discrimination training may greatly accelerate learning from models.

Bartholomew found that subjects who observed a cued video model and received video feedback on their pretest teaching session did not perform significantly different on Investigative Ratio than subjects who only read a cued written model and received no feedback on their teaching. This finding indicates that video modeling is not better than a written model, and it tends to contradict

proposition two of Bandura's theory because the combined modeling and feedback was not more effective than modeling alone. However, this was not a strong test of assumption two because it was a short one-shot treatment that probably did not allow enough time for subjects to change their behavior patterns, and it did not provide for practice sessions. This finding may lend support to postulate A of assumption IV. Observational learning alone is not sufficient to produce faultless performances, but the observer must also be provided with opportunities for practice under conditions which produce rewarding consequences.

Summary

In this chapter, 334 findings from 31 studies have been analyzed and compared with elements of Bandura's theory. An attempt was made to determine what significant effects could be found for different types of modeling, practice, and feedback combinations on 66 different interaction behaviors. Many of the treatments tried were significantly effective for some measures and not for others. Therefore, the summary of findings are presented with respect to particular clusters of interaction behaviors that consistently showed significant treatment effects or consistently nonsignificant effects.

Modeling

A wide variety of comparisons were made with respect to modeling, however, modeling was seldom the only treatment. Usually, some form of practice and feedback was included, but the principle aim of the comparison was to determine the effectiveness of a particular model presentation. Most of the studies show that several forms of modeling with practice and some feedback is effective for increasing a few of the indirect behaviors and for decreasing almost all direct behaviors. The following are the major conclusions that were reached from analyzing the 248 findings:

1. Cued written modeling with practice and video feedback was more effective than no treatment for Student Talk, but not more effective than uncued written modeling for Positive Reinforcement.
2. Cued written and verbal modeling with practice and supervisor feedback was more effective than practice and supervisor feedback for I/D Ratio and Indirect Influence.
3. Written and audio modeling without practice or feedback was only partially more effective than no treatment on I/D Ratio. The same was true of written, verbal, and

audio modeling, and there was no significant difference between the two combinations.

4. Cued written, verbal, and live modeling, along with practice and feedback, was more effective than a placebo treatment on the following behavior measures:
 - a. Praise Actions and Behaviors
 - b. Accepts and Uses Student Ideas
 - c. Extended Indirect Influence
 - d. Lectures
 - e. Gives Directions
 - f. Criticizes or Justifies Authority
 - g. I/D Ratio
 - h. Student Talk, Response
 - i. Student Talk, Initiation
5. Live modeling alone was more effective than a placebo treatment for Translation Strategies, but not more effective than video modeling.
6. Video modeling was not more effective than no treatment except for I/D Ratio, Translation Strategies, Total Visual Highlighting, and Total Verbal Highlighting.
7. Cued video and written modeling with practice and feedback was more effective than no treatment for Praise Actions

and Behaviors, Criticism, and Student Talk, but not more effective than cued written modeling.

8. Video and live modeling alone was more effective than a placebo, video modeling, or live modeling for Translation Strategies. With practice and peer feedback it was more effective than a placebo for using Hands and Smiling Toward Students.
9. Cued video and verbal modeling with practice and feedback was more effective than just practice and feedback for changing Testing Behaviors.
10. Cued video, written, and verbal modeling with practice and feedback was more effective than no treatment, placebo treatment, and just practice and feedback for the following behaviors:
 - a. Accepts Feelings
 - b. Accepts and Uses Student Ideas
 - c. Extended Indirect Influence
 - d. Reinforcing Behavior Index
 - e. Lectures
 - f. Direct Influence
 - g. I/D Ratio
11. Cued video, written, verbal, and live modeling with

practice was more effective than no treatment or a placebo treatment for most indirect and direct behaviors, except Asks Questions and Silence and Confusion.

The very complete forms of modeling when combined with practice (in any form) and feedback (in any form) seem to be effective in changing teacher interaction behaviors across most of the measures tried (see Tables 6.3 and 6.4). The following measures consistently were tested by several studies and shown to be subject to training by model observation:

1. Praise Actions and Behaviors
2. Accepts and Uses Student Ideas
3. Extended Indirect Influence
4. Lectures
5. Gives Directions
6. Criticizes or Justifies Authority
7. Extended Direct Influence
8. I/D Ratio
9. i/d ratio
10. Student Talk, Initiation

There were seven behaviors that showed no consistent pattern of responding to treatment and should probably be tested further:

1. Accepts Feelings

2. Total Teacher Talk
3. T/S Ratio
4. % Indirect Teacher Response
5. Student Talk Response
6. Total Student Talk
7. Extended Student Talk

There were two behaviors that did not seem to respond to any treatments, and thus showed very little promise for change through modeling:

1. Asks Questions (types of questions could be changed, but the number was consistent)
2. Silence and Confusion

Feedback

Seven feedback variations were tested as treatment variables across 45 interaction behaviors. Usually, some form of modeling and practice were included, but the principle aim of the comparison was to determine the effectiveness of a particular feedback protocol. Most of the studies showed that if specific modeling and practice were provided, then feedback made no significant difference in training teachers to modify their interaction behaviors (see Tables 6.5 and 6.6). The following are the major conclusions that were reached from analyzing the 81 findings:

1. When cued written and verbal instructions about Flanders' categories were provided along with practice, then feedback in the form of interaction matrices and peer discussion of teaching was more effective than the same modeling and practice without feedback. This was true across all measures except Answers Questions and T/S Ratio.
2. Written and supervisor feedback was not more effective than subjects receiving written or audio feedback alone.
3. Audio or audio and supervisor feedback was not more effective than no feedback when cued audio modeling and practice preceded the feedback.
4. Cued video feedback was not more effective than cued audio feedback, but was more effective than uncued video feedback on six of fifteen nonverbal measures.
5. Uncued video feedback was not more effective than cued written feedback in the form of an interaction matrix, and for three behaviors it was significantly less effective.
6. Cued video and written (matrix) feedback was not more effective than cued written (matrix) feedback, except for possible helping reduce three direct teaching behaviors: Gives Directions, Criticizes or Justifies Authority, and Corrective Feedback.

7. Video feedback cued by a supervisor was not more effective than no feedback or uncued video feedback.

It appears that the most effective feedback might be to provide teachers with an interaction analysis matrix and let them interpret it for themselves. This works only if the subjects have first had very specific instructions on the categories and how the matrix can be used to interpret teaching, along with several practice sessions. These findings indicate that a lot of expensive equipment and supervisory time may not be necessary to train teachers to use specific teaching skills. The money and time should be spent on providing very specific models and instructions and making sure that practice is provided along with audiotaping so that teachers can code their own behaviors.

Bandura's Social Learning Theory

Certain assumptions and postulates of this theory (as outlined in Chapter II) were tested by studies reported in this chapter. The specific findings were related to particular postulates and propositions throughout the discussion of findings. This section will summarize the assumptions and postulates tested, and list the studies that lend support to or contradicted each.

Assumption I: Virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of another person's behavior and its consequences. This assumption

was not contradicted by any of the studies, and was only partially supported by findings of Hodge (1972), Jacobs (1971), Narotsky (1972) and Wolfe (1971). It was directly supported by findings of:

1. Gall, et al., 1972
2. Krumboltz and Goodwin, 1966
3. Lange, 1970
4. Millett, 1969
5. Resnick and Kiss, 1970
6. White, 1968
7. Wright, 1967

Postulate A - Innovative behavior, generalized behavioral orientations, and principles for generating novel combinations of responses can be transmitted to observers through exposure to modeled events. No studies directly contradicted this postulate, but it was only partially supported by findings of Haefele (1970), Hodge (1972), Jacobs (1971), Narotsky (1971), and Wolfe (1971). It was strongly supported by findings of:

1. Gall, et al., 1972
2. Krumboltz and Goodwin, 1966
3. Lange, 1970
4. Millett, 1969
5. Parrish, 1968

6. Resnick and Kiss, 1970
7. White, 1968
8. Wright, 1967

Postulate F - Greatest performance gains are attained by observers when desired behaviors are clearly specified by the model rather than inferred from a few examples. The studies which tested this postulate show mixed findings, although most of them supported it. Sweeney (1968) had findings which contradicted the need for a specific model. Young (1968) had findings which partially supported the postulate, and it was directly supported by findings of:

1. Birch, 1969
2. Gall, et al., 1972
3. McDonald and Allen, 1967
4. Werner, 1972

Assumption II: Postulate D - Discrimination training (cueing correct and incorrect responses of models) may greatly accelerate learning from models. This postulate was not contradicted by any study and was supported by findings of McDonald and Allen (1967) and Resnick and Kiss (1970).

Assumption III: Observational learning does not require performance for learning to take place, but depends on certain retentional processes to mediate cues provided by the model. This

assumption was not directly tested in any of the studies; however, three of its postulates were tested and supported.

A combination of postulates D and E were tested by Parrish (1968), and his findings tend to support the idea that modeled events are cognitively retained by the observer in a code of the observed sequence, and if such codes are provided in the modeling, a great deal of information can be remembered for later reproduction.

Postulate H - Symbolic rehearsal (vicarious practice) and motor rehearsal facilitate the observer's learning by providing opportunities for the observer to reorganize and code modeled events. The effectiveness of symbolic rehearsal was supported by findings of Wright (1967) and Parrish (1968).

Assumption IV: Observational learning alone is not sufficient to produce faultless performances. The performances were undoubtedly not faultless, but Millett (1969) and Lange (1970) did find that observation of a model without practice or feedback was sufficient to make significant changes in teacher performances. The above studies tend to contradict this assumption; however, studies by Birch (1969) and Bartholomew (1970) lend support to this assumption and its postulate A. They found that the addition of practice was a significant aid. Millett and Lange did not really try practice with their subjects to see whether it would help in teacher training.

Postulate E - The observer must rely on proprioceptive feedback and the verbal reports of onlookers in order to make adjustments in his responses in line with the modeled responses. Findings of Nichols (1971) and Peterson (1973) tend to contradict this postulate for audio and video feedback, but the findings of Bondi and Ober (1969) give it strong support for feedback from printed matrices and peer discussion.

Proposition 2: The combined use of modeling and reinforcement procedures is probably the most efficacious method of transmitting, eliciting, and maintaining social response patterns. The findings of Peterson (1973) and Bartholomew (1970) tend to contradict this proposition, but Bartholomew's study did not include any practice between the modeling and feedback sessions. Partial support of the proposition comes from the findings of:

1. Amidon, 1967
2. Bondi and Ober, 1969
3. Hough and Ober, 1966
4. Levin, 1973
5. Lohman, 1966
6. Raymond, 1972
7. Simon, 1966

Strong support of proposition 2 comes from the findings of:

1. Birch, 1969
2. Fitzgerald, 1971
3. Gall, et al., 1972
4. Resnick and Kiss, 1970
5. Werner, 1972
6. Wilde, 1972

Proposition 8: Response patterns tend to generalize to situations other than those in which they were learned. This was strongly supported by the findings of Lohman (1966). His follow-up of subjects who learned certain behaviors in a special course showed that they were still using most of them significantly more than a placebo group during student teaching. More follow-up studies of this type are needed.

VII. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter contains three major sections. The first provides a summary of the purpose of the study, the background that prompted it, and the procedures for locating and analyzing the 57 studies. The second section presents the major conclusions that resulted from the analysis of the studies, and the third section gives recommendations for further experimental work in teacher training.

Summary

The purpose of this study was to locate and analyze experimental studies of teacher training that tested elements of Bandura's social learning theory. The need for such a study was established on three main factors. First, the study of teaching and teacher training has grown greatly since 1963. Second, many researchers and reviewers have called for an analysis of the state of teacher training research in terms of some theoretical framework which would allow synthesis of the many seemingly contradictory findings. Third, many experimental studies and reviews of research confine themselves to single disciplines (e. g., social studies teaching) in developing their work, while overlooking the elements of teacher training research that cut across all disciplines.

Background

Between 1958 and 1963, there was a shift away from searching for the criteria for evaluating teacher effectiveness and toward analyzing the teaching act. The development of systematic observation schemes, along with the use of video and audio recorders, has made possible the analysis of specific aspects of teaching-learning situations.

The Handbook of Research on Teaching (Gage, 1963_a) gave great impetus to research on teaching by pointing out research needs, types of systematic observation, and desirable research designs. Since 1963, researchers have identified teaching behaviors through task analysis and the use of observation systems. They have gone on to try to help teachers learn to use those skills by providing models, practice, and feedback. Often, the training has been accomplished by using the microteaching pattern of providing modeling and practice in small groups and using videotape equipment to provide feedback.

The availability of observation systems with their specific behavioral descriptions led many teacher trainers to try to train prospective teachers to use some of those behaviors. In teacher training studies, observation systems have been used to provide the teacher with descriptions of desirable behaviors, give the teacher

a set of procedures that can be used to categorize and evaluate teaching behaviors, provide the teacher with feedback on his behavior, and give the trainer a criterion instrument that measures the same dimensions of teaching as the ones provided during the training. The observation system that has been most influential is Flanders' interaction analysis. This system, or ones based on it, have been used repeatedly to provide models for teaching and criterion instruments for evaluating teaching.

The theory that was most influential in the development of microteaching and guided much of the subsequent teacher training research was the social learning theory developed by Albert Bandura and his associates. According to Bandura (1969), one of the means by which new modes of behavior are acquired is through the influence of modeling and vicarious processes. The effectiveness of observational learning depends primarily upon the transformation and retention of verbal and imaginal codes during the observation of a model performance. The role of reinforcement is limited to motivating the observer to pay attention to the important modeling stimuli. In order for the theory to be useful in analyzing teacher training studies, three sources (Bandura, 1963, 1969, 1971) were examined, and statements were categorized into assumptions, postulates, and propositions.

Procedures

Locating the teacher training studies required four major searches, which were accomplished in the following ways:

1. A computer search of the Research in Education and Current Index to Journals in Education files was requested of the PROBE system at Indiana University. It included all of the studies since 1955 that involved research on teacher education. The computer listing of studies was examined and every title that appeared to be experimental was put on a 4" x 6" card, and its abstract located in the ERIC index for RIE. The journal articles listed were located in one of five libraries and copies were xeroxed.
2. A systematic search of 19 prominent educational journals was made for every issue (1963 through 1974). Copies were made of studies not found in the previous computer search.
3. Doctoral dissertations were located by a computer search of the Xerox University Microfilms files, utilizing their DATRIX II system. They provided a print-out of titles for teacher training studies completed during the years 1960 through 1973. The abstracts of each study were located

and copied from Dissertation Abstracts International. In addition, a personal cross-checking search of DAI was made of all volumes 1960 through 1974.

4. In order to find studies that might have been published only in books, the card catalogues of five college libraries were checked for books on teacher education, teacher training, and teacher behaviors. Each book was examined for experimental studies, and the bibliographies were checked for references to other sources. Studies which had not already been found through the other three searches were copied.

In each of these searches, the abstracts of the studies were examined and copies of each complete study was obtained if it met the following limitations:

1. the study had to be an experimental study of teacher training;
2. it had to use a treatment that included some modeling, practice, feedback, or a combination of them;
3. the training had to be directed toward some specific teaching behavior;
4. an observation system had to be used to collect information about the subjects' behavior;

5. inferential statistics had to be used in testing the hypotheses.

The RIE studies were obtained on microfiche from ERIC Document Reproduction Service of Bethesda, Maryland. Dissertations were obtained on microfilm from Xerox University Microfilms of Ann Arbor, Michigan. Studies in journals and books were photocopied at one of the five college libraries used in their location.

After all of the studies were located and copied, each was carefully read to determine whether it was a well-designed, true experimental study of teacher training that could be analyzed by using Bandura's theory. The final selection of studies was based on the above five limitations, plus three additional:

1. the subjects' teaching behaviors had to be observed in a regular classroom or a "micro" classroom setting with a small group of peers or children as the students;
2. the training procedures had to give enough detail so that the particular forms of modeling, practice, and feedback could be determined;
3. the treatments tested had to be more than a gross comparison of some poorly defined "experimental" treatment with no treatment or a "traditional" procedure.

For each study that did not meet the limitations, the following

were recorded on a Unisort Analysis card: year of the study, the source, and the major weaknesses that caused it to be eliminated from the analysis. These cards were sorted to find the number of studies by year, source, and weakness.

Fourteen different types of information were recorded on a Unisort card for each of the 56 analyzed studies, in order to sort for patterns within and relationships among them. These 14 types of information were: year of the study, source, theoretical orientation, modeling conditions, practice conditions, feedback conditions, length of treatment, behaviors, sample characteristics, statistical tests, design, criterion instruments, criterion setting, and weaknesses in design or procedures. All of this information, along with the bibliographic data, hypotheses, and specific findings, was initially recorded on a data sheet.

Comparison of treatments for each finding was accomplished by analyzing and recording on IBM cards which of 29 conditions were used in training the experimental group, versus which of 32 conditions were given to the comparison group. Each possible treatment condition was coded 1-29 for the experimental groups, and 31-59 for comparison groups, plus 30 for control, 60 for placebo, and 61 for pretest. The reader should refer to Table 3.1 and the preceding pages for a complete listing and definition of each condition.

After all of the studies had been analyzed and the IBM cards punched for each finding, a cross-tabulation analysis was made for 27 major treatments and 75 teaching behaviors. The SPSS program available at Southern Illinois University, Edwardsville, was used to cross-tabulate, and sort the cards into treatment groups and subgroups by behaviors. From the cross-tabulation and groups of cards, a two-dimensional matrix was prepared to show each type of treatment along the horizontal dimension and each teaching behavior along the vertical dimension (see Table 4.2). Submatrices were also prepared to illustrate the more specific comparisons of treatments and behaviors.

The individual findings in each cell of the matrices were examined for treatment and behavior replications, and for the support they could give to the assumptions, postulates, and propositions of Bandura's social learning theory.

Conclusions

The examination of 56 studies and analysis of 476 specific findings resulted in a large number of conclusions presented in Chapters IV, V, and VI. The conclusions fell into three main categories: characteristics of the teacher training studies, relationship to Bandura's theory, and training procedures. Many conclusions were

reached and discussed in the three previous chapters, and the major conclusions are presented here under the categories given above.

Characteristics of the Studies

No well-designed teacher training studies that tested elements of Bandura's theory could be found for the years prior to 1966. The number of well-designed studies peaked at 11 in 1971, dropped to five in 1973, and none could be found for 1974. The major effort for experimental studies on teacher training seems to have occurred in the period 1969-1973.

Only 56 of the 276 experimental studies found were of acceptable design. This number was gleaned from over 2,000 teacher education studies for the 1963-1974 period. The 220 experimental studies that were excluded had major weaknesses that resulted in their elimination from the analysis. The weaknesses were in three areas: (1) failure to have a clear and specific focus in the training procedures; failure to use criterion instruments sensitive to specific, observable teaching behaviors; and (3) poor design and statistical procedures.

The majority of the acceptable studies were doctoral dissertations (53.6%), and the remainder were from ERIC files with the exception of one study from a journal. A higher percentage of doctoral dissertations were of acceptable quality than studies from any other source. The percentage of acceptable studies from journals

(2.7%) and books (0.0%) makes them very poor sources for researchers to determine the state of the art in teacher training, and makes them questionable as sources for analyzing experiments in education. Five doctoral dissertations were later published in journals, but the details given were so sparse that if they had been the only source of data about those studies, they would not have been included in the final group that was analyzed. At times, doctoral dissertations have been criticized for their poor designs and lack of thoroughness, and there were some poor ones found in this search; however, the dissertations located for the present analysis showed greater strength of design and thoroughness than did the studies from any other source.

Almost half (45.6%) of the experimenters were explicit about the theoretical framework used in developing their treatment conditions, and another 20% implied their theoretical orientation by referring to modeling and feedback. Over 80% of the experimenters who gave any indication of their theory base relied on social learning theory. Only four studies were based explicitly on operant conditioning, and all of the studies tested some of the elements of Bandura's theory, regardless of their theoretical orientation.

All of the 56 studies used one of the three "true experimental designs," as defined by Campbell and Stanley (1963), or they used a multigroup extension of one of those designs. Forty-two of the

studies gave both a pretest and a posttest to their subjects, and the other 15 studies involved a posttest only. Analysis of variance was the most common statistical procedure, with 31 studies using ANOVA programs, and 15 studies using analysis of covariance procedures.

Only 20 of the studies blinded their observers concerning the treatment status of the subjects, and 11 studies had criterion observation periods of ten minutes or less. Far too many of the investigators were not careful in collecting their data on pretests and posttests. They allowed a large possibility of the interference of observer bias.

Relationship to Bandura's theory

Every study tested at least one assumption, postulate, or proposition of Bandura's theory, and many of the studies contained findings which related to several of the postulates. This section provides a listing of the assumptions and postulates tested, and the studies that supported or contradicted each.

Assumption I: Virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of another person's behavior and its consequences. This assumption was not contradicted by any of the studies and was directly supported by findings from the following studies:

- | | |
|-------------------------------|-----------------------------------|
| 1. Gall, <u>et al.</u> , 1971 | 3. Hamilton, 1973 |
| 2. Gall, <u>et al.</u> , 1972 | 4. Krumboltz and Goodwin,
1966 |

- | | |
|---------------------------------------|----------------------------|
| 5. Lange, 1970 | 10. Orme, 1970 |
| 6. Marazza, 1973 | 11. Resnick and Kiss, 1970 |
| 7. Meehan, 1970 | 12. Rogers and Davis, 1970 |
| 8. Millett, 1969 | 13. White, 1968 |
| 9. McDonald, Allen, and
Orme, 1967 | 14. Wright, 1967 |

Postulate A - Innovative behavior, generalized behavioral orientations, and principles for generating novel combinations of responses can be transmitted to observers through exposure to modeled events. This postulate was supported by findings from the following studies:

- | | |
|-----------------------------------|--------------------------------|
| 1. Gall, <u>et al.</u> , 1972 | 8. McDonald and Koran,
1969 |
| 2. Goodwin, 1971 | 9. Orme, 1970 |
| 3. Guffy, 1971 | 10. Parrish, 1968 |
| 4. Hamilton, 1973 | 11. Resnick and Kiss, 1970 |
| 5. Krumboltz and Goodwin,
1966 | 12. White, 1968 |
| 6. Lange, 1970 | 13. Wright, 1967 |
| 7. Millett, 1969 | |

Only partial support was provided by findings of Haefele (1970), Hodge (1972), Jacobs (1971), Narotsky (1971), and Wolfe (1971). Koran (1970) found that modeling alone was not sufficient to change the performance of observers.

Postulate F - Greatest performance gains are attained by observers when desired behaviors are clearly specified by the model rather than inferred from a few examples. The studies that tested this postulate showed mixed findings, although most of them supported it. Sweeney (1968) found that general examples were sufficient for subjects to make significant changes in their behavior, but Young (1968) had findings that gave only partial support to this postulate. However, 15 studies had findings that directly supported this postulate:

- | | |
|--------------------------------|-------------------------------------|
| 1. Allen, <u>et al.</u> , 1967 | 9. Konetski, 1970 |
| 2. Birch, 1969 | 10. McDonald and Allen, 1967 |
| 3. Claus, 1969 | 11. McDonald, Allen, and Orme, 1967 |
| 4. Cornell, 1969 | 12. McDonald and Koran, 1969 |
| 5. Douce, 1972 | 13. Orme, 1966 |
| 6. Gall, <u>et al.</u> , 1972 | 14. Orme, 1970 |
| 7. Goodwin, 1971 | 15. Werner, 1972 |
| 8. Hamilton, 1973 | |

Assumption II: Observational learning requires that the observer attend closely to cues, select relevant events, and accurately perceive cues provided by the model's responses. This assumption was not directly tested in any of the studies, but two of its postulates were supported by several studies.

Postulate D - Discrimination training (cueing correct and incorrect responses of models) may greatly accelerate learning from models. This was not contradicted by any of the studies and was directly supported by findings from the following studies:

1. Hamilton, 1973
2. Morse, 1970
3. McDonald and Allen, 1967
4. Orme, 1966
5. Orme, 1970
6. Resnick and Kiss, 1970

Postulate E - The behavior of powerful models (and supervisors) will be attended to because their behavior is likely to have high utilitarian value. This would include persons who are recognized experts or those who have a high socio-economic standing. This postulate was not contradicted and was directly supported by findings of Hamilton (1973) and Morse (1970).

Assumption III: Observational learning does not require performance for learning to take place, but depends on certain retentional processes to mediate the cues provided by the model. This assumption was not directly tested in any of the studies; however, three of its postulates were tested.

A combination of postulates D and E were tested by Ward (1970) and Parrish (1968). Ward's findings contradict the idea that observers will classify modeled events into a code and thereby better learn the modeled behavior. Parrish's findings do support these postulates.

Postulate H - Symbolic rehearsal (vicarious practice) and motor rehearsal facilitate the observer's learning by providing opportunities for the observer to reorganize and code modeled events. The effectiveness of symbolic rehearsal was supported for interaction behaviors by findings of Wright (1967) and Parrish (1968), but it was not supported for learning questioning behaviors according to findings of Goodwin (1971), Hamilton (1973), and Ward (1970). However, the effectiveness of motor rehearsal was supported for questioning behaviors by findings from the following studies:

1. Birch, 1969
2. Hamilton, 1973
3. Johnson, 1972
4. Koran, 1970
5. McDonald and Koran, 1969
6. Orme, 1970

Assumption IV: Observational learning alone is not sufficient to produce faultless performances. The performances were undoubtedly not faultless, but Miller (1969) and Lange (1970) did find that observation of a model without practice or feedback was sufficient to help subjects change their performances. However, Birch (1969) and Bartholomew (1970) lend support to the assumption that observation is not sufficient.

Postulate A - The observer must be provided with opportunities for practice conditions which produce rewarding consequences. This was only weakly contradicted by some findings of Friebe and

Kallenbach (1969), Hamilton (1973), and Schmalz (1972). It was given strong support by findings of:

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|----------------------|-----------------------------|
| 1. Bartholomew, 1970 | 5. Koran, 1970 |
| 2. Birch, 1969 | 6. McDonald and Koran, 1969 |
| 3. Hamilton, 1973 | 7. Orme, 1970 |
| 4. Johnson, 1972 | |

Postulate B - Performance of previously acquired responses depends greatly upon the nature of reinforcing consequences to the model and observer. This postulate was not contradicted, but was directly supported by the findings of Morse (1970).

Postulate E - The observer must rely on proprioceptive feedback and the verbal reports of onlookers in order to make adjustments in his responses in line with the modeled responses. Two findings by Ward (1970) tended to support the necessity of feedback, and Bondi and Ober (1969) gave strong support for feedback from printed matrices and peer discussion. However, findings from the following studies contradict this postulate:

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|------------------|-------------------|
| 1. Cosman, 1973 | 3. Peterson, 1973 |
| 2. Nichols, 1971 | 4. Ward, 1970 |

Proposition 2: The combined use of modeling and reinforcement procedures is probably the most efficacious method of transmitting, eliciting, and maintaining social response patterns. This

proposition was partially contradicted by findings of:

- | | |
|----------------------|-------------------|
| 1. Bartholomew, 1970 | 3. Peterson, 1973 |
| 2. Cosman, 1973 | 4. Ward, 1970 |

However, the proposition was supported by findings of:

- | | |
|-------------------------------|------------------------------|
| 1. Amidon, 1967 | 13. Lohman, 1966 |
| 2. Birch, 1969 | 14. McDonald and Koran, 1969 |
| 3. Bondi and Ober, 1969 | 15. Orme, 1966 |
| 4. Fitzgerald, 1971 | 16. Orme, 1970 |
| 5. Gall, <u>et al.</u> , 1971 | 17. Raymond, 1972 |
| 6. Gall, <u>et al.</u> , 1972 | 18. Resnick and Kiss, 1970 |
| 7. Guffy, 1971 | 19. Rogers and Davis, 1970 |
| 8. Hamilton, 1973 | 20. Simon, 1966 |
| 9. Hough and Ober, 1966 | 21. Ward, 1970 |
| 10. Konetski, 1970 | 22. Werner, 1972 |
| 11. Koran, 1970 | 23. Wilde, 1972 |
| 12. Levin, 1973 | |

Proposition 4: Regression is most likely to occur if inappropriate responses have received prolonged intermittent reinforcement. This may be supported by some of the findings of Ward (1970).

Proposition 8: Response patterns tend to generalize to situations other than those in which they were learned. This was supported by findings of Allen, et al. (1967), Guffy (1971), and Lohman (1966).

Lohman's study gave particularly strong support because he followed up on a group of subjects during their student teaching and found that they were still using skills learned four to six months earlier.

All of the assumptions, postulates, and propositions that were tested, received support from the studies, and the contradicting findings were generally small in number and strength. Bandura's theory was found to be very useful for examining the findings of teacher training studies that involved some form of modeling in their protocols. Findings of no significant difference were often explainable in terms of this theory, and therefore, such findings didn't seem to be a waste of resources, but they actually helped contribute to knowledge about teacher training.

Training Procedures

Every study used some form of modeling for at least one of the experimental groups and most of the studies also included practice and feedback. Many of the treatments tried were significantly effective for some measures of desired teacher behavior, but not effective for others. Therefore, the conclusions are presented with respect to particular clusters of teaching behaviors.

Modeling: The majority of findings showed that modeling, in general, was effective in teaching questioning skills, for increasing a few indirect behaviors, and for decreasing almost all direct

behaviors. The major conclusions were reached from analyzing 386 findings:

1. Conclusions concerning modeling treatments for questioning behaviors:
 - a. Written modeling that was cued and followed by microteaching practice was more effective than no treatment or microteaching practice alone.
 - b. Written and verbal modeling which was cued and followed by practice was more effective than no treatment or a placebo treatment.
 - c. Uncued written or written and audio modeling was not more effective than no treatment or placebos, even when microteaching practice and feedback was provided.
 - d. Uncued video modeling was not more effective than no treatment, even when microteaching practice was provided to the experimental group.
 - e. Cued video modeling with microteaching practice and feedback was more effective than no treatment or uncued video modeling.
 - f. Cued video and written modeling with microteaching practice was more effective than no treatment, ten

weeks of student teaching, microteaching alone, or microteaching with feedback.

g. There were mixed results whenever:

- (1) cued video modeling was compared with cued written modeling;
- (2) cued video and written modeling was compared with cued written modeling;
- (3) cued video and written modeling was compared with uncued video and written modeling.

h. Cued video, written and live modeling without any practice was more effective than no treatment or microteaching practice alone. The modeling was very specific and recurred several times with the cueing provided by a supervisor.

i. If cued written and verbal modeling was provided along with practice, certain content variations in the modeling made no significant difference in the HOQ of subjects.

- (1) The addition of the study of Bloom's taxonomy was not effective.
- (2) It made no difference whether cognitive levels or affective levels of questioning were modeled.

(3) It made no difference whether Flanders' categories or general categories of teaching behavior were modeled.

j. Any of the media for modeling were effective if the models were very specific, cueing was provided by a supervisor, and microteaching or classroom practice was included.

2. Conclusions concerning modeling treatments for interaction behaviors:

- a. Cued written modeling with practice and video feedback was more effective than no treatment for Student Talk, but not more effective than uncued written modeling for Positive Reinforcement.
- b. Cued written and verbal modeling with practice and supervisor feedback was more effective than practice and supervisor feedback for I/D Ratio and Indirect Influence.
- c. Written and audio modeling without practice or feedback was only partially more effective than no treatment on I/D Ratio. The same was true of written, verbal, and audio modeling, and there was no significant difference between the two combinations.

- d. Cued written, verbal, and live modeling, along with practice and feedback, was more effective than a placebo treatment on the following behavior measures:
- (1) Praise Actions and Behaviors
 - (2) Accepts and Uses Student Ideas
 - (3) Extended Indirect Influence
 - (4) Lectures
 - (5) Gives Directions
 - (6) Criticizes or Justifies Authority
 - (7) I/D Ratio
 - (8) Student Talk, Response
 - (9) Student Talk, Initiation
- e. Live modeling alone was more effective than a placebo treatment for Translation Strategies, but not more effective than video modeling.
- f. Video modeling was not more effective than no treatment except for I/D Ratio, Translation Strategies, Total Visual Highlighting, and Total Verbal Highlighting.
- g. Cued video and written modeling with practice and feedback was more effective than no treatment for Praise Actions and Behaviors, Criticism, and Student

Talk, but not more effective than cued written modeling.

- h. Video and live modeling combined was more effective than a placebo, video modeling, or live modeling for Translation Strategies. With practice and peer feedback it was more effective than a placebo for using Hands and Smiling Toward Students.
- i. Cued video and verbal modeling with practice and feedback was more effective than just practice and feedback for changing Testing Behaviors.
- j. Cued video, written, and verbal modeling with practice and feedback was more effective than no treatment, placebo treatment, and just practice and feedback for the following behaviors:
 - (1) Accepts Feelings
 - (2) Accepts and Uses Student Ideas
 - (3) Extended Indirect Influence
 - (4) Reinforcing Behavior Index
 - (5) Lectures
 - (6) Direct Influence
 - (7) I/D Ratio

- k. Cued video, written, verbal, and live modeling with practice was more effective than no treatment or a placebo treatment for most indirect and direct behaviors, except Asks Questions and Silence and Confusion.

The very complete forms of modeling when combined with practice (in any form) and feedback (in any form) seem to be effective in changing teacher interaction behaviors across most of the measures tried (see Tables 6.3 and 6.4). The following measures consistently were tested by several studies and shown to be subject to training by model observation:

1. Praise Actions and Behaviors
2. Accepts and Uses Student Ideas
3. Extended Indirect Influence
4. Lectures
5. Gives Directions
6. Criticizes or Justifies Authority
7. Extended Direct Influence
8. I/D Ratio
9. i/d ratio
10. Student Talk, Initiation

There were seven behaviors that showed no consistent pattern of responding to modeling and should probably be tested further:

1. Accepts Feelings
2. Total Teacher Talk
3. T/S Ratio
4. % Indirect Teacher Response
5. Student Talk Response
6. Total Student Talk
7. Extended Student Talk

There were two behaviors that did not seem to respond to any treatments, and thus showed very little promise for change through modeling:

1. Asks Questions (types of questions could be changed, but the number was consistent)
2. Silence and Confusion

Practice: The majority of the findings showed that when specific modeling and feedback are provided, the form of practice is not significant. However, practice (microteaching or classroom) appears to be necessary in training for most questioning skills.

1. When cued modeling is provided, the addition of microteaching practice is not more effective than the cued modeling alone in increasing HOQ skill, probing or student talk,

or in decreasing teacher talk.

2. Microteaching practice and video feedback without modeling was less effective than no treatment.
3. When modeling was cued by a supervisor, the addition of microteaching practice was more effective in improving probing than modeling cued by a transcript with no microteaching. The combination of supervisor cueing and microteaching practice seemed to be necessary for significant effects.
4. Vicarious practice in the form of coding the teaching behavior of other teachers was not a significant addition to cued modeling. In fact, it seemed to be a significant detractor to otherwise effective treatments.
5. Distributed practice was not more effective than massed practice when linked with effective cued modeling.
6. Teaching the same lesson as the model during practice sessions was not more effective than the subjects teaching their own lesson during practice.

Feedback: Most of the findings showed that when cued modeling and practice were provided, feedback made no significant difference in training teachers to modify their interaction behaviors, and the form of feedback was not significant in training for questioning

behaviors, as long as some feedback was provided.

1. Conclusions concerning feedback treatments for questioning behaviors:

- a. When cued modeling and practice were provided, peer feedback was not more effective than no feedback.
- b. When cued modeling and practice were provided, self-cued audio feedback was not clearly more effective than no feedback or uncued audio feedback. However, when the audio feedback was cued by a supervisor, it was more effective than no feedback and uncued audio feedback.
- c. With cued modeling and practice, video feedback was not more effective than no feedback or audio feedback. Even when the video feedback was cued by a supervisor, it was not clearly more effective than audio or video feedback alone.

2. Conclusions concerning feedback treatments for interaction behaviors:

- a. When cued written and verbal instructions about Flanders' categories were provided along with practice, then feedback in the form of interaction matrices and peer discussion of teaching was more effective

than the same modeling and practice without feedback.

This was true across all measures except Answers Questions and T/S Ratio.

- b. Written and supervisor feedback was not more effective than subjects receiving written or audio feedback alone.
- c. Audio or audio and supervisor feedback was not more effective than no feedback when cued audio modeling and practice preceded the feedback.
- d. Cued video feedback was not more effective than cued audio feedback, but was more effective than uncued video feedback on six of fifteen nonverbal measures.
- e. Uncued video feedback was not more effective than cued written feedback in the form of an interaction matrix, and for three behaviors it was significantly less effective.
- f. Cued video and written (matrix) feedback was not more effective than cued written (matrix) feedback, except for possible helping reduce three direct teaching behaviors: Gives Directions, Criticizes or Justifies Authority, and Corrective Feedback.

- g. Video feedback cued by a supervisor was not more effective than no feedback or uncued video feedback.

It appears that the most effective feedback might be to provide teachers with an interaction analysis matrix and let them interpret it for themselves. This only works if they have first had very specific instructions on the categories and how the matrix can be used to interpret teaching, along with several practice sessions. These findings indicate that a lot of expensive equipment and supervisory time are not necessary to train teachers. The money and time should be spent on providing very specific models and instructions and making sure that practice is provided along with audiotaping so that teachers can code their own behaviors.

Probably the most effective combination for training teachers to develop questioning skills and other interaction behaviors would be to provide a very specific model of the behaviors, have a supervisor cue the salient features of the model's behavior, provide cycled microteaching practice, and perceptual feedback with a supervisor reinforcing the appropriate behaviors. The supervisor may not need to be present at feedback sessions, especially if the subject is provided with a matrix or other printed description of his performance.

In most studies that were successful in raising the teacher's level of questioning or in getting teachers to use more indirect

behaviors, the students of those teachers talked more in response to the questions and initiated more student talk. This supports the hypothesis that changes in selected teacher behaviors result in related changes in student behaviors.

Recommendations

The studies analyzed showed a lot of promising protocols for teacher training. The findings were not nearly as negative as most reviewer's report, but this was probably due to careful selection of the studies and subsequent analysis in terms of a theoretical framework. However, there are a number of improvements that need to be made in most experiments, and many questions remain to be investigated, especially with reference to Bandura's theory.

1. Every study of teacher training should be based on an explicit theoretical framework, such as Bandura's social learning theory. The investigators need to make the theory base clear in their reports.
2. Treatment periods in many of the experiments needed to be longer. Often the investigators attempted to train teachers to use complex skills with less than 10 hours of total treatment. This factor may have contributed to

several of the findings of no significant difference between groups.

3. Criterion tests should be done by observing subjects' teaching behavior in actual classroom situations. Many investigators only checked the subjects' use of skills in microteaching settings. This may show that a skill has been learned and can be performed, but does not determine if the skills will be used under regular classroom pressures. There are five more improvements that most investigators need to make with reference to criterion testing:

- a. Too many investigators fail to check student behavior or achievement measures. Knowledge of relationships between teacher behaviors and student behaviors would be important for the improvement of instruction.
- b. Many investigators don't blind the observers to the treatment status of subjects, and this allows a high probability of observer bias.
- c. The content should be controlled on pretests and posttests for a more valid comparison of groups.
- d. Observation of subjects should be for longer than ten minutes and distributed over several days. Too many

studies involved one observation of less than 10 minutes.

- e. More information is needed concerning aptitude and treatment interactions, so that more individual prescription of protocols can be determined from training studies.
4. More investigators should follow their subjects after a few months or a year to determine whether there is any retention of skill. Periodic modeling and reinforcement over several months or years has yet to be tried.
5. When analysis of variance or analysis of covariance is the statistical test, it should be followed by a multiple comparison test when significant F-ratios are obtained. A few investigators did not report their follow-up tests or did not use any.
6. Several treatments need more testing. An examination of Table 4.2 reveals some of the following needs:
 - a. Cued written and audio modeling with practice has not been tested and if it should prove effective for some behaviors, it would be a much less expensive treatment than video and written modeling.
 - b. Further comparison of cued written modeling with

video and audio modeling. Several studies found that a cued written model is very effective for some questioning and interaction behaviors.

- c. Video modeling needs to be tested in combination with other forms of modeling, such as, verbal and live modeling.
 - d. The form of practice seems to make very little difference, and the same is true of feedback except for the fact that written matrices seem to be effective for interaction behaviors. Perhaps less attention should be given to practice and feedback variations and more research effort put into testing modeling variations more thoroughly.
7. Certain behaviors were learned by teachers through several forms of modeling, while other behaviors were not learned by most methods tried. More modeling variations should be tried for the following behaviors or measures:
- a. Accepts Feelings
 - b. Refocus Questions and Redirect Questions
 - c. Questioning Strategies
 - d. Positive Motivation
 - e. Positive Reinforcement

- f. Reducing Total Teacher Talk
 - g. Teacher/Student Talk Ratio
8. Even though every study analyzed tested at least one assumption or proposition of Bandura's theory, there were several that raised questions that still need to be answered.
- a. Postulate C of assumption I - Does matching of responses and learning whole behavioral repertoires occur in identical ways?
 - b. Postulate D of assumption I - How do models best transmit the organization of response elements for desired behavior patterns? Would modeling be more effective if it showed the model being reinforced for performing the desired skill? Would it help if students in the model displayed enthusiasm and interest whenever the desired skill was used by the model teacher?
 - c. Postulate J of assumption I - Would it be best if models demonstrated small subunits of complex behaviors rather than showing their interactions in one display? Would the sequence of presentation make any difference?

- d. Postulate A of assumption II - What physical and social characteristics of models are desirable for demonstrations of teaching behaviors? How do subjects perceive the functional value of the modeled events?
- e. Postulate C of assumption II - How can the teacher trainer best help subjects accurately discriminate stimuli provided by the model?
- f. Postulates D and E of assumption III - What are the best ways to code teaching events so that subjects can retain the essential elements of the behaviors for later reproduction?
- g. Postulate H of assumption III - According to the findings, symbolic rehearsal was effective for some interaction behaviors and not effective for questioning behaviors. More information is needed concerning what types of symbolic rehearsal is effective and for which behaviors.
- h. Postulate B of assumption IV - What types of reinforcing consequences are best to present to the model and what types are best to provide for the observer?
- i. Postulate E of assumption IV - It is still unclear what

forms of feedback are necessary or whether any is needed if the modeling and practice are specific.

- j. Proposition 1 - What reinforcement contingencies should be introduced into teacher training and public schools that would favor the acceptance and adoption of new behavioral patterns? How can supervisors protect teachers from maltreatment if they do try new patterns of teaching?
 - k. Proposition 4 - How can reinforcement for desired behaviors be maintained at a high level and over a long period?
 - l. Proposition 7 - How can a team of supervisors and peers be organized to intermittently and appropriately reinforce teachers?
 - m. Proposition 8 - Many more studies need to do follow-up on their subjects to see whether they do use acquired behaviors in other classroom situations.
 - n. Proposition 9 - What schedule of reinforcement is appropriate and effective for each teaching behavior?
9. More studies designed to help teachers learn interaction behaviors should focus on one or two behaviors rather than on whole clusters, as was done in many of the analyzed

studies. Those studies that trained teachers for one behavior and compared two or three groups had results that more consistently were significant.

10. Investigators and reviewers should examine studies outside of their academic disciplines, in order to discover parallel work in other fields.
11. Investigators should submit and editors accept, studies with greater detail so that the best studies can be evaluated by a larger number of people involved in teacher education. Important details of design and procedure should not be omitted from journal reports. It might be better to have fewer studies reported and do a more thorough job of selection.

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