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A FIELD EXPERIMENT IN BRAZIL

DISSERTATION

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

by

Maria das Gracas Furtado Feldens, B.A., M.A.

* * * *

The Ohio State University 1976

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ACKNOWLEDGMENTS

The completion of a doctoral program may have different meanings for different persons. But there is at least one general commonality: anyone who has completed a doctoral program is fully aware that many people have contributed to its development and completion.

I wish to express deep appreciation to Dr. James K. Duncan who served as my major adviser. As a teacher, he has set an outstanding example of the quality teacher I hope to become in my country. As an adviser, his guidance, encouragement, and friendly way of always being available were crucial and more than vital to the development of this dissertation.

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

The world is changing more and more. The transformations taking place nowadays occur in different fields and places. These changes affect the structure, process, and organization of education everywhere. Therefore, there is a need to continuously innovate in the training of teachers in order to help them cope with the evolution and revolution of our times and today's schools.

Schaaf says that

we must accept the idea that a college education program does not completely prepare a teacher for effective training. Rather it represents an organized effort to prepare a prospective teacher to begin teaching (136).

Teacher education is increasingly viewed as a continuous on-going process, involving pre-service as well as in-service training.

The whole range of new ideas, issues, and trends in the educational field brought about by the pronounced and varied changes in the world produces new insights into the teaching-learning process, the instructional nature of the classroom, the need for access to new instructional materials, and the importance of new techniques for teaching and learning. These new insights are challenging teachers to continue their professional education at a speed which has never
happened before. Teachers cannot depend on information and knowledge received during professional preparation; they need to be involved in in-service training programs if they are to meet current demands.

Much in-service training in education has been primarily concerned with changing "things" that might improve learning outcomes. It may be that getting a better understanding of the behavior of the people in the classroom and helping them change that behavior is more important to the improvement of education. The means for describing and analyzing classroom instructional behavior are now available.

One of these means is through systematic observation of classrooms. Utilizing direct observations of teacher and student behaviors in the classroom setting, various interactions occurring during the instructional process can be described. Such descriptions of the instructional situation in the classroom result in a more objective, refined, and quantified description of instructional processes and procedures. The data gathered by such systematic observation may serve the following purposes:

(1) researching classroom behavior
(2) increasing teacher awareness
(3) encouraging teacher self-improvement
(4) recording changes in teacher behavior
(5) evaluating training

Medley and Mitzel remind us that "it is impossible to record everything that occurs in the classroom, even with many sound, motion picture cameras" (114). It is very important and necessary for an
investigator to decide what aspects of classroom behavior he/she wishes to observe and concentrate on. The choice is the investigator's.

Flanders has stated that "the chances are better than sixty percent that you will hear someone talking if you are in an elementary or secondary classroom" (45). Verbal behavior constitutes a very clear and significant activity in most classrooms during the instructional process. Perhaps as a result there has been extensive research on instructional verbal behavior. The assumption is made that awareness of instructional verbal behavior may ultimately lead to desire for improvement of instructional behavior on the part of the teacher. If this is the case it seems that information and understanding of behavior as described by observational systems may serve to help teachers understand the impact of their behavior on the instructional process. The awareness of teaching behavior and the knowledge of the influences it might have on students may well put teachers in a better position to guide student learning.

In using observational systems there should be no intent on the part of the outside observer to evaluate teacher behavior, but instead the intent should be to describe and analyze what is going on in the classroom. Such information is then presented to the teacher for his/her own self-evaluation and possible improvement. Such self-evaluation of teachers may occur in different circumstances and varied ways. For example, one way of using data gathered through the use of observational systems in helping teachers analyze their own classroom instructional behavior is by providing feedback data in a conference with a resource person, supervisor, and/or peer on their taped
and/or coded lesson. Such feedback is presumed to be effective if it is non-judgmental, leaving the teacher free to analyze, interpret his own behavior, and justify his own decisions about the effectiveness of such behavior.

Medley says that

An observational record is objective and therefore more easily accepted by the teacher than either the opinion of or a rating by a supervisor. It is usually more precise and detailed as well. And, finally, it tends to be fairer, or more comprehensive, than a subjective judgment (112:35).

Another way of using data collected from observational systems for analyzing and improving teacher verbal behavior is the use of the goal setting approach. In such circumstances, teachers establish objectives for their instructional behavior, based on what they are presently doing in the classroom and the kind of changes they want to make in their teaching behavior during the instructional process. Such a goal setting approach should also occur in a way that preserves the instructional autonomy of the teachers. After the teacher teaches the lesson, the data collected from observational system serves as a control measure for comparison between his goals and the lesson.

Many observational systems have been developed in English for use in observing instructional situations (139, 140). The observational system used in this investigation was the Observational System for Instructional Analysis (OSIA). The OSIA was deemed the most appropriate instrument for this investigation, largely as a result of the relationships between the investigator, the purposes of the investigation and the characteristics of the system. The reasons for the choice can be summarized as follows:
1. Basically, it is a system for studying classroom interaction in the instructional process;

2. It describes primarily verbal instructional behavior and it is reciprocal in nature, (i.e., teacher and student behavior are coded in comparable categories);

3. The data so gathered from the coding and tallying, using this system, can be interpreted in terms of instructional strategies and a variety of other indices that help in describing the nature of instructional process the teacher is engaged in;

4. The investigator is skilled in coding live classroom behavior and in interpreting the matrix data and the strategies, ratios and indices produced by the data.

In this investigation the techniques of systematic observation and the general principles and procedures for their use were applied in a field experiment in the in-service training of teachers in Brazil.

The setting of the investigation is an important part of the background of the problem.

**Background of the Problem**

As a result of the Educational Reform of First and Second Level Education Schools, contained in Law 5.692/71, changes are still occurring in the Brazilian Educational System both in structure, principles, and philosophy of education and in curriculum and organization. The implementation of educational reform is happening gradually in the public and private school systems of the country.

In attempting to reach the objectives and goals of the new educational structure and philosophy, it seems that one of the most important aspects to be considered is that of human resources. Human resources are represented by staff and qualified technical and
administrative personnel employed for the execution of the various and complex tasks that the implementation of the new concepts and ideas require.

During the initial phases of the implementation of the educational reform in Brazil, recommendations included attention to the following aspects:

- Improvement in the preparation of teachers and technical and administrative personnel, without which the new ideas of curriculum cannot become a reality;

- Reformulation of specific training courses and in-service continuing teacher education to adjust them to the new educational philosophy and policies;

- A program must be created to prepare "polyvalent" teachers, giving to those teachers a preparation adjusted to the First and Second Level Education Schools, and the new conceptualization of curriculum, according to Law 5.692/71, the "Parecer" 853/71, and others.

Based on these concerns, the program "Metas e Bases para a Acao do Governo" (Goals and Basis for the Governmental Action) of 1970 named ten important items, among which is a clearly defined need for and emphasis on the "intensive training of teachers" (118:146).

"Mutatas Mutandis" is what should be the matter of concern whenever the aspect of human resources in the Brazilian Educational System is being described. Failure to develop human resource is one of the most serious obstacles that has been faced by programs of instructional innovation and expansion in Brazil. The innovative efforts should involve aspects of quality and quantity from the training philosophy, recruitment, and conservation of staff, to the search and distribution of necessary
funds for the realization of the educational plans.

The solution for the whole national educational situation requires the complete mobilization of everyone working in the field. That way, the Reform of First and Second Level Education Schools might do much to help in the transformation of the educational climate.

The Secretarias de Educacao, acting in accord with the new educational philosophy and having created the Departamentos de Ensino de Primeiro e Segundo Graus, are now able to promote the necessary conditions for disseminating knowledge about educational principles to and among teachers, student teachers, administrators, and others, helping the efforts of the MEC (Ministerio de Educacao e Cultura-Ministry of Education and Culture).

For a number of reasons, such as size, socio-cultural, natural characteristics, the State of Espirito Santo, Brazil, has been chosen by educational authorities as a State in which to pilot one of the priority programs of the MEC. Such program is called PREMEN (Programa de Expansao e Melhoria do Ensino) and it implemented thirty four polyvalent schools and a "comprehensive" school in the State of Espirito Santo.

A relatively large number of studies and research efforts have been done by educators, specialists, administrators, and committees to define the position of the State of Espirito Santo educational system in face of the new and present situation. In defining the hierarchic priorities of consideration concerning the programs for implementation of Law 5.692/71 in Espirito Santo, these are among the goals suggested for action:
1. definition of the needs for expansion of human, technical, and financial resources;

2. training, development, and actualization of human resources for the implementation of educational reform:
   a. recycling of teachers for the "polyvalent" schools and other educational institutions in the system;
   b. training of the technical and administrative personnel for the "polyvalent" schools;
   c. in-service training of teachers;
   d. modification of the education, preparation, and general training of school personnel (26).

The need to stimulate and elevate the education of teachers in Brazil, and in the State of Espirito Santo specifically, is well documented by Ceotto (26), Chagas (24), and others (30, 118).

All of the above considerations stimulated and guided the definition of the purposes for this investigation of the creative use of an instructional observational system within an in-service context in Brazil.

Statement of the Problem

This investigation was designed around an experimental study intended to explore whether (1) in-service training, (2) in-service training accompanied by feedback, (3) in-service training accompanied by goal setting, and (4) in-service training accompanied by feedback plus goal setting would be effective in promoting changes in instructional behaviors of teachers who themselves were to decide the nature of the changes they would make. The heart of the investigation was its experimental part. It was designed in order to investigate the self-determined changes, if any, in the classroom instructional behavior of a
sample of polyvalent Brazilian in-service teachers under the four treatment conditions listed above.

Providing teachers with the information collected about their behavior during the instruction in classroom is often referred to as giving feedback. This feedback can provide teachers with valid information about their instructional behavior and, thus, it can serve as a valuable source of information that teachers may use to analyze and think about their classroom teaching, ultimately becoming more aware of its processes and characteristics.

This awareness of instructional behavior and the influence it might have on the instructional characteristics in the classroom and, consequently, on the students' instructional outcomes, may lead teachers to be willing to change their verbal instructional behavior or some aspects of it. Based on what they know in terms of verbal behavior and the instructional characteristics of the classroom, teachers may decide to analyze the existing situation and make a plan for action. That plan for action is often referred to as goal setting and serves as a valuable guide for teacher change and/or adaptation of daily instructional behavior.

The concepts and ideas of teaching-self and self-improvement of teaching have only recently become a matter of serious study and attention. Very little is found in the literature that describes the effects and consequences of self-improvement actions taken by teacher. The works of Rubin (134) and Curwin and Fuhrman (38) were found to suggest ideas that were very closely related to the ideas underlying the
characteristics of the processes used in the treatments given to the teachers participating in this investigation. Self-knowledge and self-improvement were the major aspects underlying the nature of the treatments given to the teachers participating in this investigation.

Maslow says that

"When a person understands himself, he will understand his basic needs and true motivation and will learn to behave in a manner which will satisfy those needs. Self-understanding will also enable one to understand and relate to other people more effectively (40:xviii)."

This investigation was not conducted only to serve the purposes of research. It also involved developing, implementing and generally evaluating a plan of action for improving instruction through the processes and procedures employed during the experiment.

The investigation as a whole involved much more than conducting an experiment in in-service training, feedback, and goal setting. So far as it is known to the investigator this is the first investigation of its kind conducted in Brazil and using techniques and materials developed in the United States.

The preparation phase of the investigation involved the adaptation and translation into Portuguese of the Observational System for Instructional Analysis (OSIA) and the Minnesota Teacher Attitude Inventory (MTAI). Special materials were developed in Portuguese for training research observers in OSIA. Materials were developed for the in-service training of the teachers participating in the experiment. A questionnaire soliciting teachers' reactions to the investigation
was developed to gather data on their perceptions of the experience. The in-service training program was designed and implemented by the investigator and the training was followed by the treatments for the experimental treatment groups.

The hoped for outcomes went beyond concerns for the results of the experiment and included concern for the feasibility of using the OSIA and the MTAI in Brazilian settings, a concern for data descriptive of the instructional characteristics of twenty polyvalent Brazilian classrooms, and a concern for teacher reaction to in-service training and research.

The general objectives for this investigation were the following:

1. To analyze needed changes and/or modifications in the instruments used in the investigation to make them into valuable tools to be used by and/or with Brazilian teachers;

2. To gather valid and reliable sample data about the instructional process and interactional climate in the classroom of Brazilian teachers;

3. To help teachers analyze the instructional characteristics in their classroom;

4. To help teachers analyze their own teaching and instructional behavior and expand their teaching styles;

5. To gather knowledge and information about the nature of changes resultant from the training in OSIA on the instructional behavior of in-service teachers in Brazil;

6. To analyze the effects of the conference feedback, goal setting and feedback plus goal setting on the instructional behavior of in-service teachers trained in OSIA;

7. To gather information about possible changes on teachers' perception and acceptance of children, as measured by the Minnesota Teacher Attitude Inventory (MTAI), resultant from the training in OSIA, feedback conferences, and/or goal setting.
Definition of Terms

A primitive definition of three terms used in this report of the investigation are presented in this section. No operational definitions are reported herein; they appear in the body of the text.

Polyvalent School - a school for 5th, 6th, 7th and 8th grade levels, belonging to the First Level Education School organization according to the structure of the Educational System in Brazil.

First Level Education - the first step in the structure of the Educational System in Brazil. It is similar to the American organization of first to eight grades.

OSIA Instructional Behaviors - category behaviors defined and described in the Observational System for Instructional Analysis (OSIA), an observational system developed by Hough and Duncan.

Assumptions

These were the assumptions underlying this investigation:

1. Teachers can identify and define the nature and direction of changes needed in their instructional behaviors in the classroom.

2. Teachers can identify and analyze their own problems and participate in achieving solutions when the in-service education activities are carried on within the setting in which they normally work.

3. Conditions for teacher awareness of instructional behaviors and their effects on the students' achievement and on the instructional characteristics of the classroom are enhanced when teachers are involved in the initiation and organization of training activities.

4. Change in instructional behavior in the classroom is facilitated by a direct confrontation with the outcomes of such behaviors through feedback information from systematic observations in the classroom.

5. The discrepancy between teachers' intentions of changing instructional behaviors and the records of systematic observation in the classroom can be decreased by allowing or asking teachers to compare their intentions with the actual lesson.

6. The improvement of in-service education programs can be increased through the use of approaches involving self-knowledge, self-development and the provision of individual autonomy for teachers to satisfy their own needs.

7. The Observational System for Instructional Analysis (OSIA) provides reliable and valid information about instructional behavior of a kind that practicing teachers find useful.
Limitations and Delimitations

These were some of the limitations and delimitations of this investigation:

1. The category system used in the investigation is descriptive of the instructional behaviors occurring in the classroom; it is not intended to suggest an ideal nor be used prescriptively.

2. The teachers were not controlled on such variables as sex, age, discipline major, numbers of years of teaching experience; the group of teachers was heterogeneous.

3. The presence of the observers might have influenced the teachers' and students' behaviors in the classroom.

4. The investigation did not control for the "Hawthorne" effect upon the participating teachers.

5. The sample size delimited the generalizations of the results of this investigation.

6. The effects of the investigation were limited to teachers in only one polyvalent school in Brazil.

Importance of Investigation

Observational systems of instructional analysis in classrooms have been identified as one of the promising innovations in teacher education. The conceptual link between teacher training in instructional analysis (by the use of observational systems) and change in teacher instructional behavior strongly suggested the benefits of its use in-service training of teachers (as well as pre-service training). The specific use of OSIA in in-service teacher training appeared to be valid and helpful in developing teachers' awareness of their own instructional behavior and teaching styles. Such awareness hopefully would lead to the understanding and the conscious use of those behaviors and teaching styles that have promise for improving the instructional characteristics
of the classroom and facilitating pupils' learning outcomes.

The educational plans in Brazil, as presented in the articles of the Law 5,692/71 and the decisions for its implementations in the entire national educational system, require and emphasize the necessity and importance of the preparation and continuing training of teachers. Ideally such training must give teachers opportunities and conditions for self-analysis and self-improvement while going through a continuous on-the-job professional education. The difficulties and limited number of qualified technical personnel to work with Brazilian teachers is well stated (26,27,30,118). This investigation was an effort to study one possible solution to the lack of qualified personnel to work with teachers. The general proposition of this investigation was to provide teachers with information and conditions appropriate for its use in self-evaluation of their own teaching and their own instructional processes.

The training of teachers in the use of OSIA, complemented by the "supervisor" feedback and a goal setting approach by the teacher himself according to his own perceptions and needs, might be of great value and use for and with Brazilian teachers and teacher educators. Teachers would have a systematic instrument and valid data to help them start thinking about what is going on in their classroom. The teachers who use this approach may find themselves involved in the analysis of their teaching styles, their instructional behavior, the instructional characteristics of the classroom, the possible effects of the teaching behavior on pupils, and so on. It was believed that the use of OSIA would improve the means of communication and provide a basis for respect
between teachers and their educators and/or supervisors. The use of OSIA might serve to and permit teachers, teacher educators, and supervisors to collect low-inference data about behavior manifested in the classroom. Hopefully, all these efforts might contribute to improved relationships between people working in the educational field. When observation data is objective and used in a non-threatening way, it has the potential for helping teachers improve. Hopefully, there can be a development and/or improvement of self-awareness and awareness of the behaviors of others, the instructional process, the interaction of teacher-pupils, and varieties of teaching styles and strategies. Such increased awareness could lead to improvement in the instructional behavior manifested in the Brazilian classrooms.

The OSIA behavior categories and consequent dependent variables may be defined, redefined, and/or expanded by the participating teachers in this investigation according to their own needs, perceptions and goals and in terms of the overall instructional process or any specific instructional situation in their classroom. The use of OSIA does not have to be limited to the analysis of instructional behavior only but has many other applications such as the ones used by Broadwater (17), Hough and Duncan (71), Kaiser (80), Layne (94) and Reynolds (128). Moreover, new and different uses may be suggested by the implications found in this and further investigations.
CHAPTER II

REVIEW OF RELATED RESEARCH

Introduction

The central aim of this study was the exploratory experimental investigation of the effects of feedback, goal setting and feedback plus goal setting on the instructional behavior of Brazilian in-service teachers who received training in a variety of instructional behaviors as defined in the Observational System for Instructional Analysis (OSIA).

Teacher behavior is important and of interest to those concerned with the educational and instructional process since it is known that the instructional behavior teachers manifest in the classroom influence student's growth. B. O. Smith says

As one observes instructional behavior, he sees a variety of activities. The teacher asks questions and listens and appraises answers; listens and responds to students' questions, reprimands, approves, or reacts neutrally to students. He tells how to do something or shows how it is done. He listens to students tell how to do something or observes their effort to do it. All of these activities take place in an orderly fashion, and yet they exhibit no readily observable patterns of development. To identify units of behavior within which these elements have meaning is one of the main tasks in the conceptualization of instruction (141:296-7).

Ways of describing what teachers do have been the focus of much research. Research workers have investigated teacher behavior over many years. They have analyzed and described teacher behavior change in relationship to different and varied ways of training. This
investigation is similar to the studies in this tradition. It is nevertheless unique. In no other reported studies have the teachers been directly involved in and responsible for the nature of the changes they wished to make in their ways of behaving in the classroom.

A great deal has been written about the use of systematic observation in changing teacher behavior. Research has been done on the impact that feedback has on the performance of teachers. In addition, ways of discovering one's teaching self, establishing goals to be achieved, and analyzing such achievement are aspects of teaching which have been studied in the last few years.

The purpose of this chapter is to review the literature related to various aspects of this investigation. It includes selected research literature only. Not all research literature related to in-service training, the use of observational systems, the effects of feedback on teaching behavior change, and the use of goal setting in changing behavior are reported herein.

Because research on in-service training and the use of systematic observation in changing teacher behavior overlap very much in the literature, these two areas of study are presented together. The literature on the use of feedback may overlap to some extent with the two cited above, but there is a separate part of this chapter in which such research is discussed. A brief review of studies related to the use of goal setting is also presented in this chapter. No special part of this chapter reviews the literature related to the uses
of the OSIA or the MTAI, since they are the instruments used in the investigation and the literature regarding them is briefly discussed in Chapter III.

An Overview of the Literature on In-Service Training and the Use of Observational Systems

Many different reasons are given for providing in-service programs for teachers. It is generally believed that beginning teachers and those who are less qualified need special in-service training. It is also widely believed that most teachers would benefit from in-service training. There is little good research evidence to support such belief. Most of the research related to in-service teacher education is limited to surveys and opinionnaires. Curtis (37) has stated that little research has been done to evaluate the "contribution to teaching success" of in-service education programs.

Medley and Mitzell (113) report that the first attempt to categorize classroom behavior was made by supervisors more than a half century ago (67). More elaborated schemes followed, such as those by Puckett (123), Wrightstone (163) and Barr (9).

Researchers generally recognize that one of the more important studies in the development of classroom observational instruments is the one conducted by Anderson (5, 6), in which he recorded teacher and pupil behaviors using a twenty-category checklist to measure the occurrence of "integrative" and "dominative" behaviors. Anderson's study was followed by research on classroom behavior done by Withall (161), in which only the behavior of the teacher was observed and recorded for analysis of teacher influence on the social-emotional climate in the
classroom. As an outgrowth of these studies, an observational instrument, the Flanders' System of Interaction Analysis (FSIA) was then constructed by Flanders (44, 45, 46, 47, 48) to record teacher direct and indirect behavior and student behavior.

Interaction analysis is a label that refers to any technique for studying the chain of classroom events in such a fashion that each event is taken into consideration (48:5).

Many classroom observational systems have been constructed since the work of Flanders. Simon and Boyer (139, 140) present a description of ninety-two observational systems in their anthology, Mirrors for Behavior, a series of volumes which encompasses the majority of research efforts done in the area of description and analysis of teacher-pupil behaviors.

In their complete review of research on the use of direct observations to study teaching, Rosenshine and Furst (53) describe type of studies, instruments, classification of purposes for uses of observational systems, assessment and methodological issues, and varied suggestions on the topic. They also present a section reviewing correlational studies on teaching behavior and student achievement. Such review tends to support the idea that a number of teacher-related variables are, to some extent, related to student achievement in classroom, suggesting that teacher behavior influences students' outcomes. According to Rosenshine and Furst there are nine of these variables (53:155-158). These are the teacher-related variables that have shown some modest relationships with student achievement: a) clarity, b) variability, c) enthusiasm, d) task-oriented or business-like, e) criticism,
f) teacher indirectness, g) student opportunity to learn criterion material, h) use of structuring comments, and i) multiple level of questions or cognitive discourse.

It is not exactly clear, yet, what teacher behaviors constitute clarity, but it appears to include "organization" and coherence as opposed to confusion. Variability seems to include a number of variables, such as "flexible in procedure", "adaptable vs. inflexible", counts of amounts of extra materials, displays, resources, numbers of different activities and materials used. Teacher's enthusiasm has been studied through such ratings as "dull" vs. stimulating", observer's estimation of evidence of teacher's power, vigor, excitement or involvement, as well as counts of movement, gestures, voice inflections, but the specific components of such teacher-related variable are still to be determined in relationship to student achievement. Teacher behavior classified as task-oriented or businesslike was estimated as "evading vs. responsible", "erratic vs. steady", and teacher's concern that students learn vs. concern that they enjoy themselves. General and specific teacher criticism is reported as negatively correlated with student achievement. This seems to be due to components of harsh, intense criticism and not milder form of correcting student behavior or response. Teacher indirectness has usually been studied as it refers basically to Flanders concept of indirect and direct behaviors and their ratio indirect to direct. Studies report that the greater the indirect-direct ratio, the greater the student achievement. Indirect behaviors include "praise", and
"use of student ideas", direct behaviors include "criticism" and "giving directions". Rosenshine and Furst report the difficulties in measuring student opportunity to learn criterion material through direct observations, but, in general, such a teacher-related variable seems to be related to student achievement. The variable use of structuring comments is defined as "structuring statements which provide an overview for what is to happen or has happened" (53:157) and it has been identified and counted at the beginning and end of lessons, and at the start and end of sequences of questions. The results of the studies reported by Rosenshine and Furst suggest that counts of such behavior have shown some relationship to student achievement. The use of multiple-levels of questions or cognitive discourse appears to relate to student achievement also, according to the review conducted by Rosenshine and Furst (53).

In-Service Training and the Use of Observational Systems in Teacher Education

The studies of Gunnison (59), Millet (116) and Torbet (154) provided teachers with training in an attempt to alter their classroom behavior. While the training programs were successful in bringing about changes in teacher classroom behavior, the changes were either not significant or they were not accompanied by significant differences in student achievement.

Cornell (33) found no significant changes in classroom behavior of teachers who received in-service training through exposure to audiotaped models prior to teaching two microlessons. Questioning behavior was conducted using six categories derived from Bloom's
Taxonomy. Wiegand (159) developed and evaluated an In-service Training Unit, consisting of a training manual and videotaped models of teachers portraying supportive and non-supportive behaviors in the classroom. He used three groups: one went through the In-service Training Unit, another group was exposed to lecture and follow up conferences on supportive and non-supportive teacher behavior, and the third group participated in the standard in-service program conducted by the school district. Results show that teachers in both the In-service Training Unit and lecture groups made significant positive changes in learner supportive attitude and behaviors. Webb (158) attempted to determine if training in the analysis of teaching behavior affected the self-evaluation of teachers, given the opportunity to view and judge their own teaching performance as recorded on videotape. Webb found no significant differences between the control and experimental groups. Carsetti (25) found that exposure to the live and videotaped presentations of an in-service program was no more effective in changing behavior than exposure to only videotaped presentations in an in-service program for teachers which included a technique of eliciting multiple responses from children.

Using the Roberson Teacher Self-Appraisal system, Bolen (14) analyzed the effects of the use of videotape feedback on the behavioral change of in-service teachers in elementary school and junior high school. She found no significant differences between groups in attitude change toward teaching that could be attributed to videotape feedback and self-appraisal of classroom performance. Elementary teachers in the experimental group did exhibit significant
changes in teacher behavior, in the cognitive objectives and verbal and non-verbal expression categories. Significant changes were found for the junior high school teachers in the experimental groups, in the total teaching behavior observed in the major categories of the system.

Carline (24) found that an in-service program for elementary teachers, in which the Flanders' System of Interaction Analysis (FSIA) was used as a feedback technique, produced more indirect teacher behavior.

Miller (115) investigated the influence of a laboratory centered training program on the verbal behavior of eleven physical science teachers. The training included instruction in questioning, test item construction, nature and philosophy of science, pre and post laboratory techniques, Flanders' System of Interaction Analysis (FSIA) and the use of Introductory Physical Science (IPS) materials. The Science Classroom Interaction Instrument (SCII) was used to collect the behavioral data. Miller reported that the treatment group accepted feelings more, gave more praise or encouragement, accepted or used more student responses, asked more questions at higher cognitive levels, used less criticism, and initiated more student response than the control group composed of eleven other physical science teachers.

Stevens (149) stated that teachers used a larger variety of teaching activities and increased their acceptance and use of student ideas after receiving training in the Instrument for Observation of Teaching Activities.
Harders (61) studied the effects of an in-service course in which an observation system was used to help teachers become more supportive in their verbal and non-verbal behaviors. He found that the experimental groups increased their proportion of supportive verbal response, although the non-verbal behaviors were not changed by the in-service course.

Kidd (88) conducted a three week summer workshop on behavior modification for twenty-four elementary teachers. The results revealed that the participants of the workshop significantly increased their positive and total reinforcement rates while teaching. Those who viewed videotapes of their own teaching increased their reinforcement rates to a greater degree than those who only viewed the performance of others.

Kennedy, Haefele and Ruff (84) conducted a study to determine the effectiveness of the Self-Instructional Program (SIP) as an in-service instructional package and to assess the effects of in-service instruction in the Flanders' System of Interaction Analysis (FSIA) relative to promoting the verbal flexibility of teachers. Two instructional treatments modes were used, the SIP only and the SIP plus telelecture. The results suggest that participants had acquired at least an elementary knowledge of interaction analysis, however, there were no significant differences between the two instructional modes. Analyses of eight interaction analysis indices did not provide evidence to indicate that the two in-service instructional treatments were effective in promoting either greater
teacher indirect influence or more student involvement.

Flanders (45,46) conducted an in-service project employing interaction analysis as a training tool for participant use and as a research tool for studying the verbal behavior of the participants in their classrooms. Comparisons between pre- and post-training observations suggest that teachers made significant gains, favoring post-training, with respect to the incremented use of indirect statements.

Storlie (150) studied the relationships between several characteristics of in-service teachers and change in their verbal behavior, following an in-service course in interaction analysis. The results show a significant increase in the use of indirect influence by all but fourteen of the fifty one teachers, but relationships between personality characteristics and change in indirect influence were not found.

Johnson (79) offered in-service training in group process intervention to ten elementary school teachers. The use of Flanders' System of Interaction Analysis (FSIA) revealed a reduction in teacher verbalization and an increase in student expressions of diverse and original ideas. Teachers were shown to have modeled their verbal classroom behavior after the group trainer.

Raack (124) found that elementary teachers became more indirect in their verbal classroom behavior, as measured by the Flanders' System of Interaction Analysis (FSIA), and changed their conception of the teacher's role toward a role more congruent with an indirect approach to teaching, after being exposed to an in-service
program designed to emphasize the attainment of inquiry goals, self-initiating purposeful behavior, and self-evaluation by pupils.

Parrish (120) found that teachers trained in Flanders' System of Interaction Analysis (FSIA) were more indirect, more acceptant of student feelings, more given to praise, made use of pupil ideas, and were less critical of these ideas. Therefore, their pupils talked more, integrated their ideas into discussions more freely, and talked for longer intervals.

Generally, research studies report that in-service training and the use of observational systems are effective approaches for promoting changes in the verbal behavior of teachers. The results reported in this section and the vast amount of literature on the topics support the idea of using in-service training and an observational system as one way to change the behavior of teachers. Attention on the part of teachers to their patterns of verbal interaction appears to promote teacher behavior changes. Therefore, the use of an observational system in in-service training settings holds some promise for generating changes in the verbal behavior of teachers.

The Use of Feedback in Changing Teacher Behavior

It is generally accepted that students learn more rapidly when they are kept informed of their own progress and they can see results. It may be reasonable to suggest that the same should be true of teachers who are trying to increase their own skill.
Research has shown that the use of feedback to teachers about their style of performance will tend to increase their mastery of teaching skills. Some of the findings of a selected group of investigations in which feedback was the approach used to stimulate changes in teacher behavior follow.

Research investigators, such as Kautz (82), Kinerk (89), Ragan (126), Roush (133), and Wolfe (162) have described attempts to modify teacher classroom behavior through the use of videotape and/or audiotape feedback. All reported that significant changes in classroom behavior did not occur as a result of the feedback.

Johnson (79) provided elementary school teachers with feedback on their classroom questioning behavior by means of the Questioning Dissector Grid. Each teacher had a chance to see questioning profiles of his lesson, drawn from videotaped lessons and discussed in post-teaching conferences. Results show that teachers tended to increase their use of observational, information processing and evaluative questions and to decrease their use of memory recall questions after receiving feedback from the Questioning Dissector Grid.

Some of the studies seem to say that individual self-confrontation with feedback information is ineffectual, or much less efficient than when a second person participates in the feedback process. Fuller, Veldman, and Richek (50) report that listening to tape recordings alone did not reduce discrepancies between student teachers' self-ratings and ratings by observers of their
teaching performance. But there was a significant reduction in such discrepancies when the playback was accompanied by instructors and peer commentary. Acheson (1) reports that the presence of a supervisor of student teachers during the feedback of videotape teaching led to significantly more reduction in teacher monologue than did viewing of the videotapes by the student teachers alone.

Steinen (148) found that any one of three methods of providing feedback to student teachers of mathematics increased their skill, as compared with a control group. Feedback from fellow student teachers working in pairs and feedback from pupils were both found to be more successful than self-appraisal feedback by the student teachers themselves as they modified and retaught lessons.

Davis states that "the self appraisal process seems to be less threatening than other forms of evaluation. Its value may be greatest for in-service programs for experienced teachers" (39:4294). He observed that the teachers, in his study, perceived change in their classroom behavior as a result of viewing videotapes and consciously adapting techniques to modify their behavior.

James (76,77) conducted a study to analyse the affects of three approaches to university supervision on the attitude and inductive-indirect teaching strategy of student teachers, who were randomly assigned to the following treatments (1) traditional university supervision, (2) traditional university supervision plus observation and discussion of films of experienced teachers, (3) traditional university supervision plus viewing videotaped recordings.
of their own behavior. The Teaching Strategies Observation Differential (TSOD) measured teaching strategy from videotaped recordings of classroom behavior. The findings suggest that student teachers who received supervision plus self-evaluation via videotaped recordings developed significantly more inductive-indirect teaching behaviors. No changes in student teacher attitudes were found to be significant, as measured by the Science Related Semantic Differential. Ellet (42) found that teachers can be intrinsically motivated to modify their performance when they are encouraged to use a self-analysis method. His study utilized videotape on teaching sessions and the Basic Evaluation Scale for Teachers (BEST) instrument for analysis.

Cummins (35) conducted a study to determine if teachers, through self-evaluation, could improve the quality of the verbal interaction patterns in their classrooms and thereby improve the climate of the classroom in such a way as to enhance the learning taking place. She used the Improvement Through Self-Evaluation (ITSE) program aimed at changing the ratio of indirect-direct verbal patterns in favor of the indirect pattern. Experimental and control groups prepared pre- and post-test audiotapes which were scored, at the conclusion of the research, using Flanders' System of Interaction Analysis (FSIA). Cummins found no significant differences between the I/D ratios of the two groups.

Ishler (75), using Withall's Social-Emotional Climate Index, tested the effects of feedback versus no feedback in two
comparable groups of student teachers. The student teachers who received feedback became significantly more learner-centered than did the student teachers in the group that received no feedback. Steinback and Butts (147) studied the relationships of teaching practice with peers or with children, and the presence or absence of feedback about their teaching to the achievement of specific teaching competencies. They found that students who received feedback were better able to gear the lesson to pupil needs. They also were better able to use their plans so that presentations were logical and coherent. Galush (54) found that feedback alone is not sufficient to affect verbal teaching behavior of student teachers. She states that the clarity of introduction to Interaction Analysis, the paucity of time for feedback, and the student teachers' attitudes toward teaching are possible contributing factors to change in verbal teaching behavior.

Garret (55) analyzed the effects of feedback and use of Flanders' System of Interaction Analysis (FSIA) as related to change in the indirect behavior of student teachers. There were three groups in this study: a control group and two experimental groups, both trained in Flanders' System of Interaction Analysis (FSIA). Participants in one of the experimental groups analyzed their own teaching behavior as recorded in videotape and the other received matrices compiled by the observer from audiotapes made of their performance. Garret found that seven out of fifty one comparisons were statistically significant. The research findings show that the
videotape feedback group made greater change than the matrix feedback group, but not greater than the control group, on the following: I/D ratio, reduction of the total percentage of time spent in lecturing, increasing total percentage of time of student talk. The group that received feedback from the matrix demonstrated greater change in reducing the direct to indirect ratio of teacher response to student initiation, as compared with the control group.

Houston (72) conducted a study to determine the effects of in-service education in Interaction Analysis (FSIA) on teacher classroom behavior, exploring in-service education in Interaction Analysis as a means of helping teachers become more aware of their classroom behavior and the extent to which they could alter that behavior to bring about desired changes. Houston observed few statistically significant differences in her study. The difference in the percentages of lecture and total teacher talk revealed that experimental teachers lessened those types of teaching behavior over the control group. The experimental group reported that the Flanders' System caused them to become more aware of interaction with students and better able to create a desirable learning atmosphere.

Tuckman, McCall, and Hyman (156) report that merely knowing the system of interaction analysis (FSIA) was not sufficient to induce change in teachers' classroom behavior. Verbal feedback from another person had to be added to self-observation before changes were achieved. They also found that the more a teacher's
self-perception disagreed with the facts about his actual teaching behavior; the more likely the teacher was to change his self-perception to match the observed facts.

Bond (15) conducted a study to determine what effects studying Flanders' System of Interaction Analysis (FSIA) had on elementary teachers' verbal behavior and the teachers' attitudes toward in-service education. The important variables in her study were: the feedback each teacher received concerning the classroom behavior and a device rating the in-service program which covered content related to the categorization of teacher behavior. The findings support the idea that training in Interaction Analysis is effective in helping teachers change verbal behavior, although students do not necessarily use more self-initiated talk.

Kline and Sorge report that teachers not trained in the mechanics of Interaction Analysis (FSIA) will change their classroom verbal behavior as a result of feedback from Interaction Analysis and teachers do not have to be trained in the observation analysis to effectively use the feedback data gathered in their classroom by the trained observer. They stated that

the most effective changes in method of instruction occur when teachers can compare what they wanted to accomplish with a nonthreatening objective summarization of their spontaneous behavior. Feedback is an essential aid to teachers trying to understand and change their classroom verbal behavior (90:55).

In general, the evidence in the research literature supports the use of feedback as a way of promoting change in teacher behavior. In some studies, the effects of the use of feedback on
classroom behavior is inconclusive though. The self-analysis or self-appraised approach in using feedback was considered significant and important in studies developed by Davis (39), James (76), and Ellet (42).

Feedback and interaction analysis are considered as important elements in modifying teacher classroom behavior, as reported by Galush (54), Garret (55), Houston (72), Tuckman, McCall and Hyman (156), and Bond (15). The use of feedback data gathered by trained observers, using an observational system in a teacher classroom, was reported by Kline and Sorge as an effective way of changing teacher classroom behavior. According to the findings of their research, feedback was considered an essential tool to help teachers who are trying to understand their classroom behavior in order to change it in ways perceived by them as desirable.

Generally, research studies present evidence sufficient to support the use of feedback from audiotaped and coded lesson, in a conference with a "supervisor", as a means for provoking teacher classroom behavior changes.

The Use of Goal Setting in Changing Behavior

There are not many studies in the research literature on teacher education in which the use of goal setting, as an approach for modifying classroom behavior, is reported. A selected sample of studies that used goal setting in student achievement is presented below.

Byers (20) conducted a study in which she asked high school
students to set goals for the next grading period, based on grades they had just received for the previous grading period at intervals throughout the year. The successful students set realistic goals for themselves, those who were unsuccessful set unrealistic goals, either too high or too low. Locke, Cartledge, and Knerr state that not every goal leads to the activity or end specified by the goal. A particular goal may not lead to efficacious action because it conflicts with the individual's other goals. Or the situation at a given time may be perceived as inappropriate for action. An individual may not have sufficient knowledge, ability, or determination to carry out his plan of action. Further, external factors may interfere with his performance (102:137).

The setting of performance goals has been shown to be a potent variable in changing behavior. Armstrong (7), Fryer (49), Kausler (81) and Lockette (103) all conducted research which related goal setting and performance. The investigators reached the same conclusions: the subjects who predict future performance and set goals attain a higher level of performance than that attained by those who do not set performance goals. Such conclusions held even though investigators used different experimental tasks and age groups. Gaa (51) investigated the effects of individual goal setting conferences on classroom achievement, attitude and on goal setting behavior. The goal setting group had significantly higher classroom achievement, and their subsequent goal-setting behavior was significantly different from that of the non-goal setting group.

Lathan and Kinne state that research has shown that knowledge of score alone does not lead to higher performance unless it
is used to set goals. They also say that

work on levels of aspiration has shown that if the individual sets a performance goal before carrying out a task, he tends to raise the goal if he is successful, since he increases his expectations of himself (91:190).

Locke reports that

recently Ryan has suggested that a considerable part of human behavior is controlled by the individual's conscious intentions, that is, by what the individual is trying to do (99:60).

Locke and Bryan (100) state, however, that results of experiments reported strongly support the idea that performance goals are related to and can be used to account for level of performance on a number of different tasks. The results of their studies suggest that use of such goals might be a more effective means of motivating individuals than telling them to do their best, as is typical in most educational training and performance situations.

Kelsey (83) investigated the effectiveness of a teacher education and research strategy which included aspects of operant methodology, the setting of measurable goals as performance criteria, and systematic observation techniques applied to verbal behavior of individual student teachers. The experimental subjects participated in a four-hour training session, in which they were taught to identify levels of cognitive behavior and verbal reinforcement. Then, they set individual performance goals that would increase high level cognitive behavior and positive verbal reinforcements. The subjects of the control group received no treatment. Kelsey found that out of fifty-two individual performance goals designated by experimental subjects, forty-one were attained or exceeded.
Jensen (78) reports that emphasis on individual goal setting combined with self-evaluation produced moderate changes in teaching methods and attitudes. He was examining the effectiveness of videotape recordings as a self-instructional in-service training tool designed to promote change in teacher behavior. Three conditions were set up for his study: (1) self-observation via videotape; (2) overt self-evaluation during self-observation; and (3) workshop in observational and evaluational techniques.

The studies of Kelsey (83) and Jensen (78) provide support for the use of goal setting alone or combined with self-evaluation for modifying teacher behavior. Generally, research studies on the use of goal setting suggest that it is useful and significant in improving one's effectiveness in achieving proposed outcomes.

Summary

The basic purpose of this chapter has been to present a selected sample of research literature which would support the need for research into the effects of using in-service training in an observational system for instructional behaviors, accompanied by the following treatments: feedback, goal setting, and feedback plus goal setting, in changing classroom behavior of teachers.

Generally, the use of in-service training has been reported as important considering, at least but not at last, the development of an awareness of what is going on in the teacher's classroom. In-service training programs in which observational systems were used as a means for modifying teacher classroom behavior are,
to some extent, reported as significantly effective in doing so. Feedback and interaction analysis, used in a self-appraised way, accompanied by the presence of a supervisor, is reported, in some studies, as effective in promoting change in teacher classroom behavior. The few studies reported on the use of a goal setting approach for modifying teacher classroom behavior present evidence that supports the need for continuing studies using such an approach.

Research studies provide evidence that it is possible to stimulate instructional behavioral change through in-service training, using systematic observation records as basis for feedback or goal setting treatments. The amount of change and degree of success reported vary with the study under consideration.

In the research literature reviewed, no study was identified which describes the effects on the changes of instructional behavior of teachers participating in an in-service training program in which the change to be implemented was decided upon and prescribed according to the teachers' own choice, and depending on their perceived needs and established goals. In the investigation reported here, the teacher determined the nature and direction that the change in behavior would take. The work of Rubin (134) and Curwin and Fuhrman (38) support the value of the self-directed, autonomous and individual approaches in improving teacher education. Therefore, the use of an in-service training in OSIA instructional behaviors and selected patterns of behaviors, accompanied by feedback, goal setting, and feedback plus goal setting
treatments seemed to be appropriate and even desirable as central consideration in this experimental investigation conducted in Brazil.
CHAPTER III

METHODOLOGY

Introduction

Teachers have reason to be concerned with and aware of the qualitative and quantitative nature of their behavior in the classroom, since it is generally accepted that their instructional behavior effect and influence the learning of others.

The central aim of this investigation was the analysis of the effects of feedback, goal setting, and feedback plus goal setting treatments on the instructional behavior of Brazilian teachers who had received an in-service training program in selected patterns of instructional behavior as defined in the Observational System for Instructional Analysis (hereafter these instructional behaviors will be referred to as OSIA instructional behaviors and selected patterns of such behavior). The in-service training encouraged teachers to focus attention on their own behavior and encouraged them to change that behavior in ways the teacher thought fit. This investigation was an exploratory study which was experimental in nature, and it was conducted in Brazil with the support of the Ford Foundation during the period of June to October in 1974.

This chapter presents a description of the population and sample involved, the design of the investigation, the development and preparation of materials used, and the data gathering instruments.
and procedures. It also contains a report on the training procedures, a brief discussion of each phase of the investigation, and a presentation of the techniques and procedures employed in analyzing the data.

Population

The population used in this investigation was composed of the teachers of the Escola Polivalente de Itaciba, one of the polyvalent schools in Vitoria, State of Espirito Santo, Brazil.

A Polyvalent School is a school of First Level Education, according to the actual structure of the Brazilian Educational System. It has as a major objective the total development of the student, giving him an academic preparation as well as stimulating him to sound out his aptitudes with a focus on vocational orientation and preparation for a job. The Polyvalent School in Brazil belongs to one of the federal education programs, the PREM (Programa de Expansao e Melhoria do Ensino). For more details on the polyvalent schools, see Appendix A.

The Escola Polivalente de Itaciba was chosen to be used in this investigation at the suggestion of the State of Espirito Santo's Secretary of Education and Culture and some of his immediate staff. The suggestion was based on the belief that the school was very representative of the polyvalent schools in that Brazilian State.

The Escola Polivalente de Itaciba is a First Level School for students in 5th, 6th, 7th, and 8th grades. The age range of the students is from nine to eighteen years. The socio-economic
level of the students is low. There are thirty four teachers in the
school and the average number of students per class is forty. The
school is organized into two school-periods. Teachers teach both
school-periods but the students come for only one (first period:

After receiving support from the State Secretary of
Education and Culture, the investigator established the first contact
with the school through its Principal and Vice-Principal. They
immediately agreed with the idea of the teachers participating in
the investigation. An informal meeting with the teachers was then
scheduled at which the investigator presented a general overview of
what was going to be done. The investigation would be developed with
the teachers' help and contribution and would depend on their willing-
ness to participate in a series of training sessions and individual
conferences with the investigator.

Because Brazilian teachers are not used to participating
in in-service training of this kind which involves experimentation
and classroom observation the investigator explained her role to them.
They were assured that they would not be evaluated. The investigation
would be focused on describing and analyzing the instructional
process. They were told that the investigator would be working with
them on an individual basis; that some teachers would be visited
more often than others and these visits were intended to be helpful
not judgmental. It appeared to the investigator that the explanation
was accepted by the teachers.
All thirty-four teachers of the Escola Polivalente de Itaciba manifested willingness to participate in the investigation. Therefore, it was possible to randomly select the subjects for this investigation. The sample was composed of twenty teachers all of whom received a small amount of money for participating in the investigation.

Because each teacher was teaching at least four different groups of students (classes), the random selection of the teachers was made in such a way that it included the random selection of one of each teacher's class. The same class for each teacher was observed during the whole study.

The teachers participating in this investigation taught in 5th, 6th, and 7th grades. The subject matters taught by the teachers were: Science, Portuguese, Social Studies, Mathematics and Vocational Techniques (Commercial Techniques and Agriculture Techniques). The age of the teachers ranged from twenty to thirty four and the number of years of teaching experience of the subjects ranged from one year to fifteen years. Twelve of the teachers had secondary professional training and eight teachers had their professional training in college.

Tables 1 through 4 report the frequencies and percentages of teachers participating in this investigation, according to grade level taught, table 1, subject matter taught, table 2, number of years of teaching experience, table 3, and level and area of professional training, table 4.
### TABLE 1

Frequencies and Percentages of Teachers
According to Grade Level Taught

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>6th</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>7th</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

### TABLE 2

Frequencies and Percentages of Teachers
According to Subject Matter Taught

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Portuguese</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Social Studies</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Vocational Techniques</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
### TABLE 3

Frequencies and Percentages of Teachers According to Number of Years of Teaching Experience

<table>
<thead>
<tr>
<th>No. of years of Teaching</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 5</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>6 - 15</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

### TABLE 4

Frequencies and Percentages of Teachers According to Level and Area of Professional Training

<table>
<thead>
<tr>
<th>Professional Training</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal School</td>
<td>5</td>
<td>(25)</td>
</tr>
<tr>
<td>Technical School</td>
<td>7</td>
<td>(35)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>College Level</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Language</td>
<td>5</td>
<td>(25)</td>
</tr>
<tr>
<td>History</td>
<td>2</td>
<td>(10)</td>
</tr>
<tr>
<td>Geography</td>
<td>1</td>
<td>( 5)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
From a total of thirty four teachers at the Escola Polivalente de Itaciba, twenty were randomly selected to participate in this investigation. More than that, they were randomly assigned to one of the five groups used in this investigation: four teachers per group.

The Design of the Investigation

Despite the fact that this investigation was exploratory in nature, an experimental design was developed and implemented. This served as the basic structure around which the exploratory aspects of the investigation were developed. The experiment was at the heart of the investigation. The explorations were by-products of the experimental effort.

The entire investigation may be summarized in the diagram in figure 1.

The Randomized Control-Group Pretest-Postest design, with some modifications, was chosen for use in the experiment because, in general, internal validity gains strength in such a design. The extraneous variables that occur between pre- and post- treatment are in some measure controlled, since they are presumed to affect both groups equally. Also, in this design one can protect for the possible bias observers would have in their codings if the observers are randomly assigned to observations and they do not know which groups are receiving treatment.

The Randomized Control-Group Pretest-Postest design (22:13) may be diagrammed as follows:
Preparation of Materials

Adaptation and Translation of OSIA and MTAI

Translation, Adaptation, and Elaboration of Materials for Training the Observers

Conceptualizing In-Service Program and Preparation of Materials for Teacher's Training

Observer's Training

The Experiment

Pre-Treatment Observations

Preparation for the Treatment - the In-service Training

Provision of Treatments F, G, FG

Post-Treatment Observations

FIGURE 1

Schematic Diagram of the Investigation
In this diagram X designates the treatment given to the experimental group; \( O_1 \) and \( O_3 \) represent the pre-observations; \( O_2 \) and \( O_4 \) represent the post-observations and \( R \) designates the random assignment of subjects to the groups.

The extension and modification of the Pretest - Postest Control Group Design used in this investigation is diagrammed below

\[
\begin{align*}
R & \quad O \quad X_{OFG} \quad O \\
R & \quad O \quad X_{OG} \quad O \\
R & \quad O \quad X_{OF} \quad O \\
R & \quad O \quad X_{O} \quad O \\
R & \quad O \quad X \quad O \\
\end{align*}
\]

In this diagram, the X's designate the different groups being studied in this investigation. The subscripts (e.g. OFG) specify the treatment each group received.

The treatment given to each of these randomly assigned groups will be discussed in detail in another section of this chapter. For now, a brief identification of each group is offered:

- \( X \) - Subjects participated in the control group;
- \( X_O \) - Subjects received in-service training in OSIA instructional behaviors and selected patterns of such behavior;
- \( X_{OF} \) - Subjects received in-service training in OSIA instructional behaviors and selected patterns of such behaviors and the conference feedback treatment;
\( x_{OG} \) - Subjects received in-service training in OSIA instructional behaviors and selected patterns of such behaviors and the goal setting treatment;

\( x_{OFG} \) - Subjects received in-service training in OSIA instructional behaviors and selected patterns of such behaviors and the conference feedback plus goal setting treatment.

The five groups, composed of the twenty subjects randomly selected from a total of thirty-four teachers at the Escola Polivalente de Itaciba, in Brazil, were then randomly assigned to the five comparison groups.

The Independent and Dependent Variables. There were a number of independent variables in this investigation that were directly associated with the investigator's efforts to help teachers change their instructional behavior in the classroom. These efforts were centered on:

1. In-service training in OSIA instructional behaviors and series of such behaviors;

2. Provision of feedback by the investigator based on ideas discussed during the in-service training;

3. Engagement in a conference with the investigator to set goals, before teaching, based on ideas discussed during the in-service training;

4. Provision of feedback and engagement in a conference with the investigator to set goals before teaching, based on ideas discussed during the in-service training.

The dependent variables derived from the data produced by the OSIA observations. There are a great many indices and ratios that can be computed using OSIA data. It was difficult to tell which of
these would be most useful to the subjects and to the investigator in this investigation beforehand.

Because each teacher chose his own goals and decided about the nature and direction of the change on his instructional behavior, the dependent variables were determined by the teachers themselves. It was presumed that these could be expressed in terms of clusters of OSIA variables, and determined after the treatments had been completed.

Since the focus of the observations was primarily on the teacher, nineteen possible teacher-related measures derived from OSIA were used as potential dependent variables in this investigation, with the possibility of developing additional variables whenever it would be necessary. Table 5 presents the potential nineteen OSIA dependent variables included in this investigation.

The MTAI scores provided data to be used as a control measure for the effects of the treatments given to the subjects participating in this investigation.

**Development and Preparation of Material**

During the phase of development and preparation of the material to be used in this investigation the investigator carried out the adaptation and the translation of the OSIA and the MTAI into Portuguese, specifically for use in this investigation. Permission for the translation of the OSIA into the Portuguese language was given by Duncan and Hough, authors of the system. The investigator translated parts of the four papers in which Hough and Duncan describe and present the **Revised Observational System for Instructional**
TABLE 5
List of Potential Dependent Variables Derivable from OSIA Observations Included in this Investigation

<table>
<thead>
<tr>
<th>Code Symbol</th>
<th>Name of Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>T I/D</td>
<td>Ratio of teacher indirect influence behaviors to teacher direct influence behaviors.</td>
</tr>
<tr>
<td>T i/d</td>
<td>Ratio of modified teacher indirect influence behaviors to direct influence behaviors.</td>
</tr>
<tr>
<td>T xI/D</td>
<td>Ratio of teacher indirect influence in response behavior to direct influence in response behavior.</td>
</tr>
<tr>
<td>T ri/D</td>
<td>Ratio of modified teacher indirect influence in response behavior to direct influence in response behavior.</td>
</tr>
<tr>
<td>T +/-</td>
<td>Ratio of teacher positive to negative appraisals.</td>
</tr>
<tr>
<td>T KR/PJ</td>
<td>Ratio of teacher knowledge of results to personal judgments.</td>
</tr>
<tr>
<td>T NJ/OA</td>
<td>Ratio of teacher nonjudgmental acceptance to other appraisals.</td>
</tr>
<tr>
<td>T A/NA</td>
<td>Ratio of teacher appraisals to nonappraisals in response behavior.</td>
</tr>
<tr>
<td>T Q/L</td>
<td>Ratio of teacher questioning to lecture.</td>
</tr>
<tr>
<td>T Q/R</td>
<td>Ratio of teacher questioning to response.</td>
</tr>
<tr>
<td>T C/S</td>
<td>Ratio of teacher clarification to solicitation.</td>
</tr>
<tr>
<td>T RQ/D</td>
<td>Ratio of teacher reflective questioning to drill.</td>
</tr>
<tr>
<td>T S/M</td>
<td>Ratio of teacher substantive behaviors to managerial behaviors.</td>
</tr>
<tr>
<td>TDS</td>
<td>Teacher direct substantive index.</td>
</tr>
<tr>
<td>TDM</td>
<td>Teacher direct managerial index.</td>
</tr>
<tr>
<td>TIS</td>
<td>Teacher interactive substantive index.</td>
</tr>
<tr>
<td>TIM</td>
<td>Teacher interactive managerial index.</td>
</tr>
<tr>
<td>S/T</td>
<td>Ratio of total of student behaviors to teacher behaviors.</td>
</tr>
<tr>
<td>SR/TA</td>
<td>Ratio of student response to question to teacher appraisal of response.</td>
</tr>
</tbody>
</table>
Analysis (70). The translated papers were to be used by the investigator for the training of observers and the in-service training for the teachers.

The Psychological Corporation gave permission to the investigator to translate the MTAI into Portuguese for exclusive use in this investigation.

After the translations were done and before the instruments were used in Brazil, the investigator informally verified the reliability and validity of the translations by asking some Brazilian teachers to edit them for clarity and meaningfulness. On the basis of this, appropriate revisions were made by the investigators in the translated version of the MTAI and the translated OSIA materials.

A questionnaire soliciting teachers' reactions to the investigation was developed by the investigator with the help and suggestions of Dr. Duncan to be specifically used in this investigation.

Materials were developed and prepared for use in the observers' training as well as in the training to be given to the teachers participating in the experimental groups. For the observers' training, the investigator translated parts of the book *Teacher: Description and Analysis* (69) and developed written and audiotaped examples of each behavior category of OSIA, some protocol materials to be used as a training kit, and simulation episodes to be coded by the observers during the training. Also, an OSIA coding sheet and matrix and inter-observer agreement sheets were developed to be used with and by observers. The scope and sequence of the training sessions for
the observers will be discussed in another section of this chapter. Appendix F presents a selected sample of the materials used in the observers' training sessions.

During this phase of the investigation, the investigator devised an in-service training program to be offered to the teachers and prepared all material needed for such training.

The investigator prepared forms to be used by the teachers during the in-service training and the treatment. Such forms included: Lesson Self-Evaluation, Questioning Strategies Check list, Soliciting Clarification Form, Planned-Real Questions Form, Positive-Negative Judgment Reaction Forms, Personal-based and Public Knowledge-based Judgment Form, Acknowledgement Situation Form, Plan of Action Form, and specific forms to be used by the treatment groups: "Feedback" sheets, "Goal Setting" sheets, and "Feedback and Goal Setting" sheets. The investigator used parts of the Hough and Duncan book (69) in the preparation of the materials used during the training. The classification of questions developed by Cunningham (36) was also translated into Portuguese to be used in the teachers' training. Role play activities and simulation episodes - written and audiotaped - were also prepared for use in the teachers' training sessions. Appendix G presents a selected sample of the material used in the in-service training for teachers. The purpose and general guidelines of the in-service training sessions for the teachers participating in the experimental groups will be presented in another section of this chapter.
Data Gathering Instruments and Procedures

Data gathering procedures consisted of those related to instructional behavior of teachers as recorded by OSIA, through audiotape and written coding forms, during the pre- and post-treatment observations as well as during the treatment phase of the investigation. Data were also gathered through the teachers' answers to the MTAI and their written opinion on the questionnaire soliciting teachers' reactions to the investigation.

The OSIA is a relatively new observational system developed by Hough and Duncan in 1970 (69). After more experience using OSIA in training and research, a systematic and complete revision of the OSIA was done in the Fall of 1972 (70). The instrument is used to look at instructional behavior related to certain kinds of instructional strategies and teaching styles manifested during the instructional process in the classroom. Distinctions can be made between teacher and student behavior and substantive, managerial, and appraisal behaviors. A total of nineteen functional categories of instructional behaviors, to be used for both the teacher and students, make up the OSIA. Two additional categories are added in the OSIA to record instructionally nonfunctional behavior and to provide a means for indicating the occurrence of student-to-student and/or teacher-to-teacher (in a team teaching situation) interaction.

The system has been utilized effectively in research (71, 17, 94, 80, 128). Research has demonstrated that the revised OSIA appears to have high levels of reliability and construct validity. The years of work on the instrument carried on in conjunction with
training and research activities have improved its quality. The OSIA has been used in in-service training at Westerville schools, Ohio, the training of supervisors in a Title III Project studying the Program Models for EMR students in Ohio, as well as for training of in-service teachers in college courses taught at The Ohio State University. The entire OSIA is composed of forty categories and table 6 and figure 2 give a summary of those categories.

Audiotapes were made of the observed lessons for all subjects during the pre- and post-treatment observations as well as during the treatment. Such audiotapes were used for continuous testing of the inter-observer agreement.

The MTAI was administered to all of the teachers in the pre- and post-treatment phases of the investigation, to provide some data on the nature of the sample of teachers and provide control data for the experimental investigation. The MTAI was designed by Cook, Leeds and Callis (31). The instrument is basically designed to measure the attitudes that suggest how well a teacher will get along with pupils in interpersonal relationships and, individually, how satisfied he is with teaching as a vocation. It measures teachers' attitudes toward children, toward teaching, toward school, etc. It is also designed to measure the amount of warmth, empathy and acceptance in teachers' attitudes toward children. Many researchers have used the MTAI in their studies. These include Cook and Hoyt (32), Horn and Morrison (69), Button and Iannacone (19), Muuss (117),

* A new revision of the system has been done by the authors and others in 1975 - the OSIA IV.
<table>
<thead>
<tr>
<th>Appraisal Behavior</th>
<th>Substantive Behavior</th>
<th>Managerial Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior that judges or acknowledges a person, a behavior, or a product of a person's behavior who is member of the instructional situation.</td>
<td>Behavior that is directly associated with achieving learning outcomes considered by those in the instructional situation to be a legitimate part of the subject matter of the field under study.</td>
<td>Behavior that is directly associated with creating the non-substantive conditions that are considered by those in the instructional situation to help influence the achievement of substantive learning outcomes.</td>
</tr>
</tbody>
</table>


FIGURE 2

Instructionally Functional Behaviors*
### TABLE 6
Categories of The Observational System for Instructional Analysis*

<table>
<thead>
<tr>
<th>Originator of Behavior</th>
<th>Category for Classification</th>
<th>Class of Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 Soliciting Clarification</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T2 Responding</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T3 Initiating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T4 Soliciting</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T5 Judging Incorrectness</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>T6 Judging Correctness</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>T7 Acknowledging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>T8 Personal Positive Judging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>T9 Personal Negative Judging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>T10 Soliciting Clarification</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T11 Responding</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T12 Initiating</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T13 Soliciting</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T14 Unspoken Responding</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T15 Unspoken Initiating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T16 Reflective-Manipulating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>T17 Unspoken Responding</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T18 Unspoken Initiating</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>T19 Reflective-Manipulating</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>X Instructionally Nonfunctional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y Interaction Separation Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1 Soliciting Clarification</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S2 Responding</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S3 Initiating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S4 Soliciting</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S5 Judging Incorrectness</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>S6 Judging Correctness</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>S7 Acknowledging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>S8 Personal Positive Judging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>S9 Personal Negative Judging</td>
<td>Appraisal</td>
<td></td>
</tr>
<tr>
<td>S10 Soliciting Clarification</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S11 Responding</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S12 Initiating</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S13 Soliciting</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S14 Unspoken Responding</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S15 Unspoken Initiating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S16 Reflective-Manipulating</td>
<td>Substantive</td>
<td></td>
</tr>
<tr>
<td>S17 Unspoken Responding</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S18 Unspoken Initiating</td>
<td>Managerial</td>
<td></td>
</tr>
<tr>
<td>S19 Reflective-Manipulating</td>
<td>Managerial</td>
<td></td>
</tr>
</tbody>
</table>

The questionnaire soliciting teachers' reactions to the investigation was answered only by the teachers participating in the four experimental groups, that received training in OSIA instructional behaviors and selected patterns of such behaviors. The questionnaire items were largely of an "open-ended" nature, although there were some occasions in which the teachers were requested to answer "yes" or "no". The major purpose for using the questionnaire was to gather information on the teachers' perception and evaluation of the experiment. The data so gathered would be used to help in evaluating the investigation and to provide information for improving further similar efforts.

The Training of the Observers

The observers trained for research work were five experienced Brazilian teachers who were appointed to assist in this investigation by the Secretary of Education and Culture of the State of Espirito Santo; all of them had prior direct experience in teacher education and in-service training in Brazil. The observers' training, conducted by the investigator, lasted for two and a half weeks and included a total of fifty hours of continuing practice in the use of the OSIA in simulated and live classroom situations.

The observers were informed of the general nature of the study and their role and responsibilities during the investigation.
The observers were to participate only in the pre- and post-treatment observations. Each observer was responsible for a determined number of live and audiotaped classroom observations to which each observer was randomly assigned.

The training sessions were directed by this investigator. The sessions were characterized by a joint theory-practice focus. The activities developed during such training involved group discussion, role playing, simulation, development of protocol materials, recording of lessons to be coded, coding of audiotaped lessons, written typescripts of lessons, and live classroom observation. The training settings were simulated at the beginning of the training experience. Later in the training experience, live school settings were used. The trainer and trainees made eight live classroom observations, for which the inter-observer agreement coefficients were found to be empirically acceptable (at .80 or above), before they went to make the actual observations to provide data for this investigation. The live school settings used for training experience were, in general, classrooms in schools similar to the one used in this investigation. Appendix F presents a selected sample of materials used in the observers' training sessions.

The assistant observers demonstrated specified competencies before doing the observations used in this investigation. They were able to:

1. explain the essential principles and assumptions underlying the use of observational systems in the classroom;
2. explain the essential characteristics of appraisal, substantive, and managerial behavior as defined in the OSIA;

3. explain the five appraisal behavior categories of OSIA and recognize examples of each in teaching episodes (simulated and real);

4. explain the seven substantive behavior categories of OSIA and recognize examples of each in teaching episodes (simulated and real);

5. explain the seven managerial behavior categories of OSIA and recognize examples of each in teaching episodes (simulated and real);

6. define instructionally nonfunctional behavior and recognize examples in instructional episodes (simulated and real);

7. describe the use of the interaction separation designation in coded OSIA data;

8. identify at least ninety percent of a set of representative examples of OSIA coded behavior (written, audiotaped, or real) selected from a typical instructional episode;

9. code a recording of a lesson at an inter-observer agreement level of at least .75 - .85 with a standard (the investigator);

10. using correct tallying procedures, code five minutes of a typical instructional episode;

11. identify and describe typical examples of behavior that are recorded in the thirty nine behaviors cells of the OSIA matrix;

12. code at least two successive taped recordings of lessons of approximately 10-15 minutes duration, with an inter-observer agreement of at least .80 with a standard, and

13. describe essential elements of the professional climate in which one person helps another analyze and improve instruction using OSIA as well as the general processes used in teacher self-improvement when using OSIA.
In any investigation calling for the categorization of behaviors through the use of an observational system, the different observers must be able to code the same behaviors in the same manner. Inter-observer agreement was computed in different phases of the investigation: (1) during the observers' training and at the end of the training by using audiotaped and live classroom observations; (2) during the pre-treatment observations when each observer made at least one "extra" observation together with the investigator in order to have the inter-observer agreement rechecked; (3) before the post-observations, through audiotaped recordings of two lessons; and (4) for the post-observations, for which the observers audiotaped the "live" observations they made and sent the tapes to this investigator so that the inter-observer agreement coefficient again could be estimated.

The method chosen for computation of the inter-observer agreement was the one proposed by Scott in 1955 (44). The method can be adapted to percent figures and is sensitive at higher levels of reliability. Scott calls his coefficient of reliability "pi", and it is determined by the use of the following formula:

\[ \pi = \frac{P_o - P_e}{100 - P_e} \]

where \( P_o \) is the proportion of agreement between observers, and \( P_e \) is the proportion of agreement expected by chance which is found by squaring the proportion of tallies in each category and summing over all categories. \( \pi \) is the amount that the two codings exceeded chance agreement, divided by the amount that perfect agreement exceeds chance.
In the second formula, there are $K$ categories and $P_i$ is proportion of tallies falling into each category.

The mean coefficient of inter-observer reliability for the five observers and the investigator was 0.855 at the end of the training. It is reported that a Scott coefficient of 0.85 or more is a reasonable level of performance for research purposes (44). This level of performance was maintained throughout the investigation. Table 7 presents the Scott's coefficient of inter-observer agreement for six observers, at the end of their training.

**TABLE 7**

Scott's Coefficient of Inter-Observer Agreement Among the Investigator and Trained Observers at the End of Training

<table>
<thead>
<tr>
<th>Observer</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A*</td>
<td>.850</td>
<td>.852</td>
<td>.849</td>
<td>.856</td>
<td>.859</td>
</tr>
<tr>
<td>B</td>
<td>.853</td>
<td>.851</td>
<td>.847</td>
<td>.873</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>.864</td>
<td>.851</td>
<td>.850</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td>.859</td>
<td>.850</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td>.862</td>
<td></td>
</tr>
</tbody>
</table>

$\bar{x} = .855$ * the investigator

Each observer was randomly assigned to the observation she was going to make. No observer was aware of whether the teacher she was observing was in an experimental or control group. Each
observer was paired with the investigator for one of the random observations and each observed at least one of the lessons with the investigator during the pre-treatment observation.

**The Experiment**

The experimental part of this investigation involved four phases: the pre-treatment phase, the preparation for the treatment (the in-service training), the treatment itself, the post-treatment phase.

The overall research plan of the experiment is represented below in figure 3. The explanation of each specific phase follows.

<table>
<thead>
<tr>
<th>PRE</th>
<th>TREATMENT</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSIA Observations</td>
<td>- In-Service Training in the OSIA</td>
<td>OSIA Observations</td>
</tr>
<tr>
<td>MTAI Scores</td>
<td>- Experimental treatments:</td>
<td>MTAI Scores</td>
</tr>
<tr>
<td></td>
<td>&quot;feedback&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;goal setting&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;feedback plus goal setting&quot;</td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{array}{cccc}
0_1 & 0_2 & 0_3 & 0_4 \\
2\frac{1}{2} \text{ weeks} & & & \\
\end{array}
\quad
\begin{array}{c}
X^* \\
5\frac{1}{2} \text{ weeks} \\
\end{array}
\quad
\begin{array}{cccc}
0_1 & 0_2 & 0_3 & 0_4 \\
3 \text{ weeks} & & & \\
\end{array}
\]

*\(X^* = \text{treatments}\)

**FIGURE 3**

Overall Schematic of the Research Plan of the Experiment
The Pre-Treatment Phase. In this phase, all twenty subjects responded to the MTAI. Also, during this phase of the investigation, the OSIA treatment observations were made. Each teacher was observed four times, each observation lasting fifteen minutes. Therefore, each teacher was observed for one hour resulting a minimum of 720 discrete observations of teacher's behavior. There were six observers: this investigator and the five trained observer. The observations were randomly assigned to each observer and each trained observer was randomly assigned to one observation with the trainer (investigator) for checking on the inter-observer reliability. The reliability of the inter-observer agreement was estimated by using Scott's coefficient of reliability, and resulted in a mean coefficient of .862 for this phase of the investigation. Audiotapes were made on the observations, also, for future use by the investigator.

The Preparation for the Treatment Phase (the In-Service Training). In this phase of the investigation the subjects of the four experimental groups received the in-service training in OSIA instructional behavior and selected patterns of such behaviors.

In general, the training was a joint theory-practice approach, with emphasis on the understanding and exhibiting of behaviors rather than on knowledge of code numbers and names of the behaviors in the category system. The training lasted for ten days with each day's session running about four hours.
The training sessions involved a variety of activities, such as self-evaluation of lessons, description and analysis of instructional behavior through check-lists and descriptive forms for role playing, and the simulation of instructional behaviors and selected patterns of such behavior. Appendix G presents a selected sample of materials used during the in-service training sessions.

The information given during the in-service training was presented very informally, with extensive efforts to use the teachers' own experience in the classroom. At the beginning of the training, there was no mention of the OSIA. Different instructional behaviors were discussed, role played, and simulated until the teachers were able to exhibit, characterize, and recognize them. Only then were OSIA category behaviors presented to the teachers. They were not expected to "learn" nor memorize the coding categories, but rather be able to manifest the behaviors, select the ones to be practiced, and understand the behaviors when shown them. The focus was on preparing teachers to describe and analyze the effects of the different behaviors they manifested in the classroom during the instructional process. The development of awareness was the underlying purpose of the training. A very significant aspect of the in-service training was the focus on the teachers' individuality.

The Experimental Treatment Phase. The experimental treatment involved twelve of the sixteen subjects who had received the in-service training. The twelve subjects made up the following experimental groups: \( X_{OF} \), \( X_{OG} \) and \( X_{OFG} \).
The treatment phase of the investigation lasted for five and a half weeks. All observations in this phase were made by the investigator alone. During this phase, the investigator visited the classroom of the other eight teachers who were not participating in the experimental treatment groups, providing a "placebo" effect to help protect the internal validity of the investigation.

During the whole treatment phase, the focus was on providing a helpful relationship and using self-knowledge approaches. As Rogers speaks of a helping relationship, it is one in which one [or all] of the participants intends that there should come about, in one or both parties, more appreciation of, more expression of, more functional use of the latent inner teaching resources of the individual (130:39).

In some respects the three treatment groups were treated in the same ways. In other respects the treatments differed. These were the conditions held constant for the three experimental groups that received a treatment following the in-service training in OSIA instructional behaviors and selected patterns of such behaviors:

1) Each teacher was observed five times;

2) Where conferences were provided, they were with the investigators;

3) Each teacher was encouraged to decide for himself the nature and direction of instructional behavior change;
4) All conferences were developed in a non-judgmental way that preserved the instructional autonomy of the teachers.

A short description of the nature of the treatment given to each of the three experimental groups follow below.

Group X: subjects in this experimental group received the "feedback" treatment, provided by the investigator utilizing data gathered from OSIA observations. Immediately after an observation was made, the investigator and the teacher met in an individual conference. Each teacher had five feedback conferences with the investigator.

The materials used during the conference feedback were the coded OSIA data (which the teachers were able to perceive and understand, as result of the previous training), the audiotaped lesson, and the teacher's form for "self-feedback."

The investigator stimulated each teacher to develop and continuously use the "self feedback" form after listening to each audiotaped lesson. Such form focused attention on these aspects:

what she/he did,
how she/he felt doing it,
results and/or reactions.

These were some of the aspects that characterized the "feedback" treatment:

1. it was descriptive rather than evaluative or judgmental;
2. it was specific rather than general, taking as its basis the specific behavior and/or selected patterns of behaviors coded using OSIA;
3. the emphasis was on behavior and/or the patterns of behavior the subject could reasonably be expected to do something about; and
4. it was timed so that feedback was given immediately after the observation was made, enabling the subject to recapture what she/he had been trying to do.

Group X - subjects in this experimental group received the "goal setting" treatment which involved a conference between the investigator and the subject in which the process of "goal setting" was used, utilizing OSIA information.

Each teacher in this group had five conferences for "goal setting" with the investigator. After each individual conference, the investigator made an observation of the teachers' lesson. Such observation focused on the self-chosen individual goals each teacher set before carrying out the task of teaching. The investigator's role in this treatment was the one of basic support of the teacher. The investigator did not provide feedback to the teachers in this group but allowed teachers to use feedback data. After each observation was made, the teacher had the audiotaped lesson and the OSIA coding sheet available to him and he decided for himself which "goals" he would like to keep working on and which ones he thought he had achieved.

The materials used during the "goal setting" conference were OSIA category behavior lists, OSIA matrix of intent, the teachers' form for "goal setting." Such forms involved these aspects of concern for the teacher:

what she/he wanted to do.
possible results/reactions.

Group X - subjects in this experimental group received the "feedback plus goal setting" treatment. The "goal setting" treatment involved a conference between the investigator and each individual subject, in which the process of "goal setting" was used, utilizing OSIA information and coded data. The "feedback" was provided,
with the investigator as a support, utilizing data
gathered from OSIA observations and the information
derived from the "goal setting" conference.

Each teacher had five "goal setting" conferences with the
investigator. Immediately after each of these conferences, the
investigator made an observation of the teacher's lesson. Immediately
following the observation, the teacher and the investigator had
another conference in which the teacher received the feedback treat-
ment followed by new goal setting conference. Each teacher in this
group received feedback four times.

The materials used by this experimental group were:

- OSIA matrix of intent
- teachers' "goal setting" form
- audiotaped lesson
- code OSIA data
- teachers' form for self-feedback

The same principles which guided the "feedback" treatment
only and the "goal setting" treatment only were combined for the
$X_{OFG}$ group during its experimental treatment.

The Post-Treatment Phase. One day after completion of the
treatments the sixteen subjects participating in the experimental groups
$(X_0, X_{OF}, X_{OG}, X_{OFG})$ answered the questionnaire soliciting their reaction
to the investigation. On the following day, all subjects ($N=20$) respond-
ed to the MTAI.

The post-treatment observations, using OSIA, were made by
the five trained observers only. The investigator did not participate
in these observations in order to protect the results from possible
bias she could have, knowing and having worked with the teachers in
the different treatment groups.
The observations were randomly assigned to the five trained observers. Each teacher was observed four times in a live classroom situation. Each observation lasted fifteen minutes. All observations were audiotaped. The investigator randomly selected two observations made by each of the trained observers and coded them in order to compute the Scott's inter-observer agreement coefficients. The mean of the Scott's coefficient for the post-treatment observation was .85.

Analysis of the Data

Change was the critical variable in this investigation. If change was present it was to be manifested in the evidence provided in the experimental research pre-post design.

The collected data were analyzed by using both descriptive and inferential statistical techniques. Both descriptive and inferential statistical analyses were performed using data gathered by the two instruments used in the study: the MTAI and the OSIA.

The OSIA data from pre- and post-treatment observations were punched on computer cards for analysis. A compute program specially designed by William Siders for analysis of OSIA data was used and it is on tape at the computer center at The Ohio State University campus. The data gathered with OSIA were used to generate summary OSIA matrices, accumulated total frequencies and percentages of the OSIA behavior categories and the computation of different types of OSIA dependent variables.

The descriptive OSIA statistical data analysis involved
a study of the characteristic instructional behaviors of the teachers participating in this investigation. Some attention was paid to these behaviors in relationship to student behaviors.

The inferential data analysis of the OSIA data was carried on through a long and elaborate series of statistical treatments. For these, the matrices and the variable analysis printed by the computer were extremely useful. The data produced by the OSIA matrices were analyzed through pre-programmed formulas to produce indices and ratios (the variables analysis). The indices so produced are approximately equivalent to percentages. Appendix D presents a reduced sample copy of one of the matrix and variable analysis provided by the computer in this investigation.

Seventeen OSIA dependent variables were selected from the nineteen potential variables to be used in the inferential statistical analysis. These variables seemed to represent aspects related to the teachers' efforts toward changing their instructional behavior. Arcsine transformations were computed on the pre, post and raw gain scores of the twenty subjects in each of the seventeen OSIA variables.

Correlation matrices were computed on the pre-post and pre-gain arcsine transformed scores. Based on the observed results from such matrices, it was decided that the "residual" gain scores should be computed using the arcsine transformed scores. All these statistical explorations of the data were done in order to determine how they could best be prepared and organized for the inferential statistical analysis. These statistical explorations were intended to prepare the data for the general techniques of analysis of
variance. Such techniques seemed to be most appropriate in this investigation.

Three different approaches were taken during the exploration of the statistical analysis: the analysis of variance (ANOVA), the analysis of covariance (ANCOVA), and the multivariate analysis of variance (MANOVA). They are discussed in some detail in the following chapter.

After these statistical explorations were completed it was decided that the most suitable analysis was the MANOVA. The assumption underlying its use seemed most tenable with these data, it provided the richest information and at the same time adequately protected the making of inferences at the .05 level of significance.

Following the statistical explorations developed with the data an attempt was made to define a new undefined variable on the basis of the investigator's work with the teachers and the evidence accumulated in the investigation. The new variable was defined and the data were analyzed using ANOVA.

The teachers' answers to the translated version of the MTAI were hand-scored. The scores were recorded for pre- and post-treatment measurements. MTAI scores were recorded on a master list, identified by the teachers and group code number, for posterior inferential statistical analysis.

The inferential data analysis of the MTAI scores employed two one-way ANOVA's.

Finally, a descriptive analysis of the teachers' answers to the questionnaire soliciting their reactions to the investigation
was done. The questionnaire data were examined by the investigator to discover the teachers' perceptions about the experience in order to better understand what happened and how future efforts of this kind might be improved.

A fuller understanding of this investigation required the investigator to employ a number of approaches to data analysis. Some were solely descriptive, some were statistically descriptive, and some were statistically inferential. Because of the exploratory nature of the investigation a variety of analytical procedures were employed to determine which ones were most suitable.
CHAPTER XIV

ANALYSIS OF RESULTS

Introduction

This chapter presents the results of the data analysis and findings of the investigation. It contains the descriptive and parametric inferential data results on the OSIA dependent variables, the MTAI scores, and the teachers' answers to the questionnaire soliciting their reaction to the investigation. It also describes some of the statistical explorations utilized during the analysis of results. The research questions and hypotheses which guided the investigation are presented and are used to help organize the reporting of the results.

The investigation was exploratory and experimental in nature. Its central experimental purpose was to analyze the effects of feedback, goal setting and feedback plus goal setting on the instructional behavior of Brazilian teachers who had received in-service training in OSIA instructional behaviors and selected patterns of such behaviors.

Research Questions

Several general research questions served as guidelines to this investigation. It must be noted that the instructional autonomy of the teachers was preserved during the entire experiment. As a result, it was not possible to predict in advance the nature and
directions that the changes in behavior of the participating teachers might take. They decided for themselves and therefore the determination of the nature of the changes and their significance had to be determined by analysis of data after-the-fact.

These are the research questions that guided this investigation:

1) What are the typical instructional characteristics of classrooms of the teachers participating in this investigation?

2) What OSIA instructional behaviors are manifested in the classrooms of the teachers participating in this investigation?

3) What, if any, are the major significant effects of in-service training in OSIA instructional behaviors and selected patterns of such behaviors on the instructional behavior of the teachers participating in this investigation?

4) What, if any, are the significant effects of training in OSIA instructional behaviors and selected patterns of such behaviors on the instructional behavior of the teachers who received:
   a. the feedback treatment?
   b. the goal setting treatment?
   c. the feedback plus goal setting treatment?

5) Are there any significant differences among and between the five groups in this investigation in respect to changes in their instructional behavior?

6) What is the range and mean of the MTAI scores of Brazilian teachers participating in this investigation?

7) Do in-service training in OSIA instructional behaviors and selected patterns of such behaviors and the feedback, goal setting, and feedback plus goal setting treatments have any effect on the teachers' MTAI scores?

8) What are the perceptions the participating Brazilian teachers have of this kind of in-service experience?
The answers to these questions are presented in the following sections of this chapter. Because of the nature and complexity of the research questions, and the analysis of data, it is necessary to present descriptive statistical as well as inferential parametric analysis of results. It was also necessary to subdivide the results presentation into three distinct parts: the OSIA data, the MTAI data, and the data from the questionnaire soliciting teachers' reactions to the investigation.

OSIA descriptive data results

This section of the chapter presents the results to the two first research questions:

1) What are the instructional characteristics of the classroom of the teachers participating in this investigation?

2) What OSIA instructional behaviors are manifested in the classroom of the teachers participating in this investigation.

After all OSIA observations were recorded, the behavior categories and their frequencies were key punched on computer cards. The cards were processed by the computer program specially designed by William Siders for analysis of the OSIA data. The descriptive statistical analysis given by the computer consists primarily of summary OSIA matrices with accumulated total frequencies and percentage of the OSIA behavior categories and a standard descriptive variable analysis (See Appendix D). The following results were all computed with the descriptive OSIA results, derived from the computer outputs and they present a description of the instructional characteristics of the classrooms of the teachers participating in the
investigation. This description is the result of forty hours of classroom observations and represents approximately 30,000 discrete observations of the instructional behaviors of twenty polyvalent teachers and their students.

The investigator recognizes that all data produced in the investigation were influenced by the students' behaviors in the classroom, the teachers' personalities, the school and classroom organization and other extraneous variables which were not being analyzed in this investigation.

According to Hough and Duncan,

Instructional activities are those activities associated with creating the conditions for or promoting learning. There are, of course, activities which take place in educational settings which are not instructional. We call the behaviors associated with such activities instructionally nonfunctional behaviors. This is a kind of "last resort" category. If the manifest behavior being observed is not related in any understandable way to creating the conditions for or promoting learning we classify it as instructionally nonfunctional. For example, sometimes behavior in a classroom will become extremely confused; everyone talking or moving about at the same time without any apparent purpose. Sometimes a messenger will come to the class and interrupt the instructional activities while the teacher and the messenger converse...all behaviors in education situations are not automatically instructionally functional (70-paper 2:3).

The instructionally functional behaviors are all behaviors included in the nineteen OSIA behavior categories as presented in table 6 and figure 2 in Chapter III. Figure 4 below gives a clear distinction between instructionally functional and instructionally nonfunctional behaviors, as defined in the revised OSIA.

In a classroom of the twenty subjects of this investigation,
### FIGURE 4

Instructionally Functional and Instructionally Nonfunctional Behaviors in the OSIA*

<table>
<thead>
<tr>
<th>Instructionally Functional Behavior</th>
<th>Instructionally Nonfunctional Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appraisal Behavior</strong></td>
<td><strong>Substantive Behavior</strong></td>
</tr>
<tr>
<td>Behavior that judges or acknowledges a person, a behavior, or a product of a person's behavior who is a member of the instructional situation.</td>
<td>Behavior that is directly associated with achieving learning outcomes considered by those in the instructional situation to be a legitimate part of the subject matter of the field under study.</td>
</tr>
</tbody>
</table>

an average of seventy eight percent of the behaviors manifested during a lesson are instructionally functional behaviors and twenty two percent of the behaviors are instructionally nonfunctional.

Considering the entire lesson as a unit and dividing the instructionally functional behaviors between those manifested by the teacher and those manifested by the students, an average of fifty four percent of the behaviors are manifested by teachers and twenty four percent are manifested by students. The remaining twenty two percent include the instructionally nonfunctional behaviors (silence or confusion). See table 9.

TABLE 8
Percent of Instructionally Functional and Instructionally Nonfunctional Behaviors in the Classroom of Twenty Teachers as Recorded During the Pre- and Post-Treatment Observations

<table>
<thead>
<tr>
<th></th>
<th>Pre%</th>
<th>Post%</th>
<th>Overall Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructionally -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Behaviors</td>
<td>73.84</td>
<td>82.06</td>
<td>77.94</td>
</tr>
<tr>
<td>Teacher Behavior</td>
<td>51.38</td>
<td>56.30</td>
<td>53.84</td>
</tr>
<tr>
<td>Student Behavior</td>
<td>22.46</td>
<td>25.75</td>
<td>24.10</td>
</tr>
<tr>
<td>Instructionally -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonfunctional Behaviors</td>
<td>22.16</td>
<td>17.95</td>
<td>22.06</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

N = 160 fifteen minute observations (forty hours)

Table 9 shows the average percentage of instructionally functional and instructionally nonfunctional behavior during pre- and post-treatment observations for the five groups studied in this
investigation. In four of the five groups there was a decrease in the average percentage of instructionally nonfunctional behaviors during the post-treatment observations. Apparently, \( X_{OFG} \) made the largest numerical change between pre- and post-treatment observations on the average percentage of instructionally functional (pre: \( M = 59.7\% \); post: \( M = 80.5\% \)) and instructionally nonfunctional behaviors (pre: \( M = 40.3\% \); post: \( M = 19.5\% \)) manifested during the observed lessons.

**TABLE 9**

Five Group Mean Percents of Instructionally Functional and Instructionally Nonfunctional Behaviors as Recorded During the Pre- and Post-Treatment Observations

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre Functional</th>
<th>Pre Nonfunctional</th>
<th>Post Functional</th>
<th>Post Nonfunctional</th>
</tr>
</thead>
<tbody>
<tr>
<td>( X )</td>
<td>80.1</td>
<td>19.9</td>
<td>90.5</td>
<td>9.5</td>
</tr>
<tr>
<td>( X_0 )</td>
<td>72.7</td>
<td>27.3</td>
<td>85.2</td>
<td>14.8</td>
</tr>
<tr>
<td>( X_{OF} )</td>
<td>72.7</td>
<td>27.3</td>
<td>73.5</td>
<td>26.5</td>
</tr>
<tr>
<td>( X_{OG} )</td>
<td>84.0</td>
<td>16.0</td>
<td>80.6</td>
<td>19.4</td>
</tr>
<tr>
<td>( X_{OFG} )</td>
<td>59.7</td>
<td>40.3</td>
<td>80.5</td>
<td>19.5</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>Mean</strong> 73.84</td>
<td><strong>Mean</strong> 26.16</td>
<td><strong>Mean</strong> 82.06</td>
<td><strong>Mean</strong> 17.94</td>
</tr>
</tbody>
</table>

\( N = 160 \) fifteen minute observations (forty hours)

Now, consider the total amount of instructionally functional behaviors manifested in the classroom of the subjects participating in this investigation. What does the distribution of teacher and student behaviors look like? Taking into account the total number of fifteen minute observations (\( N = 160 \)) made during this investigation,
an average of sixty nine percent of the instructionally functional behaviors are manifested by the teacher and thirty one percent of those behaviors are manifested by the students in the classroom of the twenty teachers participating in this investigation. Table 10 presents the mean percentage of teacher and student behaviors during pre- and post-treatment observations for the five groups studied in this investigation. Numerically, there was a decrease in the amount of teacher behavior and a consequent increase in the amount of student behavior in the four experimental groups of this investigation.

Table 10 also shows the numerical difference between pre- and post-treatment observations on the mean percentage of teacher and student behaviors, manifested in the classroom of the teachers of this investigation.

TABLE 10

Percent of Instructionally Functional Behaviors Manifested by Teacher and Students During Pre- and Post-Treatment Observations

<table>
<thead>
<tr>
<th>Groups</th>
<th>Teacher</th>
<th></th>
<th>Students</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre%</td>
<td>Post%</td>
<td>Pre%</td>
<td>Post%</td>
</tr>
<tr>
<td>X</td>
<td>68.3</td>
<td>71.6</td>
<td>31.7</td>
<td>28.4</td>
</tr>
<tr>
<td>X_0</td>
<td>78.0</td>
<td>74.4*</td>
<td>22.0</td>
<td>25.6**</td>
</tr>
<tr>
<td>X_OF</td>
<td>64.1</td>
<td>63.8*</td>
<td>35.9</td>
<td>36.2**</td>
</tr>
<tr>
<td>X_OG</td>
<td>68.6</td>
<td>68.0*</td>
<td>31.4</td>
<td>32.0**</td>
</tr>
<tr>
<td>X_OFG</td>
<td>69.2</td>
<td>64.1*</td>
<td>30.8</td>
<td>35.9**</td>
</tr>
<tr>
<td>Overall (%)</td>
<td>69.6</td>
<td>68.4*</td>
<td>30.4</td>
<td>31.6**</td>
</tr>
</tbody>
</table>

Overall Mean (%) 69.00 31.00
N = 160 fifteen minute observations (forty hours)
* = decreased
** = increased

The OSIA data analysis also gives information about the
Instructional strategy variables.

Instructional strategies are defined in terms of patterns of instructional behaviors and moves from one behavior to another as exhibited by a teacher and students in an instructional session (70:10).

Hough and Duncan have defined fourteen instructional strategies in terms of the source, content, direction of communication (or artifact as an object of attention), and receiver of communication or information as expressed in manifest instructional behaviors and moves of the teacher and students (69:chapters 6, 7, 8, 9). Only four of such strategies were analyzed in this investigation; they were among the seventeen OSIA dependent variables selected for statistical analysis, based on the belief that those variables were related to the teachers' efforts toward the behavioral changes they were engaged on during the in-service training and the treatment phase of this investigation. Figure 5 defines each of these, according to the source of communication, content of communication, direction of communication and receiver of communication. The four instructional strategies are: Teacher Interactive Substantive (TIS), Teacher Interactive Managerial (TIM), Teacher Direct Substantive (TDS), and Teacher Direct Managerial (TDM). In general, during an instructional session in a classroom of the twenty Brazilian teachers participating in this investigation, the most used instructional strategy was the TIS (72.5%) and the least used instructional strategy was the TDM (2.5%). See table 11.

The second research question that guided the descriptive analysis of this investigation asked for the typical instructional behaviors manifested by twenty Brazilian teachers participating in
<table>
<thead>
<tr>
<th>Source of Communication</th>
<th>Content of Communication</th>
<th>Direction of Communication</th>
<th>Receiver of Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS Teacher</td>
<td>Substantive Content</td>
<td>from teacher to student</td>
<td>Student(s)</td>
</tr>
<tr>
<td>TDM Teacher</td>
<td>Managerial Content</td>
<td>from teacher to student</td>
<td>Student(s)</td>
</tr>
<tr>
<td>TIS Teacher</td>
<td>Substantive Content</td>
<td>reciprocal = from teacher to student and back to teacher</td>
<td>Student and back to teacher</td>
</tr>
<tr>
<td>TIM Teacher</td>
<td>Managerial Content</td>
<td>reciprocal = from teacher to student and back to teacher</td>
<td>Student and back to teacher</td>
</tr>
</tbody>
</table>

**FIGURE 5**

Four Teacher Instructional Strategies Conceptualized in the OSIA*.

**TABLE 11**

Average Mean Frequencies and Percentages of Four Selected Teacher Instructional Strategy Indices in the Classrooms of Twenty Teachers in a Poly- lent School in Brazil

<table>
<thead>
<tr>
<th>Instructional Strategy</th>
<th>Pre f</th>
<th>%</th>
<th>Post f</th>
<th>%</th>
<th>Overall Mean f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIS</td>
<td>46.1</td>
<td>71.8</td>
<td>53.2</td>
<td>73.1</td>
<td>49.6</td>
<td>72.5</td>
</tr>
<tr>
<td>TIM</td>
<td>5.5</td>
<td>8.6</td>
<td>7.6</td>
<td>10.4</td>
<td>6.6</td>
<td>9.6</td>
</tr>
<tr>
<td>TDS</td>
<td>10.3</td>
<td>16.0</td>
<td>10.8</td>
<td>14.8</td>
<td>10.5</td>
<td>15.4</td>
</tr>
<tr>
<td>TDM</td>
<td>2.3</td>
<td>3.6</td>
<td>1.2</td>
<td>1.7</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>64.2</td>
<td>100.0</td>
<td>72.8</td>
<td>100.0</td>
<td>68.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*The operational definitions of these strategies is very complex and a full explication is available in the computer program. They will not be reported here.
this investigation. Table 12 presents the overall means of frequencies for each of the nineteen teacher behaviors, as defined in the OSIA. It also shows the means of frequencies of the behaviors during pre- and post-treatment observations. Based on such results, it was found that the most typical instructional behavior manifested by the twenty Brazilian teachers participating in this investigation, during the instructional process, was Substantive Initiating (T3). This behavior is defined as:

any spoken, nonappraisal behavior that presents substantive...information to another or others. The initiating behavior may be a spoken expression of knowledge and/or an expression of feeling states or value preferences (70, paper 3:18).

This behavior accounts for twenty eight percent of the total behaviors recorded for the ten most used OSIA instructional behaviors manifested by the teacher. It is more than four times the amount of the behavior of soliciting clarification (T1) that is the fifth behavior in the top ten OSIA instructional behaviors manifested by twenty teachers working in a polyvalent school in Brazil.

Next to initiating substantive information, the second most typical teaching behavior manifested by Brazilian teachers participating in this investigation is Substantive Soliciting (T4). It is defined as:

any manifest (spoken and/or unspoken) non-appraisal behavior that evokes or is clearly intended to evoke substantive behavior from another person in the instructional situation (70, paper 3:20).

This behavior alone amounts to twenty four percent of the total behaviors recorded among the ten top OSIA instructional behaviors
TABLE 12

Mean Frequency of Occurrence and Duration of Teacher Behaviors as Coded by the OSIA for the Pre-, Post-Treatment and Combined Observations for Twenty Teachers in a Polyvalent School in Brazil

<table>
<thead>
<tr>
<th>OSIA Category</th>
<th>Behavior Definition</th>
<th>Pre (X)</th>
<th>Post (Y)</th>
<th>Overall mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Soliciting Clarification</td>
<td>40.0</td>
<td>59.4</td>
<td>49.7</td>
</tr>
<tr>
<td>T2</td>
<td>Responding</td>
<td>29.0</td>
<td>9.8</td>
<td>19.4</td>
</tr>
<tr>
<td>T3</td>
<td>Initiating</td>
<td>232.0</td>
<td>256.6</td>
<td>244.3</td>
</tr>
<tr>
<td>T4</td>
<td>Soliciting</td>
<td>202.2</td>
<td>199.0</td>
<td>200.6</td>
</tr>
<tr>
<td>T5</td>
<td>Judging Incorrectness</td>
<td>15.2</td>
<td>13.2</td>
<td>14.2</td>
</tr>
<tr>
<td>T6</td>
<td>Judging Correctness</td>
<td>12.6</td>
<td>13.0</td>
<td>12.8</td>
</tr>
<tr>
<td>T7</td>
<td>Acknowledging</td>
<td>99.8</td>
<td>102.4</td>
<td>101.1</td>
</tr>
<tr>
<td>T8</td>
<td>Personal Positive Judging</td>
<td>.6</td>
<td>1.2</td>
<td>0.9</td>
</tr>
<tr>
<td>T9</td>
<td>Personal Negative Judging</td>
<td>11.2</td>
<td>6.0</td>
<td>5.9</td>
</tr>
<tr>
<td>T10</td>
<td>Soliciting Clarification</td>
<td>.2</td>
<td>.4</td>
<td>0.3</td>
</tr>
<tr>
<td>T11</td>
<td>Responding</td>
<td>4.2</td>
<td>.4</td>
<td>2.3</td>
</tr>
<tr>
<td>T12</td>
<td>Initiating</td>
<td>42.4</td>
<td>17.4</td>
<td>29.9</td>
</tr>
<tr>
<td>T13</td>
<td>Soliciting</td>
<td>98.0</td>
<td>145.2</td>
<td>121.6</td>
</tr>
<tr>
<td>T14</td>
<td>Unspoken Responding</td>
<td>2.2</td>
<td>6.8</td>
<td>4.5</td>
</tr>
<tr>
<td>T15</td>
<td>Unspoken Initiating</td>
<td>54.4</td>
<td>29.8</td>
<td>42.1</td>
</tr>
<tr>
<td>T16</td>
<td>Reflecting-Manipulating</td>
<td>3.0</td>
<td>7.4</td>
<td>5.2</td>
</tr>
<tr>
<td>T17</td>
<td>Unspoken Responding</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>T18</td>
<td>Unspoken Initiating</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>T19</td>
<td>Reflecting-Manipulating</td>
<td>.4</td>
<td>3.2</td>
<td>1.8</td>
</tr>
</tbody>
</table>
used by teachers who participated in this investigation. Substantive Initiating (T3) and Substantive Soliciting (T4) account for a little over fifty percent of the behaviors among the ten most used OSIA instructional behaviors.

Next in order use, Brazilian teachers manifest Managerial Soliciting (T13), and this behavior accounts for fifteen percent of the total amount of behaviors among the ten top OSIA teacher instructional behaviors and it is defined below:

any manifest (spoken and/or unspoken) non-appraisal behavior that evokes or is clearly intended to evoke...managerial behavior from another person in the instructional situation (70, paper 3:20).

Acknowledging behavior (T7) was the fourth most typical teaching behavior manifested by these teachers, during the instructional process. Acknowledging is:

any manifest (spoken and/or unspoken) behavior that responds or reacts to a person (self or other), an antecedent behavior of the self, or of another, or to a product of such behavior appearing in the instructional situation by acknowledging the person, behavior, or product in ways that indicate that the person, behavior, or product has been perceived. No judgment is expressed (70, paper 3:7).

It may appear that the position of the teacher acknowledging behavior, among the most commonly used instructional behaviors, is unusually high. But much of its frequency and duration was accounted for by teachers repeating student's answers. This is apparently a common practice among teachers in this polyvalent school.

Substantive Soliciting Clarification (T1) was found to be the next most typical teaching behavior and it is defined as:

any manifest non-appraisal behavior (spoken and/or
spoken) that evokes or is intended to evoke from another person the fuller meaning of an antecedent behavior of that other person or a product of his behavior. The behavior intended to evoke the fuller meaning may be in the form of a question, direction or suggestion (70-paper 3:14).

The next five most typical teaching behaviors manifested in the classrooms of the twenty teachers in Brazil were: Unspoken Substantive Initiating (T15), Managerial Initiating (T12), Substantive Responding (T2), Judging Incorrectness (T5), and Judging Correctness (T6). The mean frequencies and percentages of these are shown in Table 13.

TABLE 13

Percentage of and Mean Frequency of Occurrence and Duration of the Ten Most Frequently Occurring Teacher Behaviors for Twenty Teachers in a Polyvalent School in Brazil

<table>
<thead>
<tr>
<th>Order of</th>
<th>OSIA Behavior</th>
<th>Overall Mean of Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T3</td>
<td>244.3</td>
<td>28.0</td>
</tr>
<tr>
<td>2</td>
<td>T4</td>
<td>200.6</td>
<td>24.0</td>
</tr>
<tr>
<td>3</td>
<td>T13</td>
<td>121.6</td>
<td>15.0</td>
</tr>
<tr>
<td>4</td>
<td>T7</td>
<td>101.1</td>
<td>12.0</td>
</tr>
<tr>
<td>5</td>
<td>T1</td>
<td>49.7</td>
<td>6.0</td>
</tr>
<tr>
<td>6</td>
<td>T15</td>
<td>42.1</td>
<td>5.0</td>
</tr>
<tr>
<td>7</td>
<td>T12</td>
<td>29.9</td>
<td>4.0</td>
</tr>
<tr>
<td>8</td>
<td>T2</td>
<td>19.9</td>
<td>2.5</td>
</tr>
<tr>
<td>9</td>
<td>T5</td>
<td>14.2</td>
<td>2.0</td>
</tr>
<tr>
<td>10</td>
<td>T6</td>
<td>12.8</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Parametric Inferential OSIA Data Results

This section of the chapter describes the results derived from the parametric inferential OSIA data analysis. Primarily, it deals with the answers to research questions 3 through 5 and the two hypotheses underlying such questions. Because of the open-ended research design and the complex nature of the collected data it is
necessary to present some brief explanation of the statistical exploration done with the data and the statistical procedures used to analyze the data before going into the results themselves. It must be noted that the outcome variables, which were in fact self-defined by the teachers, are composed of counts of behavior or the frequency of occurrence of behaviors in particular categories. The nature of the variables analyzed in this investigation differ from the typical psychometric data that is analyzed in much educational and psychological research.

Exploration of the Data and Preparation for Inferential Statistical Analyses. When the original proposal was developed for this investigation different parametric and nonparametric procedures for statistical analysis were considered. The open-ended nature of the experimental investigation plus the lack of understanding of the distribution characteristics of the OSIA data made it difficult to determine what inferential statistical analyses were most appropriate. At the time the proposal was written it seemed that the analysis of covariance (ANCOVA) would be most appropriate. Nevertheless, there was concern as to whether the assumptions underlying the use of ANCOVA would be reasonably fulfilled by the actual empirical data. For example, there have been no empirical studies to support the proposition that the OSIA indices or ratios computed from teacher behaviors at one point in time correlate with the same indices or ratios computed at another point in time. Experience in the direct observation of instruction suggests that samples of teacher behavior,
taken over a given period of time (as in the pre-treatment observations in this investigation), are reasonably good predictors of teacher behavior at a later time (as in the post-treatment observations in this investigation).

The data produced in the direct observation of instruction using the OSIA are frequency counts of manifest behaviors in a variety of categories. Although one category of behavior may serve to define a variable (e.g., the number of behaviors of teacher soliciting clarification) the much more common way to define an instructional variable is by combining categories of behavior into ratios (e.g., the number of behaviors of teacher soliciting clarification / the number of behaviors of teacher soliciting clarification + the number of behaviors of the teacher soliciting). The distribution characteristics of these OSIA ratios as they would be manifested in data drawn from the extensive observation of live instructional situations are presently unknown. It is known, of course, that their value ranges from zero to 1.00.

Because of these uncertainties about the basic nature of the data it has never been directly apparent (1) what inferential statistical analysis might be most appropriate and (2) what, if any, thing should be done to prepare the data for parametric analyses like those involved in the techniques growing out of the analysis of variance. There was, in addition, a problem in deciding how pre-post change should be measured: should gain scores or residual gain scores be used? for example.
These questions about the nature of the data and how it might best be analyzed in the inferential sense led to extensive exploration of the possibilities in data analysis. That exploration began through a close examination of the characteristics of the data, as revealed by matrices and the descriptive variable analyses on the computer printouts. In many instances it was necessary to go back to the original coded data in the attempt to understand the meaning behind the summary data provided by the computer printout. The exploration continued with the statistical help and advice of John Kennedy and James Duncan, both at The Ohio State University, and the extensive use of the computer to perform trial analyses.

The descriptive statistical results gathered from the OSIA computer program analysis presented the raw pre-treatment observation scores and post-treatment observation scores on each of the seventeen OSIA dependent variables selected for analysis in this investigation. These are presented in table 14. Based on the information gathered from pre- and post-treatment scores on each of the seventeen OSIA variables, the investigator computed the raw gain scores for each of the twenty teachers. Correlation matrices for the pre-post-treatment scores and for the pre-gain scores were computed using the SOUPAC subprogram of correlations. A careful analysis of the raw data: pre, post, and gain scores, suggested that a mathematical transformation of the raw scores was appropriate in order to normalize the within group variance. The arcsine transformation was selected and the raw scores for the seventeen OSIA variables were computed for the twenty subjects.
<table>
<thead>
<tr>
<th>Number of Variable</th>
<th>Code for Variable</th>
<th>Name of Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S/T</td>
<td>Ratio of total student to teacher behaviors</td>
</tr>
<tr>
<td>2</td>
<td>T I/D</td>
<td>Ratio of teacher indirect influence behaviors to direct influence behaviors</td>
</tr>
<tr>
<td>3</td>
<td>T i/d</td>
<td>Ratio of modified teacher indirect influence behavior to direct influence behaviors</td>
</tr>
<tr>
<td>4</td>
<td>T rI/D</td>
<td>Ratio of teacher indirect influence in response behaviors to teacher direct influence in response behaviors</td>
</tr>
<tr>
<td>5</td>
<td>T rI/d</td>
<td>Ratio of modified teacher indirect influence in response behaviors to direct influence in response behaviors</td>
</tr>
<tr>
<td>6</td>
<td>T Q/L</td>
<td>Ratio of teacher questioning to lecture</td>
</tr>
<tr>
<td>7</td>
<td>T Q/R</td>
<td>Ratio of teacher questioning to response behavior</td>
</tr>
<tr>
<td>8</td>
<td>T RQ/D</td>
<td>Ratio of teacher reflective questioning to drill behaviors</td>
</tr>
<tr>
<td>9</td>
<td>T C/S</td>
<td>Ratio of teacher soliciting clarification to soliciting behaviors</td>
</tr>
<tr>
<td>10</td>
<td>SR/TA</td>
<td>Ratio of student response to question to teacher appraisal to response</td>
</tr>
<tr>
<td>11</td>
<td>T +/-</td>
<td>Ratio of positive to negative appraisal behaviors</td>
</tr>
<tr>
<td>12</td>
<td>T KR/PJ</td>
<td>Ratio of teacher knowledge to results to personal judgment behaviors</td>
</tr>
<tr>
<td>13</td>
<td>T A/NA</td>
<td>Ratio of teacher appraisal to nonappraisal in response behavior</td>
</tr>
</tbody>
</table>
TABLE 14 (Continued)

<table>
<thead>
<tr>
<th>Number of Variable</th>
<th>Code for Variable</th>
<th>Name of Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>TIS</td>
<td>Teacher Interactive Substantive Index</td>
</tr>
<tr>
<td>15</td>
<td>TIM</td>
<td>Teacher Interactive Managerial Index</td>
</tr>
<tr>
<td>16</td>
<td>TDS</td>
<td>Teacher Direct Substantive Index</td>
</tr>
<tr>
<td>17</td>
<td>TDM</td>
<td>Teacher Direct Managerial Index</td>
</tr>
</tbody>
</table>
According to Bartlett (10), the usual purpose of transformations is to change the scale of the measurements in order to make the analysis of variance more valid. He states that the arcsine transformation bears the same relation to estimated probabilities or proportions of \( x \) with binominal variance \( p(1-p)/n \), where \( n \) is the number of individuals in the sample. The approximately constant variance on the new scale is \( 2\sin^2 \frac{1}{2n} \) provided that the inverse sine, which denotes an angle, is measured in degrees. The formula for the inverse sine on angular transformation is:

\[
g(x') = \sin^{-1} \sqrt{x}
\]

The SOUPAC subprogram of transformations was used for the computation of the arcsine transformations for the pre, post and gain scores of each of the twenty teachers on all seventeen OSIA dependent variables. Turn to Appendix E to compare the numerical differences between the raw and the arcsine transformation scores in a sample of the scores.

Correlation matrices were computed for the pre-post and pre-gain arcsine transformations on each of the seventeen OSIA dependent variables. Table 15 shows the correlation coefficients of seventeen OSIA variables for the pre-post scores, comparing raw and arcsine transformation scores. Table 16 shows the correlation coefficients for the pre- and gain scores on all seventeen OSIA dependent variables, comparing raw and arcsine transformation scores.
TABLE 15

Correlations of Pre- and Post-Treatment Raw Scores and Pre- and Post-Treatment Transformed Scores for Seventeen OSIA Dependent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Raw Scores</th>
<th>Transformed* Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>.5556</td>
<td>.5734</td>
</tr>
<tr>
<td>T I/D</td>
<td>.4906</td>
<td>.5636</td>
</tr>
<tr>
<td>T i/d</td>
<td>.3100</td>
<td>.2793</td>
</tr>
<tr>
<td>T rI/D</td>
<td>.3067</td>
<td>.2835</td>
</tr>
<tr>
<td>T rI/d</td>
<td>.2139</td>
<td>.1931</td>
</tr>
<tr>
<td>T Q/L</td>
<td>.4931</td>
<td>.6016</td>
</tr>
<tr>
<td>T Q/R</td>
<td>.5467</td>
<td>.4233</td>
</tr>
<tr>
<td>T RQ/D</td>
<td>.4375</td>
<td>.4355</td>
</tr>
<tr>
<td>T C/S</td>
<td>.2706</td>
<td>.2708</td>
</tr>
<tr>
<td>SR/TA</td>
<td>.1114</td>
<td>.0747</td>
</tr>
<tr>
<td>T +/-</td>
<td>.2875</td>
<td>.3163</td>
</tr>
<tr>
<td>T K/P</td>
<td>.1722</td>
<td>.2460</td>
</tr>
<tr>
<td>T A/NA</td>
<td>.1740</td>
<td>.1697</td>
</tr>
<tr>
<td>TDS</td>
<td>.5432</td>
<td>.5411</td>
</tr>
<tr>
<td>TDM</td>
<td>-.2159</td>
<td>-.2230</td>
</tr>
<tr>
<td>TIS</td>
<td>.4041</td>
<td>.4077</td>
</tr>
<tr>
<td>TIM</td>
<td>.2366</td>
<td>.2453</td>
</tr>
</tbody>
</table>

*Arcsine transformation
TABLE 16

Correlations of Raw Pre- and Gain Scores
and Transformed Pre- and Gain Scores for
Seventeen OSIA Dependent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Raw Scores Correlations</th>
<th>Transformed* Score Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>-.6825</td>
<td>-.6915</td>
</tr>
<tr>
<td>T I/D</td>
<td>-.3243</td>
<td>-.3467</td>
</tr>
<tr>
<td>T i/d</td>
<td>-.7019</td>
<td>-.6752</td>
</tr>
<tr>
<td>T rL/D</td>
<td>-.5460</td>
<td>-.5184</td>
</tr>
<tr>
<td>T rL/d</td>
<td>-.7130</td>
<td>-.6740</td>
</tr>
<tr>
<td>T Q/L</td>
<td>.0123</td>
<td>.0367</td>
</tr>
<tr>
<td>T Q/R</td>
<td>-.7103</td>
<td>-.7038</td>
</tr>
<tr>
<td>T RQ/D</td>
<td>-.3365</td>
<td>-.3382</td>
</tr>
<tr>
<td>T C/S</td>
<td>-.4195</td>
<td>-.4186</td>
</tr>
<tr>
<td>SR/TA</td>
<td>-.7170</td>
<td>-.7005</td>
</tr>
<tr>
<td>T +/-</td>
<td>-.6777</td>
<td>-.6972</td>
</tr>
<tr>
<td>T K/P</td>
<td>-.2230</td>
<td>-.6176</td>
</tr>
<tr>
<td>T a/NA</td>
<td>-.5944</td>
<td>-.5917</td>
</tr>
<tr>
<td>TDS</td>
<td>-.0175</td>
<td>.0619</td>
</tr>
<tr>
<td>TDM</td>
<td>.3580</td>
<td>.8866</td>
</tr>
<tr>
<td>TIS</td>
<td>-.2248</td>
<td>-.5451</td>
</tr>
<tr>
<td>TIM</td>
<td>.0585</td>
<td>.0091</td>
</tr>
</tbody>
</table>

*Arcsine Transformation

As a result of an examination of the raw and arcsine transformed scores and their correlation coefficients, it was decided that a new unit of measurement should be considered for the statistical analysis of the OSIA data.

Cronback and Furley (34:68) state that:

"raw change" or "raw gain" scores formed by subtracting pretest scores from posttest scores lead to fallacious conclusions, primarily because such scores are systematically related to any random error of measurement.

Cronback and Furley (34), Lord (104,105), O'Connor (119), and other investigators recommend the use of "residual gain" score as a substitute for the "raw gain" score. They present different
ways to compute "residual gain" scores, depending on the nature of the investigation. For the purpose of this investigation, the "residual gain" for each subject on each of the seventeen OSIA dependent variables was computed through the use of the BMD 02R computer program for stepwise regression. (See Appendix E).

The formula used for the computation of the "residual gain" scores was the following:

\[ Rg = Y - \hat{Y} \]

where:
- \( Rg \) - residual gain score
- \( Y \) - actual post score
- \( \hat{Y} \) - expected post score = \( b_0 + b_1X_1 \)

where:
- \( b_0 \) - intercept
- \( b_1 \) - slope
- \( X_1 \) - individual pre-test score

The decision was made to use residual gain scores where they could be used, and the parametric techniques associated with analysis of variance. The actual dependent variables in this investigation were being defined by the teachers participating in the experiment as they decided on the nature and the direction of the change in their own instructional behavior. Although there are many instructional variables defined in the OSIA, either in terms of categories of behavior or indices and ratios, there was no way of knowing whether these variables would correspond to or measure the changes toward which the teachers were working.

There was some evidence to suggest the direction of change that grew out of the investigator's work with the teachers in the in-service training and during the time she was observing and having conferences with teachers. There was also some evidence of the nature and direction of the change that did occur in the data.
summarizing the pre- and the post-treatment observations. The
difficulty here was one of identifying the nature and direction
of the changes in instructional behavior that were (1) attributable
to the efforts of the teachers and not to chance, (2) could reason-
ably be said to be related to the treatment conditions (independent
variables) of in-service training, feedback, goal setting and
feedback plus goal setting and (3) were definable and measureable
in terms of those types of outcome variables that the data from the
OSIA produces or is capable of producing.

A second level of exploration of the data involved the ap-
plication of different statistical approaches to the problem of
determining what inferences might be made on the basis of the
data arising from the experiment. It should be pointed out here
that the purpose of the exploration was not one of discovering which
statistical analysis would provide the highest levels of support
for the hypotheses under test but rather to discover (1) which
approach would most clearly identify the nature and direction of
the changes, if any, and (2) whether or not different statistical
analyses produced contradictory results. This statistical explora-
tion is not reported in detail here but a summary of the rationale
and the results of that work follows. Three different approaches
were taken during the exploration of the statistical analyses:
the analysis of variance (ANOVA), the analysis of covariance (ANCOVA),
and the multivariate analysis of variance (MANOVA).

The pre- and post-treatment arcsine transformed scores were
used in the ANCOVA analysis. The residual gain scores derived from
arcsine transformed scores were the unit of measurement used in the ANOVA and in the MANOVA analyses.

According to Kennedy (85), analysis of covariance represents a marriage between conventional analysis of variance and regression analysis. To perform an ANCOVA, information is obtained on a concomitant variable, covariable, or covariate, and this concomitant information is used within a regression context to purify or reduce error variance.

Harris says that:

The answer to the problem of multiple experimental groups in the univariate case is (univariate) analysis of variance (ANOVA); the solution to the multiple comparison problem when there are two or more outcome measures as well as two or more groups is multivariate analysis of variance (MANOVA). (62:93).

He continues saying:

Heuristically, one-way MANOVA consists of a search for that combination of the variables which maximally discriminate among the k groups in the sense of producing the largest possible univariate F-ratio, followed by comparisons of this largest possible univariate F to a critical value appropriate to such a statistic, taking into account the extreme capitalization on chance involved in finding it. (62:101).

As previously stated, this investigation was characterized by an open-ended approach to the nature and the direction of change, an approach in which the subjects were trying autonomously to chose things to do, to decide what they wanted to do. The subjects were defining their own dependent variables. Therefore, one purpose of the statistical analysis was to find the dependent variables, to isolate them, based on what the teachers were trying to do, rejecting what the teachers were not trying to do. The statistical analysis' focus was to select and to reject the OSIA dependent
variables; to eliminate variables that were not making any difference and to select the variables that were making the difference.

The use of ANOVA helped to identify which among many OSIA dependent variables was making any difference. The use of MANOVA helped to identify those variables that, within a particular cluster of OSIA dependent variables, were making a difference. The use of ANCOVA helped to confirm that the significance of differences held up on many of the variables when a covariate technique was employed as opposed to the use of residual gain scores. All the different approaches tended to identify the same variables as variables that indicated the nature and direction of the change. In large measure these variables appeared to the investigator to be the ones that most closely approximated the nature and direction of the changes she thought the teachers had been working on during the treatment phase of this investigation.

On the basis of this experience, it was decided to use MANOVA as the basic approach to the statistical inferential analysis of the data. It required a study of the inter-correlations of the residual gain scores of the OSIA dependent variables (See Appendix E) so that they could be appropriately clustered for the MANOVA analyses and it entailed more work but with the accompanying discriminant analyses the MANOVA provided much richer information to help in the interpretation of the data. More specifically the major reasons for using MANOVA for the basic statistical analysis were the following:
1. the treatment given to the teachers was open-ended. Therefore, there was no way of telling which variables represented efforts made by the teachers;

2. there were many potential data produced by the OSIA including the seventeen selected variables to be studied and analyzed in this investigation;

3. it was necessary to ask the basic question from the behavior of the teachers: which variables they were working on;

4. many OSIA dependent variables are relatively inter-correlated because the behavior categories used to compute them are, in some instances, common to two or more variables;

5. the study of the correlation of residual gain scores of the seventeen OSIA dependent variables indicated a need to explore appropriate clusters of variables;

6. to group variables in order to determine which variables or cluster of variables were showing significant differences it was necessary to explore a variety of such combinations.

The grouping of OSIA dependent variables for the MANOVA was based on:

1. identified teachers' goals, based on the records kept by the subjects and given to the investigator during the conferences;

2. correlation matrices and other empirical evidence;

3. theoretical basis of the OSIA, with particular regard to the categories used in computing the seventeen selected OSIA dependent variables.

Figure 6 presents a general summary of the statistical exploration of the data used in this exploratory and experimental investigation, developed in Brazil.

The Research Questions and Hypotheses

The inferential statistical analyses of the OSIA data collected during this investigation were guided by the following research questions
Collection of OSIA Data
Live Classroom Observations

Descriptive Analysis OSIA
Computer Program Pre-Post

Computation of Gain Scores

Correlation Matrix
Pre-Post, Pre-Gain

Arcsine Transformations
Pre-Post-Gain

Correlation Matrix
Pre-Post-Gain

Residual Gain Scores
Arcsine Transformation

Correlation Matrix
Residual Gain Scores

Statistical Analyses

ANOVA
Residual Gain

ANCOVA
Pre-Post

MANOVA
Residual Gain

FIGURE 6
Nature and Sequence of the Inferential Statistical
Data Analysis Procedure of the OSIA Data
and hypotheses:

Research Questions:

3) What are the major significant effects of in-service training in OSIA instructional behaviors and selected patterns of such behaviors on the instructional behavior of the teachers participating in this investigation?

4) What are the significant effects of training in OSIA instructional behaviors and selected patterns of such behaviors on the instructional behavior of the teachers who received:
   a. the feedback treatment?
   b. the goal setting treatment?
   c. the feedback plus goal setting treatment?

Null Hypothesis One:

The instructional behaviors of teacher cannot be changed by the effects of an in-service training of such behaviors, accompanied by conference feedback and/or goal setting conference treatments.

Research Questions:

5) Are there any significant differences among and between the five groups in this investigation concerning the change in classroom instructional behavior?

Null Hypothesis Two:

The mean gain score for the five groups in their instructional behavior, as measured by the OSIA variables, cannot be changed as result of in-service training in OSIA instructional behaviors and selected patterns of such behaviors, accompanied by the feedback, goal setting and feedback plus goal setting treatments.

In order to answer the research questions presented above as well as to test the null hypothesis, a series of MANOVA runs were performed on different groups of OSIA variables, using the FINN computer program. A total of six MANOVA runs were performed. Three
of those produced statistically significant differences at the alpha level (.05), and they are presented below.

According to the teachers' report on their intentions for changing their instructional behavior, three OSIA dependent variables were identified by the investigator as representing such goals. In general, these goals were presumed to be most common to the teachers participating in the experimental groups. These variables were: $S/T$, $T C/S$, and $T +/-$.

$S/T$ is the ratio of the amount (occurrence and duration) of all student behaviors of soliciting clarification, response, initiation, solicitation, judging incorrectness, judging correctness, acknowledgement, personal positive judgment, personal negative judgment to all teacher behaviors of soliciting clarification, response, initiation, solicitation, judging incorrectness, judging correctness, acknowledgement, personal positive judgment, and personal negative judgment plus all student behaviors.

$T C/S$ is the ratio of the amount (occurrence and duration) of teacher soliciting clarification to solicitation plus soliciting clarification behaviors.

$T +/-$ is the ratio of the amount (occurrence and duration) of teacher judgment of correctness and personal positive judgment to judgment of incorrectness and personal negative judgment plus judgment of correctness and personal positive judgment behaviors.

To test the set of three OSIA variables, the five group means were compared by performing a MANOVA. The resultant Wilk's lambda of .172 was found to be statistically significant ($F=2.729; \text{df}=12/34.68; p < .010$).

To determine the nature of group differences related to the set of three OSIA dependent variables, a factor structure analysis was performed using the Canonical Correlation computer program developed by Cooley-Lohnes and implemented by Janet Rice. The discriminant
analysed produced only one statistically significant dimension. The discriminant weights for each of the three dependent variables are presented in table 17. Note that these weights are standardized weights (160:163) and thus may be used in attempts to determine the relative contribution made by each variable to the dimension. In the same table, the results of factor structure correlation and the univariate F's derived from ANOVA for the variables by treatment groups are summarized.

These follow-up techniques clearly indicate that the teacher groups studied differed in the variables being analyzed. The standardized discriminant function coefficients (weights) in table 17 show two large contributors to the significance of the function: S/T (.712) and T C/S (.649).

Based on the eigenvectors for the five groups, as related to membership to each variable, and with the information from the group means presented in table 18, it may be concluded that high scores in variable S/T are positively correlated with groups X (M = .068),

**TABLE 17**

*Multivariate Analysis of Variance with Residual Gain Scores on S/T, T C/S and T +/- as the Set of Dependent Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>MS Between Groups</th>
<th>Univariate (df=4/15)</th>
<th>p</th>
<th>Standardized discriminant weights</th>
<th>Structure Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>.013</td>
<td>2.634</td>
<td>.0758</td>
<td>.712</td>
<td>.691</td>
</tr>
<tr>
<td>T C/S</td>
<td>.013</td>
<td>2.672</td>
<td>.0730</td>
<td>.649</td>
<td>.647</td>
</tr>
<tr>
<td>T +/-</td>
<td>.062</td>
<td>1.747</td>
<td>.1922</td>
<td>.202</td>
<td>.436</td>
</tr>
</tbody>
</table>

Multivariate F=2.729, df=12/34.68, p < .010
X_{OG} (M=.027), and X_{OG} (M=.011) and negatively correlated with groups X (M=-.037 and X (M=-.075). Therefore, the teachers who received the in-service training in OSIA instructional behaviors and selected patterns of such behaviors, accompanied by feedback, goal setting, and feedback plus goal setting treatments increased the ratio of student/teacher participation, through their instructional behavior, in the classroom, as measured in live observations of the instructional process, using the OSIA. These teachers showed positive gain scores on the variable $S/T$. The teachers who received only the training and the ones who participated in the control group showed negative gain on the variable $S/T$.

The results also show that high scores on variable $T.C/S$ belong to group $X_{OG} (M=.095)$, not belonging to groups $X (M=-.020)$, $X_{O} (M=-.062)$, $X_{OF} (M=.000)$ and $X_{OFG} (M=-.012)$. Membership in these four groups did not correlate at a level of significance ($\alpha=.05$) with the variable $T.C/S$. These teachers who received in-service training in OSIA instructional behaviors and selected patterns of such behaviors and the goal setting treatment demonstrated an increase on the ratio of the use of clarification to the use of solicitation. High scores in $T.C/S$ are positively correlated with group $X_{OG}$.

Figure 7 graphically summarizes the results presented above. Variable $T +/-$ does not offer any singular contribution to the significance of the function analyzed through the MANOVA. A look at figure 7 and table 18 shows that the mean residual gain on $T +/-$ for group $X_{OFG} (.184)$ was singularly positive, and greater than the mean gain for groups $X_{OG} (.019)$, $X_{OF} (.024)$, $X_{O} (-.137)$ and group
### TABLE 18

Residual Gain Score Group Means and Standard Deviations of Three OSIA Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>$X(N=4)$</th>
<th>$X_o(N=4)$</th>
<th>$X_{OP}(N=4)$</th>
<th>$X_{OG}(N=4)$</th>
<th>$X_{OFG}(N=4)$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>S/T</td>
<td>-.037</td>
<td>.061</td>
<td>-.075</td>
<td>.048</td>
<td>.068</td>
</tr>
<tr>
<td>T C/S</td>
<td>-.020</td>
<td>.066</td>
<td>-.062</td>
<td>.052</td>
<td>-.000</td>
</tr>
<tr>
<td>T +/-</td>
<td>-.089</td>
<td>.216</td>
<td>-.137</td>
<td>.117</td>
<td>.024</td>
</tr>
</tbody>
</table>
FIGURE 7

Five Group Means on the Three OSIA Variables
S/T, T C/S and T +/-
The next cluster of OSIA variables analyzed through MANOVA included: \( S/T, T I/D, T Q/L \) and \( T +/- \). This cluster of variables also approximated the apparent intentions of the teachers in the view of the investigator. \( T I/D \) and \( T Q/L \) are similar in nature to \( T C/S \) but are computed using more categories of behavior and tend to be more stable.

\( T I/D \) is the ratio of the amount (occurrence and duration) of teacher soliciting clarification, soliciting, judging correctness, acknowledgment and personal positive judgment to initiation, judging incorrectness, and personal negative judgment plus soliciting clarification, soliciting, judging correctness, acknowledgment and personal positive judgment.

\( T Q/L \) is the ratio of the amount (occurrence and duration) of teacher soliciting clarification and solicitation to initiation plus soliciting clarification and soliciting behavior.

The other two OSIA variables included in the analysis are defined on page 102.

The five group means were compared by performing a one-way MANOVA in order to test the above cluster of OSIA dependent variables. The resultant Wilk's lambda of .1418 was found to be statistically significant \((F=2.087; df=16/37.298; p < .032)\).

To determine the nature of group differences related to the set of four OSIA dependent variables, a factor structure analysis was performed, using the same technique described before in this section of the chapter. The results showed that there was only one statistically significant dimension in the discriminant analysis. Table 19 presents the standardized discriminant weights for each of the four OSIA variables, the results of the factor structure correlation
TABLE 19

Multivariate Analysis of Variance with Residual Gain Scores on S/T, T I/D, T Q/L and T +/- as the Set of Dependent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>MS Between Groups</th>
<th>Univariate F(df=4/15)</th>
<th>P&lt;</th>
<th>Standardized Discriminant Weights</th>
<th>Structure Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>.013</td>
<td>2.634</td>
<td>.076</td>
<td>.378</td>
<td>.661</td>
</tr>
<tr>
<td>T I/D</td>
<td>.061</td>
<td>1.662</td>
<td>.211</td>
<td>-.753</td>
<td>.374</td>
</tr>
<tr>
<td>T Q/L</td>
<td>.147</td>
<td>3.242</td>
<td>.042</td>
<td>.965</td>
<td>.711</td>
</tr>
<tr>
<td>T +/-</td>
<td>.062</td>
<td>1.747</td>
<td>.192</td>
<td>.565</td>
<td>.612</td>
</tr>
</tbody>
</table>

Multivariate F=2.087; df=16/37.298; p < .032

and the univariate F's for each OSIA variable.

The follow-up techniques used after the multivariate F ratio was found to be statistically significant at the alpha level (α=.05) clearly indicate that the teacher groups studied differed in the four variables being analyzed in this investigation.

The standardized discriminant weights show that variable T Q/L (.965) contributes positively and singularly to the statistical significance of the function. The variable T I/D (-.753) is contributing negatively to the significance of the function.

The factor structure results demonstrate that three of the four OSIA dependent variables are considered as important for the statistical significance of the multivariate F ratio. Such variables are: S/T (.661), T Q/L (.711) and T +/- (.612). The results presented in table 20 show that high scores on variables S/T and T +/- belong to groups X\(_{QF}\) (M=.068; .024), X\(_{OG}\) (M=.027; .019) and X\(_{DFG}\) (M=.016; .184) not belonging to groups X (M=-.037; -.080 and X\(_{O}\) (M=-.075; -.137). High scores on variable T Q/L belong to groups
### TABLE 20

Residual Gain Score Group Means and Standard Deviations of Four OSIA Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>X (N=4) M</th>
<th>SD</th>
<th>X_Q (N=4) M</th>
<th>SD</th>
<th>X_OF (N=4) M</th>
<th>SD</th>
<th>X_OG (N=4) M</th>
<th>SD</th>
<th>X_OFG (N=4) M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>-.037</td>
<td>.061</td>
<td>-.075</td>
<td>.068</td>
<td>.073</td>
<td>.027</td>
<td>.038</td>
<td>.016</td>
<td>.104</td>
<td></td>
</tr>
<tr>
<td>T I/D</td>
<td>-.080</td>
<td>.141</td>
<td>-.030</td>
<td>.275</td>
<td>-.048</td>
<td>.097</td>
<td>-.001</td>
<td>.179</td>
<td>.229</td>
<td>.216</td>
</tr>
<tr>
<td>T Q/L</td>
<td>-.067</td>
<td>.096</td>
<td>-.224</td>
<td>.146</td>
<td>-.022</td>
<td>.123</td>
<td>.010</td>
<td>.254</td>
<td>.302</td>
<td>.341</td>
</tr>
<tr>
<td>T +/-</td>
<td>-.089</td>
<td>.216</td>
<td>-.137</td>
<td>.117</td>
<td>.024</td>
<td>.126</td>
<td>.019</td>
<td>.211</td>
<td>.184</td>
<td>.234</td>
</tr>
</tbody>
</table>
$X_{OG}$ (M=.010) and $X_{OFG}$ (M=.302), not belonging to groups $X$ (M=-.067), $X_{O}$ (M=-.224) and $X_{OF}$ (M=-.022). Therefore, the teachers who received the goal setting and the feedback plus goal setting treatments, accompanying the in-service training in OSIA instructional behaviors and selected patterns of such behaviors, scored higher on variable $T_{Q/L}$ than did the teachers in the other groups. The teachers in groups $X_{OG}$ and $X_{OFG}$ demonstrated an increase in the amount of questioning behavior over the amount of lecture behavior as measured by the variable $T_{Q/L}$. High scores in variable $T_{Q/L}$ are positively correlated with groups $X_{OG}$ and $X_{OFG}$.

Table 20 presents the group means and standard deviations for the four OSIA variables. Figure 8 graphically summarizes the results discussed above.

Another set of OSIA variables that was tested by MANOVA included the following: $S/T$, $T_{I/D}$ and $T_{RI/D}$. These, also, could be said to approximate the nature of the changes the teachers were apparently trying to achieve.

$T_{RI/D}$ is the ratio of the amount (occurrence and duration) of indirect teacher behaviors that follow immediately after student behavior to the amount of indirect plus direct teacher behaviors that follow immediately after student behaviors. It is referred to as the teacher response $I/D$ ratio.

Variables $S/T$ and $T_{I/D}$ are defined in pages 102 and 107 respectively.

When comparing the five group means through MANOVA, the resultant Wilk's lambda value of .174 was found to be statistically significant ($F=2.705$; df=12/34.686; $p < .011$).

The nature of group differences related to the three OSIA
Residual Gain

FIGURE 8

Five Group Means on the Four OSIA Variables
T Q/L, T +/-, T I/D and S/T
variables was determined through the factor structure analysis used as a follow-up technique. The discriminant analysis produced only one dimension that was statistically significant. The standardized discriminant weights for each variable, the factor structure correlations and the results of the univariate F for each of three OSIA variables by treatment groups are presented in table 21.

**TABLE 21**

Multivariate Analysis of Variance with Residual
Gain Scores on S/T, T I/D and T rI/D as the Set of
Dependent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>MS Between Groups</th>
<th>Univariate F(df=4/15) p&lt;</th>
<th>Standardized discriminant weights</th>
<th>Structure Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>.0125</td>
<td>2.6335 .0758 -0.900 .686</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T I/D</td>
<td>.0610</td>
<td>1.6616 .2110 1.459 .102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T rI/D</td>
<td>.0626</td>
<td>1.5638 .2349 -1.184 -.197</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multivariate F=2.705; df=12/34.686; p < .011

The value of the standardized discriminant weights demonstrate the variables S/T (-0.900) and T rI/D (-1.184) are contributing negatively to the statistical significance of the function as variable T I/D (1.459) is contributing positively to the significance of the function.

A look at the factor structure correlation for each variable indicates that S/T (-.686) is the most important variable in the cluster and that its importance is represented negatively. Low scores in variables S/T are negatively correlated with groups X_{OF} (M=.068), X_{OG} (M=.027) and X_{OFG} (M=.016), but positively correlated with groups X (M=.367) and X_{O} (M=.075). Therefore, the teachers who participated
in the goal setting treatment group and the feedback plus goal
setting treatment group, scored high in variable S/T and the control
group as well as the group that received only the in-service training
scored low on the same variable.

Table 22 presents the group means and standard deviations
for the three OSIA variables. Figure 9 graphically represents the
profile analysis for the group means for each of the three OSIA vari-
ables. The teachers in the group that received the in-service train-
ing and the feedback plus goal setting treatment (M=.229) scored
relatively higher than groups X (M=-.080), XG (M=-.030), XOG (M=-.048)
and XOG (M=-.001) in variable T I/D.

Although the factor structure correlation for variable
T rI/D was not significant at the alpha level (α.05), it provided
evidence of a directional difference among the five groups. This
directional difference was in favor of groups X (M=.053) and
XOG (M=.185).

Figure 9 graphically summarizes the results presented above.

Results. Based on the analyses described above, the null
hypotheses stated at the beginning of this section of the chapter,
were rejected.

Null Hypothesis One:

The instructional behavior of the teachers cannot be
changed by the effects of an in-service training in
OSIA instructional behaviors and selected patterns
of such behaviors, accompanied by conference feedback,
goal setting and feedback plus goal setting treatments.

This null hypothesis was rejected at an alpha level value
less than .05. The reason for such rejection may be summarized as
follows.
TABLE 22
Residual Gain Score Group Means and Standard Deviations of Three OSIA Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>X(N=4) M</th>
<th>X(N=4) SD</th>
<th>X(N=4) M</th>
<th>X(N=4) SD</th>
<th>X(N=4) M</th>
<th>X(N=4) SD</th>
<th>X(N=4) M</th>
<th>X(N=4) SD</th>
<th>X(N=4) M</th>
<th>X(N=4) SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>-.037</td>
<td>.062</td>
<td>-.075</td>
<td>.048</td>
<td>.068</td>
<td>.073</td>
<td>.027</td>
<td>.038</td>
<td>.016</td>
<td>.104</td>
</tr>
<tr>
<td>T I/D</td>
<td>-.080</td>
<td>.141</td>
<td>-.030</td>
<td>.275</td>
<td>-.048</td>
<td>.097</td>
<td>-.001</td>
<td>.179</td>
<td>.229</td>
<td>.216</td>
</tr>
<tr>
<td>T rI/D</td>
<td>-.079</td>
<td>.158</td>
<td>-.137</td>
<td>.342</td>
<td>-.022</td>
<td>.132</td>
<td>.053</td>
<td>.156</td>
<td>.185</td>
<td>.128</td>
</tr>
</tbody>
</table>
FIGURE 9

Five Group Means on the Three OSIA Variables S/T, T I/D and T rI/D
There were statistically significant differences among and between the five group mean gain scores in the instructional behavior in the classroom, as measured by the OSIA variables tested through MANOVA. Generally, groups $X_{OF}$, $X_{OG}$ and $X_{QFG}$ demonstrated higher mean gain score than groups $X$ and $X_{O}$. Specifically, these groups had higher scores on the variables listed below. In each case the gains were found to be statistically significant and appear to have been related to the effects of the treatment levels:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/T</td>
<td>$X_{OF}$, $X_{OG}$ and $X_{QFG}$</td>
</tr>
<tr>
<td>T +/-</td>
<td>$X_{OF}$, $X_{OG}$ and $X_{QFG}$</td>
</tr>
<tr>
<td>T Q/L</td>
<td>$X_{OG}$ and $X_{QFG}$</td>
</tr>
<tr>
<td>T C/S</td>
<td>$X_{OG}$</td>
</tr>
</tbody>
</table>

The results presented above were supported by the findings gathered from the ANCOVA and ANOVA analyses. Therefore, there is sufficient evidence to support the statistical significance of such results.

Three other clusters of OSIA variables were analyzed through MANOVA. Such clusters represent, to some extent, aspects the teachers were working on in order to change their instructional behavior. These clusters of variables and the multivariate F's resulting from the statistical analyses follow:

1) $T_{Q/L}$, $T_{RQ/D}$, $T_{C/S}$
   (Multivariate F=1.821; df=12/34.69; p < .084)

2) $T_{I/D}$, $T_{Q/L}$, $T$ +/-, TIS
   (Multivariate F=1.671; df=16/37.30; p < .097)
3) \( T_{I/D}, T_{ri/D}, T_{ri/d}, T_{Q/L} \)

(Multivariate \( F = 1.392; df = 16/37.3; p < .198 \))

More statistical explorations

The statistical exploration of the data collected during this investigation had a second set of purposes related to determining what variables were of substantive significance in the open-ended setting of the in-service program offered to the teachers. The treatments given to the subjects in this investigation were teacher-defined. Therefore, the outcome variables were, in fact, outcome instructional behavior defined by the teachers. After the experiment was performed, there was no easy way of knowing which variables the teachers had worked on. A look at potential variables, in a configuration which makes sense on the basis of the investigator's experience was needed at that point.

These major concerns guided the new statistical data exploration:

1. The desire to define a new single OSIA instructional variable that would

2. approximate more closely the nature and direction of the instructional behavior change the teachers in the feedback, goal setting, and feedback plus goal setting groups were working toward, and

3. would after-the-fact use all of the information that would be gleaned from the experience of conducting the investigation and from the results of the statistical analysis.

An intensive study of the records of the teachers' goals for changing their instructional behavior in the classroom, revealed to the investigator during the experiment, was done. It was accompanied
by a careful analysis of the statistically significant results observed from MANOVA, ANCOVA and ANOVA. After some further analysis and study of those aspects a new variable was created for the study of the teachers' goals related to changes in instructional behavior in the classroom. The new variable may be represented as follows:

The ratio of modified teacher-defined indirect influence behavior to direct influence behavior:

\[
\frac{a}{a + b}
\]

Where \( a \) - behaviors that the teachers intended to increase in amount and frequency of occurrence;

\( b \) - behaviors that the teachers intended to decrease in amount and frequency of occurrence.

The behaviors that the teachers appeared to have selected to increase were:

- T1 - Substantive Soliciting Clarification
- T4 - Substantive Soliciting
- T6 - Judging Correctness
- T7 - Acknowledgment
- T8 - Personal Positive Judging
- T10 - Managerial Soliciting Clarification
- T13 - Managerial Soliciting

These are the behaviors that the teachers appeared to have selected as the ones to be decreased in amount and frequency of occurrence:

- T3 - Substantive Initiating
- T5 - Judging Incorrectness
- T9 - Personal Negative Judging
- T12 - Managerial Initiating
- T15 - Substantive Unspoken Initiating
- T18 - Managerial Unspoken Initiating

The frequencies for each OSIA category behavior were computed
for each observation of each teacher. The percentage of frequencies for each OSIA category behavior was computed, considering the total amount of teacher behaviors as the universe being studied. Then, the value of the raw Ti/D was computed for each of the twenty teachers.

The new OSIA Ti/D may be defined as a measure of the nature of changes of instructional behavior in the classroom. Indirect Influence (i) is the set of behaviors the teachers wanted to increase, such as asking questions, using positive appraisal and acknowledging others. Direct Influence (D) is the set of behaviors that the teachers wanted to decrease, such as initiating information or opinion by telling others and using negative appraisal of others.

The pre and post-treatment scores were computed by hand for the twenty teachers on the new Ti/D. Following, the investigator computed the gain score for each of the teachers. The "residual gain" scores were also computed, by using the BMD 02R program for stepwise regression. Appendix E presents a list of the pre, post, gain and residual gain scores for the twenty teachers on variable Ti/D.

Table 23 presents the group means for pre- and post-treatment scores. Table 24 presents the group means for gain and residual gain scores in the Ti/D variable. A one-way ANOVA was performed on the group mean gain scores in the variable Ti/D. This results in an F ratio of 2.389 (df=4/15 p < .097) which was not statistically significant at the alpha level of .05. The testing of the group mean "residual gain" scores by the one-way ANOVA showed an F ratio of 2.578 (df=4/15; p < .080).

Next, a one between-one within ANOVA was calculated for the
### TABLE 23

**Group Means of Pre and Post-Treatment Scores on the New T i/D**

<table>
<thead>
<tr>
<th>Groups</th>
<th>PRE</th>
<th>POST</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X$</td>
<td>.608</td>
<td>.592</td>
<td>.600</td>
</tr>
<tr>
<td>$X_O$</td>
<td>.497</td>
<td>.487</td>
<td>.493</td>
</tr>
<tr>
<td>$X_{OF}$</td>
<td>.633</td>
<td>.708</td>
<td>.671</td>
</tr>
<tr>
<td>$X_{OG}$</td>
<td>.618</td>
<td>.675</td>
<td>.647</td>
</tr>
<tr>
<td>$X_{OFG}$</td>
<td>.483</td>
<td>.791</td>
<td>.638</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>.568</strong></td>
<td><strong>.651</strong></td>
<td><strong>.609</strong></td>
</tr>
</tbody>
</table>

### TABLE 24

**Group Means of Gain and Residual Gain Scores on the new T i/D**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Gain</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X$</td>
<td>-.016</td>
<td>-.064</td>
</tr>
<tr>
<td>$X_O$</td>
<td>-.009</td>
<td>-.129</td>
</tr>
<tr>
<td>$X_{OF}$</td>
<td>+.074</td>
<td>+.033</td>
</tr>
<tr>
<td>$X_{OG}$</td>
<td>+.057</td>
<td>-.018</td>
</tr>
<tr>
<td>$X_{OFG}$</td>
<td>+.308</td>
<td>+.179</td>
</tr>
</tbody>
</table>
testing of the group means for pre and post-treatment observations by the treatment levels, for variable T i/D. The F ratio computed for the pre-post effects was found to be statistically significant (F=4.694; df=1/15; p=.047). There was no statistically significant difference between groups, as measured by the F ratio value of 1.117 (df=4/15; p=.385). The interaction effects of the analysis of variance of the group means by pre- and post-treatment observations in the variable T i/D was found to be not statistically significant (F=2.389; df=4/15; p=.097).

The results from such analysis show that there was a statistically significant difference between pre- and post-treatment scores in the new variable T i/D, but that the difference between groups were not statistically significant at the alpha level of .05. In order to note where the statistical difference between pre- and post-treatment scores lie, turn to figure 10 which clearly shows a shift on the three experimental groups, favoring the post-treatment scores. A new look at table 23 helps in understanding the results of the statistical analysis of group means variance computed for the pre- and post-treatment scores on the new variable T i/D.

Comparisons of the group means in table 23, supported by the computed F ratios presented in table 25, lead to the conclusion that the teachers who received in-service training in OSIA instructional behaviors and selected patterns of such behaviors, accompanied by the feedback plus goal setting treatment made the highest numerical change between pre- and post-treatment scores in variable T i/D, favoring the post-treatment observations.
The post-treatment observation scores for the teachers

TABLE 25

Analysis of Variance for the Five Groups by Pre- and Post-Treatment Scores on the new T i/D

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups (A)</td>
<td>4</td>
<td>.158</td>
<td>.039</td>
<td>1.117</td>
<td>.385</td>
</tr>
<tr>
<td>Error (S/A)</td>
<td>15</td>
<td>.530</td>
<td>.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Post (B)</td>
<td>1</td>
<td>.069</td>
<td>.069</td>
<td>4.694</td>
<td>.047</td>
</tr>
<tr>
<td>Interaction (AB)</td>
<td>4</td>
<td>.139</td>
<td>.035</td>
<td>2.389</td>
<td></td>
</tr>
<tr>
<td>Error (SB/A)</td>
<td>15</td>
<td>.219</td>
<td>.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>1.115</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

who received the in-service training in OSIA instructional behavior and selected patterns of such behaviors, accompanied by the treatments of feedback and the goal setting were numerically larger than the pre-treatment observation scores of the same teachers in variable T i/D. The group means for the teachers who received only the training and the teachers who participated in the control group show that there was a small numerical decrease on the post-treatment observation scores of these groups compared with the pre-treatment observation scores, as reported in table 23. Figure 10 illustrates the pre-post-treatment observation patterns, as measured by variable T i/D. For the three treatment groups, $X_{OF}$, $X_{OG}$ and $X_{OFG}$, the gains at the pre-post-treatment interval were numerically higher than the gains in the other two groups, $X$ and $X_{O}$. The highest numerical gain between pre- and post-treatment observations were observed in the group means for $X_{OFG}$ (pre: M=483; post: M=.791).
FIGURE 10

Group Means on the Variable T i/D
The MTAI data results

The *Minnesota Teacher Attitude Inventory* (MTAI) was used to gather descriptive data on the teachers in this investigation and to provide data for use as a control measure in the experimental part of this investigation. Two research questions served to guide the analysis of the MTAI data, collected on the twenty teachers participating in this investigation.

The first research question was the following:

6) What is the range and mean of the MTAI scores of Brazilian teachers participating in this investigation?

The range of the MTAI scores for the teachers participating in this investigation was from -27 to +64. Table 26 presents the MTAI scores for the twenty teachers during pre- and post-treatment phases of the investigation.

According to the authors of the instrument,

It is assumed that a teacher ranking at the high end of the scale should be able to maintain a state of harmonious relations with his pupils, characterized by mutual affection and sympathetic understanding...The teacher should like the children and enjoy teaching. Situations requiring disciplinary actions should rarely occur...A sense of proportion involving humor, justice and honesty is essential (31:3).

They continue saying:

At the other extreme of the scale is the teacher who attempts to dominate the classroom. He may be successful and rule with an iron hand, creating an atmosphere of tension, fear and submission; or he may be unsuccessful and become nervous, fearful and distraught in a classroom characterized by frustration, restlessness, and inattention, lack of respect, and numerous disciplinary problems...The teacher tends to think in terms of his states, the correctness of the position he takes on classroom matters, and the
subject matter to be covered rather than in terms of what the pupil needs, feels, knows and can do (31:3).

The possible range of the MTAI scores, based on studies developed in the United States, is from -150 to +150. The overall mean for the MTAI scores for the twenty teachers was 11.325 (SD=27.514).

This investigation was not intended to develop norm group means and SD’s for the MTAI scores nor to make any specific comparisons with the norm group means developed by the authors of the instrument for the experienced elementary teachers in the United States (31). Because the population used in this investigation may differ very much from the populations used by Cook, Leeds and Callis (31) in developing such norm group means and SD, no effort was made to make comparisons of Brazilian teachers with norm groups in the United States.

It may be noted that:

Information available to date indicate that attitudes of adults are rather resistant to change. This seems to hold true for the attitudes measured by the Inventory. It should be remembered that teacher-pupil attitudes are simply indicators of the teacher’s classroom behavior and that mere inculcation of better attitudes by instruction may not produce any change in behavior (31:4).

Nonetheless, in light of the in-service training program and the work with the teachers during the experiment it seemed wise to test this proposition. At the same time, it seemed appropriate to ask and answer the question: do the five groups differ in their attitude before treatment as it was measured by the MTAI?

A one-way ANOVA tested the five group means on the MTAI
### TABLE 26

Pre- and Post-Treatment MTAI Scores for Twenty Teachers in a Polyvalent School in Brazil

<table>
<thead>
<tr>
<th>Groups</th>
<th>Teacher</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>1</td>
<td>+21</td>
<td>+21</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-26</td>
<td>-18</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>+32</td>
<td>+36</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-14</td>
<td>-19</td>
</tr>
<tr>
<td>X₀</td>
<td>5</td>
<td>-02</td>
<td>+12</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>-19</td>
<td>-27</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>+35</td>
<td>+07</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>+05</td>
<td>-24</td>
</tr>
<tr>
<td>X₀OF</td>
<td>9</td>
<td>-30</td>
<td>+02</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>+11</td>
<td>-14</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>-20</td>
<td>-24</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>+34</td>
<td>+38</td>
</tr>
<tr>
<td>X₀OG</td>
<td>13</td>
<td>+02</td>
<td>+03</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>+19</td>
<td>+30</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>+34</td>
<td>+58</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>+55</td>
<td>+41</td>
</tr>
<tr>
<td>X₀OFG</td>
<td>17</td>
<td>+44</td>
<td>+62</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>+15</td>
<td>-24</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>+64</td>
<td>+22</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>-06</td>
<td>+17</td>
</tr>
</tbody>
</table>
TABLE 27

Pre-, Post-Treatment and Overall Means and Standard Deviations of MTAI Scores for the Five Groups of Teachers in a Polyvalent School in Brazil

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>4.13</td>
<td>25.70</td>
</tr>
<tr>
<td>Pre</td>
<td>3.25</td>
<td>27.66</td>
</tr>
<tr>
<td>Post</td>
<td>5.00</td>
<td>27.82</td>
</tr>
<tr>
<td>X_0</td>
<td>-1.63</td>
<td>21.02</td>
</tr>
<tr>
<td>Pre</td>
<td>4.75</td>
<td>22.54</td>
</tr>
<tr>
<td>Post</td>
<td>-8.00</td>
<td>20.35</td>
</tr>
<tr>
<td>X_OF</td>
<td>-0.38</td>
<td>26.18</td>
</tr>
<tr>
<td>Pre</td>
<td>-1.25</td>
<td>29.27</td>
</tr>
<tr>
<td>Post</td>
<td>0.50</td>
<td>27.20</td>
</tr>
<tr>
<td>X_OG</td>
<td>30.25</td>
<td>21.31</td>
</tr>
<tr>
<td>Pre</td>
<td>27.50</td>
<td>22.52</td>
</tr>
<tr>
<td>Post</td>
<td>33.00</td>
<td>23.08</td>
</tr>
<tr>
<td>X_DFG</td>
<td>24.25</td>
<td>31.13</td>
</tr>
<tr>
<td>Pre</td>
<td>29.25</td>
<td>30.93</td>
</tr>
<tr>
<td>Post</td>
<td>19.25</td>
<td>35.17</td>
</tr>
<tr>
<td>Overall</td>
<td>11.33</td>
<td>27.51</td>
</tr>
<tr>
<td>Pre</td>
<td>12.70</td>
<td>27.28</td>
</tr>
<tr>
<td>Post</td>
<td>9.95</td>
<td>28.38</td>
</tr>
</tbody>
</table>
scores, for the pre- and post-treatment scores. The Balanova V subprogram of SOUPAC was used for such computation. The results show that there was no statistically significant difference among the five group means (F=1.459; df=4/15; p=.26). No statistically significant difference was found between pre- and post-treatment test of the MTAI scores (F=.302; df=1/15; p=.59). The interaction effects were found to be not statistically significant (F=.522; df=4/15; p=.72). Table 28 presents a summary of the statistical results described above. Such results suggest that the experimental treatments had no effects on the teachers' attitudes, as measured by the MTAI.

As a further step in the statistical analysis of the results, a one-way ANOVA was performed on the MTAI group means in the pre-treatment scores only. The F ratio value of 1.169 was found to be not statistically significant at the alpha level .05 (df=4/15; p=.364), as presented in table 29. There was no statistical significant difference among the five groups of teachers prior to the treatment given to them.

Results from the Questionnaire

The last section of this chapter presents a brief and general summary of the results collected through the teachers' answers to the questionnaire soliciting their reactions to the treatments employed in the investigation. The instrument was answered only by the subjects who received the in-service training in OSIA instructional behaviors and selected patterns of such behaviors (N=16); the subjects of the control group did not answer the questionnaire. A complete description of the subjects' response to the questionnaire is presented in Appendix C.
**TABLE 28**

Analysis of Variance of Pre- and Post-Treatment MTAI Scores for the Five Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>4</td>
<td>7,053.15</td>
<td>1,763.28</td>
<td>1.459</td>
<td>0.26</td>
</tr>
<tr>
<td>Error</td>
<td>15</td>
<td>18,120.01</td>
<td>1,208.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Post Groups/</td>
<td>1</td>
<td>75.62</td>
<td>75.62</td>
<td>0.302</td>
<td>0.59</td>
</tr>
<tr>
<td>Pre-Post</td>
<td>4</td>
<td>522.25</td>
<td>130.56</td>
<td>0.522</td>
<td>0.72</td>
</tr>
<tr>
<td>Error Groups/</td>
<td>15</td>
<td>3,753.62</td>
<td>250.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>29,524.65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 29**

Analysis of Variance of Pre-Treatment MTAI Scores for the Five Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>4</td>
<td>.336</td>
<td>.840</td>
<td>1.169</td>
<td>.364</td>
</tr>
<tr>
<td>Error</td>
<td>15</td>
<td>.108</td>
<td>.719</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>.444</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The purpose of the questionnaire was to gather information related to the teachers' perception of the in-service training activities they participated in during this investigation. The responses were to be used as a partial basis for the improvement of future related studies and for the improvement of future in-service training to be given to Brazilian teachers.

Overall the findings from the questionnaire suggest that in the teachers' perception the in-service training program and the treatments had a lot of practical meaning and significance. One hundred percent of the teachers (N=16) felt that it was worth their time to participate in the study. Six teachers (37.5%) considered the time used for the training sessions as appropriate. The reasons for their opinion on this aspect may be briefly summarized as follows:

- they were in action, using the time effectively and going immediately into the application of the ideas discussed in each session.

Ten teachers (62.5%) did not consider the time used for the training sessions as appropriate and the general idea they expressed was that there should have been a period set aside from the school time for the in-service training and that a longer period of time could be set aside for such training.

The time for the classroom observations was considered as appropriate by sixty nine percent of the teachers and thirty one percent of the teachers considered it as inappropriate and suggested longer period of time for the classroom observations.

Ten teachers (62.5%) reported that they learned some new ideas from the training sessions. Six teachers (37.5%) reported
as not having learned any specific new ideas from the training, but having become aware of many aspects they already knew but were not applying in the classroom. Appendix C presents the individual answer given by each teacher as well as the description of the application of the ideas gained from the training sessions.

Among others, these are some of the strong aspects of the investigation, as perceived by the teachers who participated in the experimental groups:

1. they developed an awareness of teacher and students' behaviors during the instructional process;

2. attention was given to teacher-student interaction going on in the classroom during the instructional process;

3. teachers became more aware of their role in the classroom during the instructional process;

4. the individual conferences with the investigator were helpful;

5. audiotaped lessons were used as a basis for the revision of educational methods and instructional techniques and the implementation of changes.

The teachers participating in this investigation who answered the questionnaire reported that lack of time was the weakest aspect of the investigation. They observed that:

1. fifteen minutes was too short a time for observing a lesson;

2. there were too many things to be seen and done in a short period of time;

3. the observations were made during a few months.

Among the comments made by the teachers who answered the
questionnaire were the following:

This type of study should be in the nature of a continuing activity to be offered to teachers all year long, which would allow for more generalizations of the results obtained.

and:

I think that studies like this should be developed at least once a year, in order to make teachers aware of the teaching/instructional process, off-setting teachers' accommodation to routine.

Summary

This chapter reports the results and findings gathered by the investigator on the following instruments: the translated forms of the OSIA and MTAI, and the questionnaire soliciting teacher's reactions specially designed for use in this investigation.

The descriptive OSIA data results were presented, considering the classroom instructional characteristics and the typical instructional behaviors manifested during a lesson in the classroom of the Brazilian teachers who participated in this investigation.

The inferential parametric analysis of the OSIA data showed that four variables were the most important ones in the investigation and that they represented the teachers' intentions for changing their instructional behaviors in the classroom. These variables were S/T, T O/L, T C/S and T +/-. Three of the treatment groups were found to be providing statistically significant contributions to the importance of these OSIA variables. The three groups were: X_{OF}, X_{OG}, and X_{OFG}. A brief description of the results found from the variable created by the investigator, T i/D, was also presented in this chapter.

The statistical descriptive and inferential data analyses of the MTAI
were presented. Finally, the chapter contains a general summary of
the teachers' answers to the questionnaire soliciting their reactions
to the in-service treatment experiences that were provided to them
during this investigation.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This field experiment in staff development was conducted with the support of the Ford Foundation and the Secretary of Education and Culture in the State of Espirito Santo, Brazil, during the period of June to October in 1974. Immediately after receiving foundation support, the preparation for the investigation took place. Such preparation involved work of the investigator in adapting materials and translating them, with permission from English into Portuguese. These materials included selected papers and materials associated with the Observational System for Instructional Analysis (OSIA), the Minnesota Teacher Attitude Inventory (MTAI), a variety of selected papers and materials associated with the Observational System for Instructional Analysis (OSIA), and a variety of other English language materials that could be used in an in-service program for Brazilian teachers. An open-ended and flexible in-service program was designed around the central theme that teachers should determine the nature and direction of the changes, if any, they would make in their instructional behavior after they had become aware of the nature of instructional behavior as described in the Observational System for Instructional Analysis. They were to be supported differentially in these efforts by the investigator.
Although the investigation was intended to achieve a number of purposes the central purpose was to conduct a field experiment to discover whether (1) in-service training, (2) in-service training followed by a series of classroom observations and feedback conferences, (3) in-service training followed by goal-setting conferences and a series of classroom observations, and (4) in-service training followed by goal-setting conferences, a series of observations and feedback conferences would be effective in helping teachers who had set their own goals to change their instructional behavior.

A total of forty hours of live classroom observation were used to gather data on the changes in the instructional behavior of teachers. Five observers were trained by the investigator before the experiment was begun. At the end of their training they were all able to collect valid and reliable OSIA data from live, direct classroom observation.

During the implementation phase of the investigation, the experimental part was carried on and it involved the following phases:

1. pre-treatment - all twenty subjects responded to the MTAI and were observed four times, through direct live classroom observations made by this investigator and the trained observers, using the OSIA.

2. preparation for the treatment - sixteen subjects participating in the four experimental groups, received in-service training in OSIA instructional behaviors and selected patterns of such behaviors:

3. experimental treatment - twelve subjects who had participated in the in-service training received on the following treatments:

   a. feedback (four teachers)
   b. goal setting (four teachers)
c. feedback plus goal setting (four teachers)

4. post-treatment - all twenty subjects responded to the MTAI. They were observed four times through direct live classroom observations made by the trained observers, using the OSIA. The sixteen teachers in the experimental groups responded to the questionnaire soliciting their reactions to the investigation.

The activities involved in the preparation and the implementation of the in-service training program provided basis for two things: (1) the experimental research investigation and (2) an in-service staff development program. Overall, those efforts were made in order to achieve such hoped for outcomes or purposes as the following:

1. To determine the feasibility of using the translated form of OSIA as a valid and reliable instrument for gathering data and doing research in Brazilian classrooms;

2. To gather descriptive information on the instructional behaviors manifested by twenty teachers in a Polyvalent School in Brazil;

3. To determine, through experimental investigation, the effects of the independent variables (in-service training, feedback, goal setting and feedback plus goal setting);

4. To generate a better basis for understanding how instructional behaviors can be modified through in-service training;

5. To generate a better basis for conducting further research especially in Brazil; and,

6. Testing new staff development ideas that might be utilized in in-service training programs.

The sample used in this investigation was composed of twenty teachers, randomly selected from a total of thirty four teachers working at the Escola Polivente de Itaciba, in Brazil. The twenty teachers were, then, randomly assigned to five groups: one control group (X) and four experimental groups (XO, XOF, XOG and XOFG).
The independent variables in this investigation represented the efforts to help the teachers to change their instructional behavior in the classroom and were centered on: (1) provision of in-service training; (2) provision of feedback; (3) helping teachers to set goals; (4) provision of feedback plus goal setting.

A total of seventeen OSIA potential teacher-related dependent variables were selected for analysis in this investigation. From the information gathered during the pre- and post-treatment observations, the gain scores of the twenty teachers were computed for the seventeen variables. The pre-, post-treatment and gain scores were examined and after some statistical exploration they were prepared for the techniques of analysis of variance. The statistical treatments involved the computation of arcsine transformation of the scores followed by the computation of the arcsine transformed "residual" gain scores. Three statistical techniques were employed in the analysis: the ANOVA, the ANCOVA and the MANOVA.

The seventeen potential OSIA dependent variables were employed by clustering three to five such variables and using the techniques of MANOVA. The results are presented in Chapter IV. Four variables were found to be statistically significant at the alpha level .05 or better. These variables were: (1) the ratio of student to teacher behavior; (2) the ratio of teacher positive to negative appraisal behavior; (3) the ratio of teacher questioning to lecture, and (4) the ratio of teacher soliciting clarification to solicitation. Generally, three groups accounted for the significant changes in the teachers' instructional behavior. The changes were in
the form of gains in the ratio values from pre- to the post-treatment observations. The groups were $X_{OF}$, $X_{OG}$ and $X_{OFG}$. Tables 17 to 22 and figures 6 to 9 summarize the findings presented above.

After an intensive study of the teachers' records, collected during the treatment phase, and a careful analysis of the results observed from MANOVA techniques a new OSIA dependent variable was created. It was intended to generally represent the nature and the direction of the teachers' efforts to change instructional behavior during the treatment. It was the ratio of modified teacher-defined indirect influence behaviors to direct influence behaviors. The ratio was computed from the frequencies of behaviors derived from the OSIA computer data analysis outputs. The results from a one between-one within one-way ANOVA revealed that there was a significant difference between pre- and post-treatment observations, favoring post-scores. Tables 23 to 25 and figure 10 present a summary of the results obtained from that analysis.

The MTAI scores for the twenty teachers were collected during the pre- and post-treatment phases of the investigation. A one between-one within one-way ANOVA was performed in order to test the pre-post difference between the five group means of the MTAI scores. No significant difference was found among the group means nor for the pre-post means. Tables 26 to 29 present the summary of those results.

The sixteen teachers who had received the in-service training in the OSIA instructional behaviors and selected patterns of such behaviors responded to a questionnaire soliciting the teachers'
reactions to the investigation and the responses are presented in Appendix C.

Findings and Interpretations

This section of the chapter presents a summary of the findings of this investigation and some interpretations:

1. Based on the information gathered from pre- and post-treatment observations made on the classroom of teachers in the five groups used in this investigation, the classrooms of the twenty teachers were characterized by the following:

   a. Seventy eight percent of a lesson involves behaviors classified as instructionally functional in the OSIA. The rest of the lesson (twenty two percent) is composed of instructionally nonfunctional behaviors (silence or confusion).

Four groups of teachers showed a change in the amount of instructionally functional and instructionally nonfunctional behaviors, during pre- and post-treatment observations. It must be noted that the instructionally nonfunctional behavior category was recorded by the observers at any time in which everybody in the classroom was talking or doing something at the same time.*

The apparently significant numerical differences between pre- and post-treatment observations, showing a decrease in instructionally nonfunctional behaviors, might be related to the fact that, during the in-service training and the treatments which followed it, the teachers became more aware of the nature of classroom instructional behaviors.

*Strictly speaking, the behavior is not necessarily instructionally nonfunctional. Very often the observer cannot distinguish which of many of the categories of instructionally functional behaviors the behavior belongs to. Ground rules for the use of the OSIA require that he codes such situations as instructionally nonfunctional.
behaviors. There is evidence in the experience of the investigator to suggest that the teachers were trying to modify behaviors of their own that would tend to reduce the number of occasions in the classroom when everyone was talking at the same time. For example, before the in-service training, a teacher would present a question, many students would answer it at the same time, the teacher would request order. After the in-service training, the same teacher would use a different approach during the instructional process. His purposes might be to increase student participation and increase the number of positive appraisals. The teacher would, then, present a question, allow one student to answer it, appraise, acknowledge or solicit clarification from the same student and then ask another student to answer the same question or another question. In the view of the investigator these kinds of efforts on the part of the teacher seem to constitute the best explanation of the decrease in instructionally nonfunctional behaviors. The teachers who received the in-service training manifested the largest gain in the amount of instructionally nonfunctional behaviors on the post-treatment observations.

b. From the total amount of instructionally functional behaviors, recorded in the classroom of the Brazilian teachers who participated in this investigation, sixty nine percent consisted of teacher behaviors and thirty one percent were student behaviors.

The findings summarized in table 10 suggest that the in-service training in OSIA instructional behaviors accompanied by the treatments of
feedback, goal setting and feedback plus goal setting were effective in increasing the amount of student behaviors in the classrooms of these teachers.

c. The OSIA instructional strategy most used by the Brazilian teachers participating in this investigation was the Teacher Interactive Substantive. The source of communication in this strategy is the teacher, the content of communication is substantive, the direction of the communication is reciprocal from teacher to student and back to teacher, and the receiver of communication is the student.

The least common OSIA teaching strategy observed in the classroom of the participating Brazilian teachers was the Teacher Direct Managerial, whose source of communication is the teacher, the content of communication is managerial, the direction of communication is from teacher to student and the recipient of communication is the student.

2. The five OSIA instructional behaviors most typically manifested in the classroom of the Brazilian teachers who participated in this investigation were:

- Substantive Initiating (T3)
- Substantive Soliciting (T4)
- Managerial Soliciting (T13)
- Acknowledging (T7)
- Substantive Soliciting Clarification (T1)

Five other OSIA instructional behaviors were found to be the next most used in the classroom of the teachers in this investigation:

- Unspoken Substantive Initiating (T15)
- Managerial Initiating (T12)
- Substantive Responding (T2)
- Judging Incorrectness (T5) and
- Judging Correctness (T6)

The findings suggest that a little over fifty percent of the ten most commonly occurring OSIA instructional behaviors manifested by the Brazilian teachers in this investigation involved two types of
substantive behaviors: Initiating and Soliciting. The teachers spent considerable time in initiating information or opinion or soliciting information or opinion about the subject matter under study.

Soliciting and soliciting clarification behaviors seem to be very much typical behaviors in the classroom of Brazilian teachers who participated in this investigation. The teacher behaviors of substantive soliciting, managerial soliciting and substantive soliciting clarification account for forty five percent of the ten OSIA instructional behaviors most typically used in their classrooms.

Substantive Initiating, Unspoken Substantive Initiating and Managerial Initiating represent a total of thirty seven percent of the behaviors recorded for the ten OSIA teacher instructional behaviors most commonly used in the classrooms of the Brazilian teachers in this investigation.

Three OSIA appraisal behaviors appeared in the list of the ten most used instructional behaviors observed in the classroom of the teachers and they accounted for a total of fifteen percent of the ten most used behaviors. The appraisal behaviors were Acknowledging, Judging Incorrectness and Judging Correctness.

Teacher Responding behavior was among the ten most frequently occurring OSIA instructional behaviors. This suggests that the teachers allowed for student-initiated soliciting and/or soliciting clarification behaviors and that the teachers responded to them.

Generally, in grouping the OSIA instructional behaviors
according to their nature and characteristics, the findings of this investigation revealed that Brazilian teachers manifested the following categories of instructionally functional behaviors:

a. soliciting and soliciting clarification;
b. initiating information;
c. judging correctness, judging incorrectness and acknowledging the student, his behavior or the results of his behavior;
d. responding to student's questions or suggestions.

Tables 12 and 13 in Chapter IV summarize the results presented above.

3. The teachers in the control group (X) did not show any significant change in their instructional behaviors, as measured by the OSIA dependent variables. The findings of this investigation suggest that the in-service training in OSIA instructional behaviors and selected patterns of such behaviors \(X_0\) was not sufficient in itself to promote significant changes in the instructional behaviors of the Brazilian teachers participating in this investigation.

Four OSIA dependent variables appeared to define and measure some of the effects of the in-service training accompanied by one of the treatments: feedback, goal setting, and feedback plus goal setting. These variables were: (1) the ratio of student behaviors to the sum of teacher and student behaviors; (2) the ratio of the teacher positive appraisal behaviors to the sum of the teacher positive and negative appraisal behaviors; (3) the ratio of teacher questioning to the sum of teacher questioning and lecture behaviors; and (4) the ratio of teacher clarification behavior to the sum of teacher clarification and solicitation behavior.

The ratio of student to teacher behavior increased in the classroom of teachers in three groups: the ones who had received
the in-service training in OSIA instructional behaviors and selected patterns of such behaviors accompanied by the feedback \(X_{OF}\), goal setting \(X_{OG}\) and feedback plus goal setting \(X_{OFG}\) treatments. After receiving the in-service training and the treatments, those teachers allowed for more student participation in the classroom, as measured by the student to teacher behaviors ratio.

The ratio of teacher positive to negative appraisal behaviors was changed in the classroom of teachers in three groups in this investigation favoring the post-treatment observations. There were no significant changes on the instructional behaviors of teachers in the control group nor in the group that received only the in-service training. The increase in the ratio of positive to negative teacher behaviors seems to be related to the effects of the in-service training and the feedback \(X_{OF}\), goal setting \(X_{OG}\) and the feedback plus goal setting \(X_{OFG}\) treatments. After receiving the in-service training and the treatments, Brazilian teachers in this investigation directed more positive appraisal behaviors to the students.

Only two groups in this investigation were shown to have the ratio of teacher questioning to lecture behavior changed, favoring the post-observations. Apparently the in-service training in OSIA instructional behaviors and selected patterns of such behaviors had to be accompanied by the goal setting \(X_{OG}\) or the feedback plus goal setting \(X_{OFG}\) treatments in order to promote significant change on the ratio of teacher questioning to lecture. Teachers in these two groups decreased the amount of lecture in their classrooms,
increasing the chances for student participation, by asking more questions and/or seeking clarification of ideas, answers, statements. The in-service training alone and the in-service accompanied by the feedback treatment did not promote significant decrease in the amount of lecture in the classroom of the Brazilian teachers, participating in this investigation.

The ratio of teacher clarification to soliciting behaviors was found to have increased only in the classroom of the teachers who received the in-service training accompanied by the goal setting \( X \) treatment. Teachers in this group increased the amount of soliciting clarification behaviors in their classroom. The in-service training alone or accompanied by the feedback or the feedback plus goal setting treatments were not associated with change on the instructional behavior of Brazilian teachers, as measured by the ratio of teacher clarification to solicitation behaviors.

4. A new OSIA dependent variable was created in order to represent the efforts in changing instructional behaviors, carried on by the Brazilian teachers in this investigation. The teacher-derived modified indirect influence behaviors to direct influence behaviors variable involved the ratio of the behaviors the teachers wanted to increase (categories T1, T4, T6, T7, T8, T10 and T13) to the behaviors they wanted to decrease (categories T3, T5, T9, T12, T15, and T18) and those they wanted to increase (T1, T4, T6, T7, T8, T10 and T13).

The findings revealed a shift on the instructional behaviors of teachers in this investigation, favoring the post-treatment
observations, as measured by the ratio of modified teacher-derived indirect influence behavior to direct influence behaviors.

Apparently, the activities involved in the in-service training followed by feedback \((X_{OF})\), goal setting \((X_{OG})\) and feedback plus goal setting \((X_{OFG})\) treatments were effective in enabling the teachers in these three groups to increase their behaviors of soliciting, soliciting clarification, positive appraisal and acknowledgment and to decrease the behaviors of initiating and negative appraisal. It seemed that the in-service training accompanied by feedback plus goal setting \((X_{OFG})\) was the most effective approach to promote the change on the teachers' instructional behaviors in the direction and nature they had determined.

Data concerning the control group and the group that received the in-service training only were also examined: neither of these groups exhibited any change in their instructional behavior in the direction proposed, as measured by the ratio of modified teacher-derived indirect to direct behavior.

5. The MTAI scores for the Brazilian teachers participating in this investigation ranged from minus 27 to plus 64. The overall mean \((N=20)\) was 11.33 and the SD was 27.51.

6. There is no evidence to suggest that the MTAI scores for the Brazilian teachers in this investigation were affected by the in-service training in OSIA instructional behaviors and selected patterns of such behaviors, accompanied or not by the feedback, goal setting, and feedback plus goal setting treatments. No significant changes were observed on the MTAI scores of the five groups when
comparing the pre- and post-treatment scores.

7. Findings gathered from the questionnaire soliciting teachers' reactions to the investigation answered by sixteen teachers participating in the four experimental groups, revealed that at least fifty percent of those teachers thought that:
   a. it was worth their time to participate in this investigation;
   b. there should be a period set aside from school time for the in-service training;
   c. the time for the observations was appropriate;
   d. they learned some new educational ideas from the in-service training sessions and they became more aware of many instructional techniques they already knew but were not applying in the classrooms;
   e. one of the strengths of the investigation was the opportunity for the development of an awareness of the teacher-student interaction process occurring in the classroom;
   f. lack of time was the only weak aspect of the investigation.

8. Taken as a whole, the findings suggests that it was feasible to use the OSIA as a basic instrument around which to develop in-service programs for teachers and to conduct research.

Conclusions
1. The OSIA was considered as an adequate and feasible observational instrument in gathering instructional behavioral data and data on the instructional characteristics of the classroom through direct live and/or audiotaped observation, in the classroom of twenty teachers working at the Escola Polivalente de Itaciba, in Brazil.

   The instrument was revealed to be a valid and feasible tool that might be used by and/or with Brazilian teachers, teacher educators and supervisory personnel.

2. The in-service training in OSIA instructional behaviors and selected
patterns of such behaviors accompanied by the feedback, goal setting, and feedback plus goal setting treatments, offered to teachers in a non-authoritative way in which the instructional autonomy of each teacher was observed, and involving self-directed, self-selected and individualistic approaches was found to be effective in promoting change in the instructional behaviors of the Brazilian teachers who participated in this investigation.

3. No changes on teachers' perception and acceptance of children were found to be associated with the effects of in-service training in OSIA instructional behaviors and selected patterns of such behaviors or the treatments of feedback, goal setting and feedback plus goal setting, given to the Brazilian teachers in this investigation, as measured by the MTAI.

Implications and Recommendations

Many implications and consequent recommendations may be drawn from the results of this investigation. Two general groups of recommendations are presented: the ones related to further research and the ones related to educational practices of teacher educators, supervisory personnel and the classroom teacher. The recommendations and implications have reference to educational research and practice generally and, in many instances, have relevance to the educational situation in Brazil.

For Further Research. The evidence from this investigation suggests that the teacher's awareness of the effects of instructional behavior upon the students' behavior and the classroom instructional
characteristics, developed through an in-service training in OSIA instructional behaviors and selected patterns of such behaviors was not sufficient by itself to promote significant changes in the instructional behavior of the teachers. The findings clearly suggest that such awareness had to be accompanied by conference feedback, goal setting, or feedback plus goal setting treatments in order to promote significant changes in the instructional behaviors of the teachers participating in this investigation.

However, the findings do not present evidence that the treatments alone: feedback, goal setting, feedback plus goal setting, without the development of an awareness carried on during the in-service training, are sufficient to promote change in instructional behaviors of teachers. These facts suggest researchable questions.

It may be that the in-service training might be conducted for a longer period of time, since the treatments which followed it were a continuation of the in-service training itself, allowing the teacher to keep practicing, increasing or decreasing the amount of some instructional behaviors, according to his own perceptions and needs. Many studies could be conducted in order to test and retest the findings of this investigation, such as:

1. Replication of a similar design, using different samples with different characteristics (e.g., size of sample, grade level of teachers, subject matters taught, etc.) to test the generalizability of the findings of this investigation;

2. Provide training and treatments for longer periods of time and study the effects;
3. Replicate this investigation with the same sample over a period of years in order to have information on the longitudinal effects of this approach to self-development and to test the persistence of the treatment effects;

4. Develop studies in which the treatment given is self-selected, self-directed and individualistic for the teachers as opposed to a treatment dictated by the investigator to determine if teacher self-determination of the nature and direction of change is a significant factor in promoting instructional changes;

5. Analyze the effects and results of studies in which the dependent variable(s) is (are) self-defined by the participating teachers;

6. Replicate this study using larger sample to permit more statistical power in the analysis of the data;

7. If a study similar to the one conducted here is to be developed, the investigator should experiment with different statistical techniques and/or procedures in dealing with the classroom direct observation data and its analysis (e.g., the nonparametric statistical techniques were not thoroughly explored in this investigation. Because the distribution of OSIA ratios is not clearly known, there is reason to believe that such techniques would be appropriate for use with this kind of observational/behavioral data);

8. The individuals involved in this investigation were in-service teachers. A similar study might be conducted to determine what changes might result if the treatments were to be conducted in a pre-service teacher education setting;
9. A study might be conducted to determine the effects of changes in the instructional behavior upon the students or the interactional climate in the classroom and the consequent effects upon the curriculum;

10. Studies might be developed in order to analyze the relationships between teacher instructional behavior in the classroom and student outcome (achievement, motivation toward school/learning, self-concept, etc.);

11. Studies might be developed to determine relationships between classroom interactional climate and teachers' personality traits or characteristics and consequent effects on students' outcomes;

12. Studies might be developed to analyze the effects of curriculum content and/or school organization upon the instructional behavior and/or the interactional climate in the classroom.

13. There is a lack of research showing the nature, if any, of the predictive validity of the MTAI. Therefore, studies might be developed in order to investigate the validity of the instrument as a device for predicting teacher behavior in the classroom;

The recommendations for further research which follow here are directly related to investigations to be developed in Brazil:

14. Study the types of instructional behaviors manifested by teachers and students in the Brazilian classrooms, using larger and different samples (e.g., all grades in the "standard" First Level Education Schools, classrooms in the Second Level Education
15. Only four OSIA instructional strategies were analyzed in this investigation; a similar study might be conducted in which all instructional strategies would be considered and studied in different types of classrooms in Brazil;

16. Because soliciting and soliciting clarification were found to be behaviors widely used by the Brazilian teachers involved in this investigation, studies should be conducted to analyze the teachers' use and students' reactions to such behaviors;

17. Develop a research investigation to study the validity and reliability of the translated MTAI using larger samples of Brazilian teachers;

18. Develop research investigations to gather normative data on Brazilian teachers responses to the translated MTAI;

19. As a consequence of studies such as the ones suggested above, if the MTAI is found to be an efficient and reliable tool to be used with Brazilian teachers, create new studies in order to develop norm groups with means and SD's for samples with different characteristics;

20. As another consequence of the results gathered from the above suggested studies, make comparison studies between MTAI scores of teachers in Brazil and teachers in the United States.

Teacher Education and Practice

The evidences from this investigation provide some support for the following recommendations for teacher education and practice;

1. This investigation encouraged teachers to practice the
behavioral changes they wished to make. Because there is evidence that significant behavioral change did occur it seems reasonable to recommend this practice in teacher education;

2. The teachers' reactions to this investigation reinforce the importance of providing teachers with time to study and modify their instructional behavior. Therefore, it seems that teachers should be given such opportunity;

3. The provision for development of awareness, self-actualization, self-evolving process in teacher self-development were emphasized in this investigation. Because there is support from the investigation that significant changes occurred in teachers' behavior as a result of such approaches, it seems reasonable to recommend them as one appropriate basis for a teacher education model;

4. The value of feedback, goal setting and feedback plus goal setting in helping teachers change their instructional behavior seems to be consistently supported by this investigation. It seems that teacher educators might consider these aspects as important ones to be included in training programs;

5. It would appear that the introduction of new ideas or instructional techniques is neither a necessary nor a sufficient ingredient for bringing about changes in teachers' instructional behavior;

6. Audiotaped and coded systematic feedback appears to be effective in helping to promote instructional behavior changes in the direction and nature determined by the teacher himself, provided that his instructional autonomy is preserved. It appears
that the use of these types of feedback would be effective in in-service (as well as in pre-service) training of teachers;

7. It seems that when teachers are given the opportunity to set goals for changing instructional behaviors, after participating in in-service training focusing on the awareness of the effects of such behavior, the results observed are very much similar, in nature and direction, to the proposed goals. Teacher education programs might consider the provision of such experiences to the trainees;

8. Supervisory feedback conferences plus goal setting treatment were found to be effective change agents for selected aspects of classroom instructional behavior: teachers allowed a larger amount of student talk, asked more questions, sought more clarification of answers or ideas, and gave more positive appraisals. Therefore, if these aspects are considered important in some classroom situations, and based on the evidence from research that teacher instructional behavior affects students' outcomes, teacher educators might consider such experiences as appropriate to be offered in training programs for in-service as well as prospective teachers;

9. Four OSIA dependent variables were found to be representative of the efforts of the teachers who were trying to change their instructional behavior in this investigation. Those variables were the student to teacher behavior ratio, the ratio of teacher positive to negative appraisal behaviors, the ratio of teacher clarification to solicitation behaviors and the ratio of teacher questioning
to lecture behaviors. There is evidence from research showing the relationship between teacher behavior and student growth. Therefore, based on the validity of the assumption that teachers are able to select the nature and direction of instructional behavior change they want to engage in, teacher educators might emphasize those aspects in the training programs for in-service and prospective teachers. Attention might be given to the development of strategies to promote more student participation in the classroom, teacher positive judgments and their effects upon the students, the use of questions to seek clarification as well as the questioning strategies and techniques used in the classroom. These aspects might be involved in teacher education programs for in-service and prospective teachers.

Summary

Generalizations involving this investigation are limited by the characteristics of the population sampled as well as by the accuracy and reliability of the interpretation of the data obtained and analyzed.

Training in OSIA instructional behaviors and selected patterns of such behaviors, accompanied by feedback, goal setting and feedback plus goal setting, appear to be an effective approach for promoting change on the instructional behavior of teachers comprising this population.

If experiment is conducted under same conditions, with similar population of polyvalent teachers, with support from the
institutions supporting this investigation, there is some confidence that the results would be the same.

The findings of this investigation provide evidence that the use of a systematic instrument, the OSIA, and the valid descriptive data provided by it, was a helpful way to lead those twenty Brazilian teachers to start thinking about what is going on in their classrooms. Those teachers apparently found themselves involved in analysis of their teaching styles and instructional behavior, the instructional characteristics of their classroom, the effects of their instructional behavior upon the behavior of the students and so on. Hopefully, such an approach improves the means of communication and provide basis for respect between classroom teachers, and their educators and/or supervisors. If it does, efforts like these will facilitate the relationships between people working in the educational scene in Brazil. And it is that kind of co-work co-operation that is so badly needed in education everywhere.
APPENDIX A

Brief Notes on the Polyvalent Schools in Brazil
(PREMEN - Programa de Expansao e Melhoria de Ensino)

A Polyvalent School is a school of First Level Education (in the actual structure of the Brazilian Education System) for students of 5th, 6th, 7th and 8th grades. It has as major objective the total development of the student, giving to him an academic formation as well as it does stimulate him to sound out his "aptitudes," with a focus on vocational-orientation and preparation for a job.

Some of the characteristics of a Polyvalent School are:

1) it is a school for general education. Its focus is more toward the subject-matters for general education than for specialized education;

2) there is a sounding out ("sondagem") of aptitudes ("aptitudes"), a vocational orientation, and initiation for the job;

3) the center of the building is the library, that also serves the community;

4) the integration school-community is a very important aspect of consideration;

5) there is a focus on team-work;

6) it does "rationalize" activities, delimiting number of students per class, structuring the personnel organizations, and their functions, having an administrative and technical team-group, building practical and functional buildings to serve the present and the future utilization of them;

7) there is a basis of activities focused on the modern pedagogy; the staff participates in programs of recycling and "licenciature..."
de curta duracao", there is a service of "pedagogical orientation" in each school and a service of supervision on the State level;

8) the organization of the polyvalent school and the way that it does function reflect the total respect for the human being as itself (student, teacher, administrator, educational specialist, community personnel). Therefore, there is a focus on the "habilitacao" - development of competencies - of the teacher staff, administrative and technical personnel that work on it, the adoption of instructional techniques that stimulate the development of students' responsibility, participation, creativity, freedom, etc., the creation of services for students and teachers' assistance, programs for assistance and involvement of the community, etc.)

According to the Law 5.692/71, the polyvalent school is an advanced First Level Education School. The Polyvalent School was structured before the Educational Reform, based on the principles stated by the EPEM (Equipe the Planejamento do Ensino Medio), created to organize activities of planning for the middle education in the country, in the document entitled "Fundamentacao Teorica das Escolas Polivalentes."

During the third phase (1972) of the Course Planning of the Program, PREMEN (before: Programa de Expansao e Melhoria do Ensino Medio - nowadays: Programa de Expansao e Melhoria do Ensino, since there is no more "middle school" concept in the new educational structure in the country) emphasized the common points between the Polyvalent Schools and the First Level Education Schools, as described following:

1) as an "area-based" school, maintaining relationships with other schools that teach the four first grades of the First Level education, the polyvalent school attend to the principle of horizontal integration, stated on the Law 5.692/71;

2) through the library and sport installations, the polyvalent school attend to the principle of intercomplementaridade which is enlarged by the use of Arts classrooms and Science Lab in the evenings;

3) the curriculum planning was organized in a way that integrates the eight grades of the First Level Education Schools. Acting as an "area-based" school, the polyvalent school is promoting the curriculum involvement with the other schools, based on the student flux
and mobilization. Therefore, the principle of **vertical integration** is being observed;

4) the administrative and technical personnel is composed of principal, vice principal, educational counselor, pedagogical coordinator, supervisor, secretary, librarian, all trained for their respective functions and prepared to apply the principles of the Law 5.692/71;

5) the whole staff is trained to apply the new concepts of evaluation and recuperation of instruction;

6) the structure of the school emphasized the coordination of subject-matters and "classroom councils" (which goal is to maintain the cohesion of each subject-matter and the cohesion among all of the subject-matters), concerning the objectives, content, operational modes and evaluation. Each unit is responsible for **intern coherence of each subject-matter** (it does not matter how many activities, study areas or disciplines the subject-matter will be converted into);

7) the organization of the polyvalent school foresee that each teacher will have an amount of weekly hours to be used in the preparation of his work, a way of teacher in-service self-improvement;

8) the relationships **community-school** are guaranteed by the activities of the "Circulo de Pais e Mestres" (similar to the PTA organization in American schools) and the Community Council in each school.

The Service of Pedagogical Coordination is the organization encharged of planning, organization, coordination and following-up of instructional and educational activities in the school. The objectives of the Service of Pedagogical Coordination are:

1) to improve the educational process through the continuing training of teachers, following-up and attention to the pedagogical methods and techniques evolution;

2) to improve the learning products by using adequate didactic techniques related to the modern concepts of the teaching-learning process;

3) to improve the didactic equipment of the school, offering better possible conditions for the educational process of the youth;

4) to guarantee the articulation of the different subject-matters for a better and more efficient result of the instructional process and curriculum integration in function of the stated objectives.
The PREMEN in the STATE of ESPIRITO SANTO is the most important mission of the Polyvalent Schools in the state, whose purpose is to reach these goals:

1) to create a "quantitative" improvement of new and efficient activities for teachers training; modernization of the curriculum, educational administration, creation of "model schools" and the supplying of school equipment and didactic materials;

2) to create more classrooms, to build new school buildings and to adapt educational establishments in the State Educational System;

3) to increase the level and number of educational resources and improve their flux for the educational purposes.

The total program of implementation of the PREMEN schools in Espirito Santo was proposed to be done in four years, 1970-1974. There were three most important aspects considered on the planning, coordination, control and execution of the program as following:

a) building the educational establishments,

b) development of human resources,

c) increase and development of educational equipment.

PREMEN plans involved a training of teachers in Espirito Santo as following:

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<td>Academic Subject-Matter</td>
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APPENDIX B

QUESTIONNAIRE

The purpose of this questionnaire is to gain your perceptions of the recently completed experiences in the training in OSIA. The responses you give will enable us to improve further studies and in-service training. All information will be considered confidential.

Recalling the study in OSIA and conferences you had with us, please answer the following questions:

I) Do you feel it was worth your time to participate in this study? Why?

II) Do you think the time used in the training sessions was appropriate? Why?

III) Do you feel the time used in the observations was appropriate? Why?

IV) Do you feel the time used in the conferences with us was appropriate? Why?

V) Did you learn any new ideas from your study of OSIA?

VI) If your answer was yes, discuss briefly the possible application of these ideas.

VII) What conditions would have helped you apply the ideas gained from this study?

VIII) List what you feel were the strong points of the study.

IX) List what you feel were the weak points of the study.

X) Other comments and/or suggestions.
APPENDIX C

Responses to the Questionnaire by the Sixteen Brazilian Teachers Participating in the Four Experimental Groups

I) Do you feel it was worth your time to participate in this study? Why?

Group X

Teacher #

5 It was worthwhile. I became aware of my teaching behavior toward/with students. Also, I became aware of the fact that I can improve my teaching behavior. I am ready to do it by applying what I have learned during the training. I sensed some of my problems, but I was not fully aware of them.

6 Yes, because through it, I had an opportunity to learn new techniques related to educational problems which will help me in improving some teaching methods.

7 Yes, because it clarified some points that I did not know before.

8 It was worth my time because I could feel and "see" mistakes I was making unconsciously.
Teacher 

9 Yes. Many things teachers unconsciously do because they are not aware of them. Also, some changes were made in my teaching behavior, since I was doing many things which were "wrong" and, through the study, I was made aware of these and tried to improve my teaching behavior. I think I did.

10 Yes, because through it we had opportunity to think about some points which we were not observing or which we had forgotten.

11 Yes, because I had an opportunity to observe what I was doing in the wrong way and that seems to be basic, fundamental in the instructional process.

12 Yes, because it reminded me of many things that I had forgotten, or maybe I became more aware of the educational job which consists of an actualizing process.

13 Yes, because at least teachers became aware that educational processes are constantly changing. Through improvements, changes, continuing actualization, those processes must be studied, analyzed, and used with adequate knowledge and information.

14 Yes, because it did remind me of some knowledge I had and was not using in the classroom.
Yes, because the natural tendency is to transform the lesson into a routine and this study broke up such a situation, by leading me to recall important behaviors which were already forgotten by me.

Yes. It helped me to remember some pedagogical aspects I had learned and, because of the classroom routine, had forgotten to some extent.

Group XQFG

Teacher #

Yes. For me, the study was worthwhile: everything that refers to educational problems interests me very much. During the study, I had opportunity to become aware of some types of behavior occurring during the instructional process.

Yes, because I became aware of what I was doing, related to types of behavior and teaching strategies I was using in the classroom.

Yes. I think it is always good to know new things. In the case of OSIA, I had many opportunities for self-evaluation and to see many mistakes I was making in the classroom.

I think so. Although the topics were not new for me, the training allowed me to remember and put them into practice, emphasizing the points which, indirectly, were suggested by the researcher.
II) Do you think the time used in the training sessions was appropriate? Why?

Group X₀

Teacher #

5 The time was appropriate, although it should have been scheduled in a period which would not coincide with normal class time.

6 I think it should have been given in a period set aside for the training.

7 No, because the time should have been longer, to allow everybody to analyze the situation much better.

8 No, because we were worried (mostly myself) with the students in the classroom.

Group X₀F

Teacher #

9 No, the time was short; all activities should be developed during the training sessions and not as work to be done outside that time.

10 Yes, since we could get a general idea about what we would be doing and how the participation would be.

11 It could have been better if we had had a time different from the school time. But the training did bring enrichment for the teaching-learning process.

12 In my opinion, the training should be given in a period which the teachers would not be working in schools.
Group X\textsubscript{OG}

Teacher #

13 Probably. The teachers were taken out of their routine job, gaining some ideas, going immediately and directly back to work which really gave opportunities for possible application of what had been discussed.

14 No, I think the time should be longer, better gains would have been made if the training had been given during a period of time in which we were not working.

15 Not sufficient, but appropriate because it was done before the lesson which gave opportunity for planning the types of behavior to be emphasized during the lesson.

16 No, because teachers and the researcher were concerned with the students in the classroom.

Group X\textsubscript{OFG}

Teacher #

17 Maybe it would have been better if it had come during a "free" period of time for the teachers, because the students stayed working by themselves and it was not according to my plans.

18 Yes. It was appropriate because we were in action, using the time effectively and going immediately into the application of the new goals we had set up.

19 Yes. The time was sufficient for us to get the necessary information and directions which were clear and objective.
The time used for the training was not appropriate, since there was not enough time to do the activities. It would be better if teachers had time for the training without being worried about so many other things to be done.

III) Do you feel the time used in the observations was appropriate? Why?

Group X

Teacher #

5 I think that 15 minutes were not enough time. The whole lesson should be observed, not only a part of it.

6 Yes. I think that, although the time was short, it allowed observers to have an idea of what we were doing or trying out in the classrooms.

7 Yes, to observe something, there is no need for a long period of time. It was good!

8 No, because only once was it really possible to audio tape the lesson as I wanted it done.

Group X

Teacher #

9 Yes, most of the lessons I teach are activity-based because of the nature of the subject matter itself. We do not use verbal behavior for long periods of time. If the situation was not like that, I think the time would be short; it would have been interesting had you observed the complete lessons.
10 No. I think that the "ideal" time would be 50 minutes, since we could get to the development of behavior manifested during the lesson.

11 Yes, because the observations had to be in a real situation, as they were.

12 Yes, although I also think that the observer should stay longer in the classroom to have more opportunities to observe the whole lesson, when varied and different situations would occur.

Group X

Teacher #

13 Yes, although short, the time was sufficient to give a general idea of what had been done, planned, or even experimented with in the classroom.

14 No, I think that a period of 15 minutes does not allow the observer to "see" many things, since the classes are very large (40 students).

15 No. I think it was an artificial situation since, sometimes, the lesson had to be expositive in nature to allow the audio-taping of the lesson.

16 Yes, because it did not present any constraints to the normal ways of developing the lesson.
Teacher #

17 Yes. I believe it was sufficient for a brief analysis of the teacher's and students' ways of behaving in the classroom during the instructional process.

18 Surely, at least on my part. All observations made were real, you observed the behaviors I reveal in the classroom situation. Any time would be appropriate for me, since I was in classroom trying to modify some behaviors I had selected to work on.

19 Yes. I think the time was sufficient for the observer to have a general idea of the lesson, my teaching behavior, and interaction with students.

20 I think so. The objective of the observations was the teacher-student interaction, and it occurs during the whole instructional process. It could be 15 or 30 minutes. The interaction would be almost the same.

IV) Do you feel the time used in the conference with us was appropriate? Why?

Teacher #

5 It was not sufficient for me. I would like to have had more opportunities to talk about my classes.
6 Although I did not have the conference, I think that the time disturbed some a little. A greater involvement on the part of the teachers was needed.

7 Even though not having had the conferences, I think they should have been longer.

8 I did not have any.

Group XDF

Teacher #

9 I don't think it was enough time. But it was appropriate because it was immediately after the observation, which made it easier for the ideas to be developed together.

10 Yes, it was sufficient. The time was enough for us to sense what had been observed as well as listen to suggestions. It was appropriate because, without it, it would have been impossible to get to any conclusion related to the observed lessons, even though it did take one of our hours for planning.

11 In general, I think it was, because the happenings were recent to us.

12 It should have been in a period of time different from our work time, being longer and allowing for more exchange of ideas.
Group XFG

Teacher #

13 --

14 It was sufficient, but not appropriate because I did not have opportunity to talk to you immediately after the lesson. Maybe it would have been more opportune if my schedule had been organized in such a way that we could have discussed things after the lesson had been observed.

15 It was not sufficient, but it was appropriate because it was done before the lessons, which gave opportunity for planning the types of behavior to be considered.

16 No, because almost always we had to do it very quickly since there were other things to be done. Concerning the researcher, I think she would have gained much more if the teachers had had more time to devote to the study itself.

Group XFG

Teacher #

17 Yes, because it was immediately after the lesson, when I was still remembering very well what I had done. The audiotaping helped to remember, but it was better that I could "feel" what I had done before listening to the tape, which made my own judgment more objective.

18 Yes.

19 Yes, we always had time to listen to the audiotaped lesson to think through, to discuss, to listen to suggestions, comments, etc.
Although being during planning time, I think the time was sufficient.

V) Did you learn any ideas from your study of OSIA?

Group X

Teacher #

5. Yes: the questioning strategies.

6 Yes. I think that all teachers must always know about new things, especially when they are related to educational problems.

7 Yes.

8 New ideas, properly, no, but larger understanding of what I already knew.

Group X

Teacher #

9 Yes.

10 Yes.

11 I learned many things, but more important than that, I became aware of questioning, the importance of question planning for better motivation and learning process.

12 Not new ideas, but it made me analyze my own ideas and recalled things I had forgotten.
Teacher #

13 Yes.

14 Sincerely, no. Everything that was presented through OSIA was already known by me. But, the training was important for my own awareness of teaching.

15 Yes.

16 Yes. Maybe the change in terms such as "broad" and "narrow" questions, judgments based on public and private criteria, acknowledging behavior, appraisal behaviors, and others.

Teacher #

17 Yes and no. I did know some of them but could not find a way of applying them in the classroom, and I know something about the others.

18 It simply made me aware of some attitudes I was manifesting unconsciously, without thinking that I could modify them and see better results in the instructional process.

19 Yes.

20 No.

VI) If your answer was Yes, briefly discuss the application of such ideas.
174

Group X_0

Teacher #

5 Planning questions before teaching a lesson.

6 How to acknowledge students.

How to self-evaluate a lesson.

The types of questions to be asked during a lesson.

7 In my opinion, it was not only educational ideas but an instructional/teaching technique which I did not know before.

8 --

Group X_{OF}

Teacher #

9 Type of questions, the students' individual answers, to wait for students' answers.

10 To decrease negative judgments, changing them into positive ones.

To rephrase questions for better communication.

To give opportunities for a larger number of students to expose their ideas in the classroom.

11 I found it necessary to review the questioning strategies.

Many times we do make mistakes without being aware of them.

12 The classification of questions - it made me think more seriously about the type of questions - which ones were more relevant for the students and their learning, not for the teacher himself. Also, the type of behavior analysis based on the students' and my own reactions.
Teacher 

13 Teachers must always be concerned with their teaching analysis because it gives them opportunity to try out different teaching strategies which may facilitate and improve the quality and results of the lesson. Of course, teachers know that, but they are not aware of the application of such ideas.

14 --

15 Dialogue (teacher-student), personal positive judgment, student's individual answer, give time for student's reaction.

16 In reality, I was not worried about the varied strategies during the daily interaction process with students. Now that I am aware of them, I have more basis for making the necessary arrangements.

I don't see too many possibilities for application of the ideas, in the actual situation, because of a series of factors related to the school and educational system structures.

Teacher 

17 To apply them whenever opportunities appear favorable to me.

18 I will keep on trying out and working on the awareness of some behaviors in order to improve my instructional behavior. I will keep observing very seriously my reactions and, immediately, the students' reactions related to different behaviors manifested in the classroom.
19 I will improve my relationships with students. Therefore, hopefully, more learning will occur.

20 I will plan and give attention to the phrasing of questions, giving opportunities for everybody to participate, waiting for the students' answers, expanding their answers, soliciting clarification, trying to have the most timid students participate in the instructional process.

VII) What conditions would have helped you apply the ideas gained from this study?

Group XQ

Teacher #

5 What really helped me to apply those ideas was the awareness of them and the efforts given toward their use.

6 --

7 The phrasing of "broad" and "narrow" questions, the classification of questions, positive and negative judgments.

8 This study helped me by showing the instructional reality I am coping and living with: the positive and negative aspects of it.

Group XQF

Teacher #

9 --

10 Smaller number of students.

More attention, on my part, when doing what I had planned to:
- decrease negative judgements
- rephrase questions
- give opportunity for more students' participation.

11 In general, the individual conferences and the listening to the audiotaped lessons helped me a lot.

12 --

Group XOG

Teacher #

13 The possibility for immediate application of acquired ideas, before they could be forgotten or left out, helped the participants to apply the ideas gained from this experience.

14 The experiences provided help for the teachers in terms of developing an awareness of the instructional process. Therefore, the teachers were concerned with better planning of lessons and the instructional process itself.

15 --

16 If I were working with the other classes I teach, the conditions which would have helped me more are:

- have less than 40 students in each class
- have more time for planning lessons, for researching instructional resources, etc.

Group XOG

Teacher #

17 Based on emphasized aspects, I think that it is impossible to have a quick change in my instructional behavior. I selected
the questioning aspects to work on and I am trying to put into practice what we have discussed. I am still experimenting on it but I can feel that I am having good results.

18 I did not apply the ideas, but I had enough curiosity to observe the situations while listening to the audiotapes, and I felt the different reactions of the students.

19 To have only 20 students in each classroom. The opportunity for self-evaluation, trying to improve my instructional behavior.

The awareness of my teaching "mistakes."

The opportunity to listen to the audiotaped lessons.

20 I liked to have the lessons audiotaped: their analysis allowed me to perceive some situations of which I was not aware at the time they occurred. I became interested in the question problems. I tried to offer more opportunity for students' participation.

VIII) List what you feel were the strong points of the study.

Group X₀

Teacher #

5 Individual conferences which I did not have.

6 The whole study had positive aspects only, since we felt and observed changes in our own behavior as well as in the students' behaviors.

7 The instructional techniques, the classification and phrasing of questions.
The awareness of teachers' and students' behavior, mostly related to ways of communicating.

Group XQP

Teacher #

It was a practical study, with feedback after the lesson, which made it possible to avoid the errors in the lessons which followed each session.

To make teachers aware of their roles.

The revision of educational methods, the implementation of changes through comparisons of audiotaped lessons.

The awareness of the fact that there is always a more efficient way of questioning during the instructional process; the use of students' thinking, allowing them to think and avoiding trying to think for them.

Group XOG

Teacher #

The objectivity of the study.

The planning of questions, giving enough time for students' thinking, to give freedom for students to think and expose their thinking, to specify the student's name only after presenting the question.

The whole training was positive, since the ideas discussed in it were useful in improving learning as well as increasing teacher-student interaction.
The awareness that I have to change some of my instructional behavior in order to do a better job. To know that there is someone very much concerned with the teacher himself.

Group X_CFG

Teacher #

To become aware of some teaching aspects which I was not perceiving very well.
The art of questioning, to wait for the students' answers.
In general, there are lots of positive aspects of the experiences.

To make me more aware of classroom behavior with the students.

The improvement of instructional behavior related to appraisal, managerial, and substantive activities in the classroom.
Interaction with the whole class improved and, as a result, improved the learning process through my indirect action upon it.

Attention to teacher-student interaction.
Awareness of teachers as they got to know themselves better as teachers.

IX) List what you feel were the weak points in the study.

Group X_O

Teacher #

Only 15 minutes for observing the lesson.

---
7 I don't see anything negative on this study. Future studies should be longer because that type of investigation is really helpful and valid for the teacher.

8 The time distribution: too many things to be seen and done in a short period.

Group XOF

Teacher #

9 Time.

10 The observations were made during few months. Maybe if they were made during at least a whole semester, more confident conclusions could be drawn from them.

11 Lack of appropriate time.

12 Time was the weak point of the study. There could be more exchange of ideas between teachers and observer if the time for the conference was not that short.

Group XOG

Teacher #

13 Lack of adequate system for observing the arts classes.

14 Time was the negative aspect of the study since there were too many responsibilities for the teachers, all at the same time, which might have influenced negatively the results of the investigation.

15 ---

16 Lack of enough time for interrelationship between trainees and researcher.
If there is any, it would be related to lack of time.

In a study like this everything is valid, depending on the situation to which we apply it. Therefore, it is necessary to have more practice, more observation.

Lack of time for teachers.

I acknowledge the value of the study. But I think that the time we had was minimum and it was not possible to do too much.

In case you have success with this study, I would like to see other similar investigations being developed, not only with college and/or secondary teachers, but mostly with elementary teachers. In general, studies should be developed with everyone responsible for education.

Time for participation, outside the school time.
If the classes were smaller, it would be easier to develop the study.

I hope the experimental studies will continue because they are very important and necessary for the educational improvement.

Group X0G

Teacher #

This type of study should be in the nature of a continuing activity to be offered to teachers all year long, which would allow for more generalizations of the results obtained. I tried to interest the Supervisor of Commercial Techniques in the idea to help improve subject-matter, classroom management, etc.

I think that studies like this should be developed at least once a year, in order to make teachers aware of the teaching instructional process, offsetting the teachers' accommodation to routines.

More time for training.

Smaller number of students per class.

I hope more experimental studies will be developed.

More adequate time should be given for training programs.

Group X0FG

Teacher #

Keep on with the purpose of helping teachers.

Continue to give emphasis to this topic.

I hope that other similar studies will be developed.

--
APPENDIX D

Reduced Copy of:

1. OSIA Matrix
2. Indices for OSIA Strategies
3. Standard Variable Analysis
# OSIA Matrix

|   | J1 | J2 | J3 | J4 | J5 | J6 | J7 | J8 | T10 | T11 | T12 | T13 | T14 | T15 | T16 | T17 | T18 | T19 | X | Y |
|---|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| 1 |    | 1  |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 2 |    |    |    | 1  |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 3 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 4 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 5 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 6 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 7 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 8 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |
| 9 |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |    |    |

---

The matrix above represents the relationship between different variables J1 to J8, T10 to T19, X, and Y. Each cell contains a number indicating the strength or frequency of the relationship.
### INDICES FOR OSIA STRATEGIES

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<th>Student Direct Managerial</th>
<th>Teacher Direct Managerial</th>
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<th>Individual Managerial</th>
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### STANDARD VARIABLE ANALYSIS

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<table>
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APPENDIX E

STATISTICAL TABLES

Table
30. List of Raw and Arcsine Transformation Pre-, Post-Treatment and Gain Scores on Variable S/T for Twenty Teachers in a Polyvalent School in Brazil.

31. Arcsine Transformation Pre-, Post-Treatment and Residual Gain Scores on Variable T +/- for Twenty Teachers in a Polyvalent School in Brazil.

32. Correlation Matrix of Arcsine Transformation Residual Gain Scores in Seventeen OSIA Variables Used in This Investigation.

33. Pre- and Post-Treatment Raw Scores and Raw Gain and Residual Scores on Variable T i/D for Twenty Teachers in a Polyvalent School in Brazil.
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**ARCSINE TRANSFORMATION PRE-, POST-TREATMENT AND RESIDUAL GAIN SCORES ON VARIABLE T +/- FOR TWENTY TEACHERS IN A POLYVALENT SCHOOL IN BRAZIL**

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APPENDIX F

SELECTED SAMPLE OF MATERIALS USED IN THE OBSERVERS' TRAINING

1. Learning and Instruction
2. Review of Appraisal Behaviors
3. Examples of Soliciting Clarification Behaviors
4. Practice - Example
5. The Observational System for Instructional Analysis - Categories and Coding (Portuguese Version)
6. Coding Sheet used during Training
7. Transcript of a Portuguese lesson - for Coding training
8. Practice - "Protocol"
9. Observation Sheet Used during Investigation
APRENDIZAGEM E INSTRUÇÃO

APRENDIZAGEM: e o processo através do qual atividades se originam ou são modificadas de acordo com reações referentes a situações que ocorrem na sala de aula, considerando que as características de tais mudanças não podem ser explicadas com base em respostas espontâneas (instintos), tendências, maturidade ou estágios temporários do organismo (ex: fadiga, droga, etc.) - Hilgard.

Dai:

APRENDIZAGEM: mudança de comportamento ou mudança na disposição para comportar-se (incluindo eliminação de aprendizagens anteriores, permanencia e consistencia de certas aprendizagens previas).

INSTRUÇÃO: toda atividade na qual professores e alunos são envolvidos quando agindo ou atuando ativamente a fim de promover aprendizagem ou condições consideradas como promovedoras da aprendizagem.

INSTRUÇÃO: basicamente envolve 3 fases:
1. pre-ativa - planejamento
2. ativa - ocorrência do processo de instrução propriamente dito
3. pos-ativa - de acordo com a fase anterior e refletindo a mesma.

Estaremos considerando, no uso do sistema, SOAI, a fase ativa do processo de instrução — preocupação e consideração com os comportamentos manifestados para alunos e professores, enquanto eles participam e trabalham durante a situação de sala de aula.
EXEMPLOS DE ATIVIDADE DE INSTRUÇÃO:

- aluno tentando "descobrir" um princípio científico, através de experiência com equipamento de laboratório;
- professor apresentando ou discutindo a vida de Castro Alves;
- grupo de alunos discutindo como podem apresentar o resultado do trabalho realizado na sala de aula;
- aluno ou professor ajustando projetor (slides, filmes) para melhorar o foco;
- professor fazendo perguntas a fim de poder diagnosticar como alunos podem compreender a derivação de determinada fórmula,

Todas essas atividades têm como objetivo estimular aprendizagem. É necessário considerar possibilidades de que a aprendizagem não ocorra. Contudo, tais atividades são realizadas com intenção de promover aprendizagem.

Numa sala de aula, vários comportamentos, reações e interações ocorrem, tanto por parte do professor como do aluno.

Em geral, existem 3 tipos principais de comportamentos observáveis numa sala de aula:

1. comportamento de AVALIAÇÃO
2. comportamentos relacionados com a MATERIA
3. comportamentos relacionados com MANEJO DE CLASSE

1. AVALIAÇÃO:

Você fez um ótimo teste, João.

Eu discordo de sua ideia.

A sua composição teve muitos erros de ortografia (resultado do comportamento de uma pessoa).
A distinção entre os outros 2 tipos de comportamento e bem clara e facil de ser reconhecida quando estamos observando numa sala de aula.

2. MATERIA: não ha avaliação.

Comportamentos diretamente associados com facilitação de obtenção de novos conhecimentos.

3. MANEJO DE CLASSE:

Comportamentos que tendem a promover clima social favorável a aprendizagem (ou desfavorável, as vezes).

Início da aula informalmente, com discussed sobre ocorrências e experiências que não estão diretamente ligadas a matéria.

Ex: resultado do jogo de futebol, organizacão de grupos, etc.
REVISAO DOS COMPORTAMENTOS DE AVALIAÇÃO:

Classifique os seguintes comportamentos, escrevendo ao lado o código correspondente a categoria a que eles pertencem como comportamentos de avaliação, de acordo com o "Sistema de Observação e Análise de Instrução" (SOAI):

1. "O relatório mostra que há cinco milhões de pessoas desempregadas e não somente quatro como você sugeriu."

2. "Voce usou o teorema corretamente."

3. "Correto, o Porto de Tubarao e o maior do mundo em exportação de minerio."

4. "A professora acha que nos não trabalhamos suficientemente no projeto esta semana."

5. "Sinceramente, eu não gostei do que você fez hoje."

6. "João apanhou o livro, ontem."

7. "Todos estamos aqui, com exceção de Maria."

8. "Pedrinho já disse o que ele pensa." Como vocês reagem a isto?

9. "Eu acho que você foi espetacular no jogo de hoje."

10. "Não concordamos com a ideia que Manoel apresentou."

Baseada na classificação de SOAI, organize alguns "protocolos" em que os comportamentos

\[P_5, P_6, P_7, P_8, P_9\]
\[A_5, A_6, A_7, A_8, A_9\]

estesjam presentes. Sublinhe cada um desses comportamentos, colocando ao lado o **código** conveniente:
SOLICITANDO CLARIFICAÇÃO

Exemplos diversos:

1. perguntando diretamente pelo significado:
   "O que você quer dizer com esta resposta?"

2. solicitando uma resposta mais completa e bem elaborada, em continuação ao que foi dito ou feito anteriormente:
   "Mostre-nos o que mais você poderia fazer com este material."

3. procurando entender os motivos do comportamento:
   "Por que você se aborreceu conosco?"

4. procurando elementos do comportamento de uma pessoa, os quais parecem não estar correlacionados e, daí, entender a relação entre tais elementos:
   "Por que você usou este tipo de solução na experimentação e não o que nos havíamos discutido em sala de aula?"

5. perguntando por implicações que um comportamento poderia ter:
   "O que aconteceria se você usasse esta mesma técnica para resolver este novo tipo de problema?"

6. perguntando por previsões dos efeitos de um comportamento:
   "Como você acha que o grupo se sentiu quando você disse: 'Esta discussão é estupida'?'"
PRATICA E FIXAÇÃO:

I - Classifique os comportamentos que se seguem, usando as categorias de SOAI e codificando-os adequadamente:

1) P - "Roberto, diga-nos o aspecto que mais o impres- sionou na visita que fizermos a Brasterola." ( )

2) A - "Creio que seria bom discutirmos este assunto novamente, pois não entendi bem o que a senhora quis dizer, no final da aula de ontem." ( )

3) P - "Quem foi o primeiro Presidente do Brasil, após a Revolução de 1964?" ( )

A - "Jânio Quadros" ( )

P - "Jânio Quadros. ( ) Quem concorda com a resposta de Roberto?" ( )

A - "Eu não. A resposta dele está errada." ( )

A - "Acho que ele não entendeu bem a pergunta. ( ) Posso responder por ele?" ( )

P - "Claro, pode continuar." ( )

A - "Bem, eu acho que o primeiro Presidente do Bra- sil, após a Revolução de 64, foi Castelo Branco." ( )

P - "Correto! ( ) Quem gostaria de nos dizer alguma coisa acerca do governo de Castelo Branco? ( )

Eu acho que todos aqui sabemos alguma coisa acerca de fatos importantes ocorridos durante seu governo." ( )

II - Organize "protocolos" onde os comportamentos de SOAI já estudados possam ser sublinhados e codificados.
"SISTEMA DE OBSERVAÇÃO E ANALISE DA INSTRUÇÃO" (SOAI)
Autores: Dr. John Hough e Dr. James K. Duncan
Tradução: Maria das Graças Furtado Feldens

**CATEGORIAS E CODIGOS**

Comportamentos manifestados pelo PROFESSOR e ALUNOS

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<td>P19</td>
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X  Código usado para ocorrências sem função de instrução propriamente dita
Y  Separação usada para interação
EXERCÍCIO - FIXAÇÃO:

Codificação com intervalos de 5 segundos:

Nome: 
Data: 

Ouça a gravação que se segue e, usando os códigos das categorias dos comportamentos de SOAI, codifique a lição em intervalos de 5 segundos, ou, mais frequentemente, se o comportamento mudar durante o período de 5 segundos. Inicie e termine a codificação com o símbolo X.
TREINO

5ª b – 2ª turno – Portugues

P – Olhe, então nos vamos ver: Por que mesmo que o adjetivo varia em grau? Por que?

A – Porque nem todas as pessoas tem a mesma qualidade.

P – Porque nem todas as pessoas tem a mesma qualidade... a mesma qualidade. Então cada ser, variando da qualidade, o adjetivo flexione em....grau.

A – Em grau.

P – Grau! Então vamos ver quantos são os graus do adjetivo?

A – Comparativo e Superlativo.

P – Comparativo e Superlativo.

O comparativo pode ser de?...

A – Superioridade, inferioridade e igualdade.

P – Quando e que o grau comparativo é de superioridade?

Um exemplo. Você,...fala! Superioridade, quem sabe?

Você!

A – E...

P – Vamos comparar duas meninas e uma vai ser o que que a outra...?

A – Mais do que a outra.

P – Do que a outra. E um exemplo?

Jane e...

A – ...menos
P - menos?
A - mais.
P - mais.
A - Estudiosa do que Gloria.
P - Do que Gloria.
Então nos temos o grau comparativo de...
A - Superioridade.
P - Por que que nos falamos que Jane e mais estudiosa do que Gloria?
Se tivermos o grau comparativo de superioridade, como será o de inferioridade?
Menos.
A - Menos.
P - Então nos diremos que Gloria e...
A - ...menos estudiosa que Jane.
P - E o grau comparativo de igualdade, como será?
Tão...quanto.
A - Tão, quanto.
P - Uai, então nos vamos dizer que Jane e...
A - ...tao estudiosa quanto Gloria.
P - Gloria.
Agora nos vamos ver o outro grau do adjetivo que e o grau.....?
A - ...superlativo.
P - Este grau também se subdivide, mas agora nos vamos deixar de fazer comparações. Nos vamos fazer relação, so. Então, nos vamos ver superlativo relativo. Olha, pela palavra nos vamos ver: comparativo faz... comparação.
A - Comparação.
P - Relativo faz...
A - Relação.

P - Relação.
   Então vamos dar o exemplo de superlativo relativo.
   Eu vou dizer:
   Jose é o mais estudioso de todos.
   Eu comparei o Jose com alguém?

A - Não.

P - Não. Não comparei o Jose. Eu fiz uma relação so com a turma. Dentre todos da turma eu disse que o Jose e o......?

A - .....mais estudioso que todos.

P - Mais estudioso de todos. E o mais de todos. Eu fiz uma relação com o resto da turma. No comparativo nos vemos que nos usamos "o mais" para comparativo de?

A - Superioridade.

P - Entao eu tambem tenho mais, entao eu direi que aqui e um superlativo relativo de.....

A - Superioridade.

P - Superioridade.
   E como seria aqui o de inferioridade?

A - Jose e o menos estudioso de todos.

P - Mais baixo um pouquinho. Jose e o menos estudioso de todos. Entao tambem o superlativo relativo pode ser de.....?

A - Superioridade.

P - E de?

A - Inferioridade.

P - Inferioridade.
   Agora nos vamos ver se esse vai ser de igualdade, hem? Vamos ver. Quando eu comparo eu posso dizer que os dois sao iguais, mas fazendo relação sera que podemos falar que os dois sao iguais?
A - Nao.

P - Nao tem jeito. Entao, aqui, o superlativo relativo, nao tenho igualdade. Eu so tenho.....

A - Superioridade e inferioridade.

P - Superioridade e inferioridade.
Com superioridade usar sempre.....

A - Mais.

P - E com inferioridade?

A - Menos.

P - Menos.
Quem e que me da outro exemplo que nao seja esse aqui?
Superlativo relativo de superioridade. Vamos ver! Quem sabe?

A - Maria e o menos, a menos.....

P - A mais.....

A - Maria.....Maria e a mais estudiosa que.....

P - Nao, que, nao, de todas.

A - De todas.

P - Outro exemplo, quem sabe? Gloria.....

A - Gloria e a mais estudiosa de todas.

Com o grau superlativo relativo de superioridade, com o adjetivo bonita.

A - Paulo e mais bonito de todos.

P - De todos. Paulo e mais bonito de todos.
Agora nos vamos pedir exemplo do grau superlativo relativo de inferioridade. Que palavra que nos temos que usar?

A - Menos.
P - Quem é que vai dar o exemplo? Vocês, ai?
A - Eu sou menos estudioso que Paulo.
P - Não, assim você comparou. Não faça comparação; e relação so.
   Eu sou o menos estudioso da classe.
Organize um "protocolo", no qual os comportamentos já codificados na folha anexa sejam manifestados numa situação simulada de sala de aula.
FOLHA DE OBSERVAÇÃO:

SOAI - (Sistema de Observação e Análise da Instrução)

AUTORES - Dr. James Kelly Duncan
Dr. John Hough

TRADUÇÃO - Maria das Graças Furtado - 1974

PROFESSOR :
TURMA :
DATA :
OBSERVADOR :

COMENTÁRIOS:
APPENDIX G

SELECTED SAMPLE OF MATERIALS USED IN THE IN-SERVICE TRAINING OF TEACHERS

1. Lesson Self-Analysis Form
2. Types of Questions
3. Review
4. Reaction Sheet
5. "Protocol" Sheet
6. Checklist
7. Reaction Sheets:
   - Positive judgment
   - Negative judgment
   - Acknowledgment
AUTO-ANALISE DE AULA

I)

II) Quais fatores contribuíram para que você avaliasse sua aula como o fez?

III) O que você faria para tornar sua aula perfeita (caso não tenha sido)?

IV) Decisões:
Tipos de Perguntas:

memoria
"Fechadas"
convergente

avaliação
"Abertas"
divergente

- Pense em perguntas que você costuma fazer na sala de aula. Como você classificaria tais perguntas?

- Tente usar tipos variados de perguntas na sua classe. Observe a reação dos alunos. Avalie a aula, em termos das perguntas feitas e reação dos alunos.
Classifique as perguntas abaixo como "abertas" ou "fechadas", colocando um A ou um F, observando se tal tipo de pergunta oferece oportunidade para várias respostas ou simplesmente requer uma específica e única resposta.

1. Que tipo de animal é este?   
2. Qual é o efeito da conjunção na sentença?  
3. Suponha que você estivesse tentando convencer alguém de que o ar é real. Como você faria isto?  
4. Como você acha que a vida no Brasil seria se ainda fossemos colônia de Portugal?  
5. O símbolo 45 é formado de 2 algarismos?  
6. Como você define "liberdade"?  
7. O que é a gravidade?  
8. Qual é o sujeito da oração?  
9. Como você acha que a vida seria se não houvesse gravidade?  
10. Onde se localiza a cidade de Manaus?
Descreva, abaixo, pelo menos, 3 (tres) situações nas quais você permitiu a um ou mais alunos que falassem durante a aula sobre o assunto em discussão ou fizesse perguntas a você. Sumarize a sua reação a isto e a consequente reação do aluno ou alunos.
"Protocolo"

Organize um protocolo, no qual você, como professor, faça perguntas que solicitem por clarificação e mais participação dos alunos.
Indique se sua aula inclui cada um dos itens abaixo, marcando SIM (S) ou NÃO (N). Se o item não é aplicável a situação, marque no espaço (NA).

1. Fiz perguntas só aos alunos "voluntários".
2. Perguntei aos alunos "não-voluntários".
3. Solicitei resposta "solitária".
4. Solicitei resposta "controlada".
5. Solicitei resposta "sem controle".
6. Solicitei resposta "em grupo".
7. Permiti aos alunos darem respostas espontâneas.
8. Animei vários alunos a responderem a mesma pergunta.
9. Dei tempo suficiente para a reação dos alunos.
10. Ajudei os alunos a melhorarem suas respostas, fazendo perguntas que os levaram a:
    - corrigir a resposta dada
    - clarificar a resposta dada
    - estender a resposta dada
11. Providenciei o material necessário, quando conveniente.
12. Orientei os alunos mais do que falei toda a aula.

Observações ou comentários:
Pense em julgamentos que você emite na sala de aula. Alguns são baseados na matéria propriamente dita, no conhecimento; são avaliações baseadas em critérios publicamente aceitos.

Outros são baseados na sua opinião pessoal, em critérios aceitos pela própria pessoa, de acordo com os valores, sentimentos e pensamentos dela.

De exemplos de comportamento de avaliação dos dois tipos. Eles podem ser tanto positivos como negativos.

1. Baseados em **criterio publico** ou da **materia** -

2. Baseados em **criterio pessoal** ou **individual** -
Descreva, abaixo, situações nas quais você julgou seu(s) aluno(s) **positivamente**. Explique porque o fez e como foi a reação da classe, ou do aluno a quem tal julgamento foi dirigido.

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Descreva, abaixo, situações nas quais você julgou seu(s) aluno(s) negativamente. Explique por que fez isto e como foi a reação da turma ou do aluno a quem tal julgamento foi dirigido.

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Enumere situações nas quais você manifestou o comportamento de reconhecimento de alunos na sala de aula:

<table>
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<tr>
<th>Aluno</th>
<th>Comportamento de Reconhecimento</th>
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