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ABSTRACT

A comparative study was made of Mexican secondary teachers in the Telesecundaria (TS), which utilizes televised instructional programs, and in the Ensenanza Directa (ED), which does not. The aim was to describe the teaching done in the TS system, to compare the two systems, and to examine statistically the relation of teaching and learning activities to student achievement in Math and Spanish. Most teachers relied on lecturing, allowing little student participation or group work. Where a few teachers, usually the better educated ones, did encourage student participation, student achievement was higher. The following implications seemed warranted: 1) the educational level of the individual should be a criterion for selection as a teacher; 2) teachers should provide students with an introduction to televised instructional programs, to encourage fuller participation; 3) teachers should spend more time in planning their classes; and 4) teacher training should prepare teachers to rely less on lecturing and more on activities which stress individualized learning, student participation, and group work. (PB)

TEACHER OBSERVATION IN MEXICO

by

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May, 1973

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INTRODUCTION

The observation of Mexican secondary school teachers in the Telesecundaria* (using ITV in all subjects and classroom "coordinators") and Ensenanza Directa* (regular instruction without ITV) was undertaken to achieve three objectives:

1) To understand and systematically describe the teaching methodology actually being used by TS classroom coordinators;

2) To determine the similarities and differences in the teaching activities employed by coordinators and those used by teachers in the regular ED system; and

3) To examine statistically the degree to which various classroom teaching behaviors are related to student achievement.

The first two objectives were pursued with the hope of better understanding the classroom role of TS coordinators. Observations of ED teachers were undertaken to provide a basis of comparison, and not to prove the "superiority" or "inferiority" of either group. In addition, it was felt important to investigate the degree to which the classroom teaching provided in the TS system is similar to, or different from, that provided in the regular secondary school system.

The final objective, that of examining the relationship between

(*Hereinafter referred to as TS and ED)

teaching behaviors and student achievement, was pursued in the belief that teachers' methods influence what students learn. The study sought to discover which classroom activities were most closely associated with increased student achievement.

The study's over-all goal was to provide TS leaders — state supervisors, orientation personnel, evaluators, teacher-trainers, and high-level administrators — with the kind of concrete information that could help them determine what changes, if any, should be made in: (1) pre-service training of new coordinators; and (2) in-service training programs for those coordinators currently teaching in the system.

This report will describe the following:

1) The Theoretical Background of the Study;
2) The Classroom Observation Instrument;
3) The Training of Mexican Observers;
4) The Planning of the Investigation;
5) The Results of the Study;
6) Implications and Recommendations; and
7) Summary

THEORETICAL BACKGROUND

The classroom observation form used in the following study was adapted from a form originally designed and employed in El Salvador to observe the classroom teaching behavior of teachers in that country's instructional television system. The original form was based on C. E. Beeby's theory of educational development, as expressed in his book, The Quality of Education in Developing Countries. Beeby's hypothesis is that all educational systems develop through four stages. He also holds that teachers' levels of general education and the quantity and quality of their professional preparation are directly related to their educational system's stage of development.

Briefly, in Beeby's First Stage of educational development, the majority of teachers have little general education and almost no professional training. Because the school curriculum at this stage is frequently vague (or non-existent), the teacher is the sole authority of knowledge. The students' school day consists largely of rote exercises, memorization, and choral drills.

In the Second Stage, teachers continue to possess relatively little general education, but they now have more professional training. Authority is concentrated in an official curriculum, and teachers generally lack the confidence to adjust the curriculum to the

interests and needs of their students. The majority of questions asked by teachers have a single correct answer. Students continue to be passive receptacles for the knowledge supplied by teachers.

Teachers in the Third Stage have more general education than in the previous stages, and they are better-trained. They follow the official curriculum with less rigidity, and students learn that not all the correct answers are to be found in the curriculum. Teachers' increased professional preparation raises their self-confidence and stimulates them to enrich the school day with special projects and audio-visual aids. Students actively participate in the learning process by asking questions and by bringing their own experiences into the classroom.

Stage Four includes teachers with a great deal of general education and professional preparation, and they stimulate their students to think for themselves. The learning process is individualized to relate to the needs, interests, and abilities of each student. Much time is devoted to projects, problems, and exercises chosen by the students themselves.

Beeby's theory implies that the transition from one stage to its successor requires a change in classroom activities such as the following.

Teacher lecture and dictation: As a classroom develops, dictation gradually disappears and lecture time diminishes, while the proportion of student talk and activities increases.

Teacher questions: The kinds of questions asked by the

teacher are an important measure of development. As a classroom progresses, the proportion of opinion and thought questions (multiple-answer) to memory questions (single-answer) should increase. By memory questions we mean those with a single correct answer (What are the seasons of the year? Who was the first president of Mexico?). Opinion questions are those relying more on point of view than logical thought, but which permit a variety of correct responses (What do you think of this play?). Thought questions are those requiring students to make deductions, comparisons, generalizations, etc. (Is this a lyric or an epic poem — why? Why are these triangles equal? What formula can you deduce from this exercise?).

Use of learning aids: In the early stages of development, a syllabus or text and the blackboard are likely to be the only learning aids used. As a classroom develops, other learning aids — pictures, charts, maps, demonstrations — should begin to appear. Their use should increase with further development, until finally learning aids are individualized.

Individualized instruction: As a classroom moves upward, a portion of the teacher's time should begin to be devoted to directing group exercises and activities, and to helping individual students. With further development, these activities should gain importance.

Homework assignments: As a classroom progresses, the teacher should increasingly assign homework that requires investigation and reasoning by students.

Student questions: In the first levels of development, students ask few, if any, questions. Most of those they do ask involve classroom procedure (What are we supposed to do?). As a classroom progresses, students should begin to ask some clarification questions (What does this mean?) and then thought questions (What would happen if...?). As development continues, thought questions should predominate.

Student talk: In the "traditional" classroom, students rarely venture an opinion without being specifically asked for it by the teacher. As a classroom moves upward, we expect more opinions to be volunteered by students, and some discussion among students to occur. As development continues, both activities should increase dramatically.

Small group and individual work: In the earliest stages of development, group work is nonexistent, and the individual work done by students is mechanical (practicing mathematical operations, copying from the blackboard). As a classroom develops, occasional group work should occur, and the individual work assigned students during class should require more thought and investigation. Farther along the development path, students should spend an increasing amount of time working on projects, problems, and exercises of their own choosing.

THE OBSERVATION INSTRUMENT

The sample observation form, translated from the Spanish, on the following page illustrates the classroom activities selected for observation. As is apparent, not all the potential teaching and learning activities were included; other possibilities—such as the teacher's ability to maintain student interest, the teacher's knowledge of his subject matter, and his/her ability to relate a lesson to the environment and experiences of pupils—were purposely excluded as being too difficult to measure. Besides, it was felt that the activities included on the form were sufficient for the purposes of this study.

How to record observations

Once the activities to be observed were selected, the problem was to devise a simple means of recording their occurrence in the classroom. We decided to build our form on a time basis. As seen on the sample form, beneath each activity is a line of five boxes:

2. Lectures

1	2	3	4	5

Each individual box ([1]) represents five minutes of class time. During the first five-minute observation period, the observer marks the first box of <u>every</u> activity engaged in by both teacher and students. For example, let us suppose that during the first five mirutes observed the teacher began by lecturing for three minutes

OBSERVATION FORM

SCHOOL _____ OBSERVER _____

TEACHER _____ TOWN _____

GRADE _____ DATE _____

SUBJECT _____ TV ☐ NO TV ☐

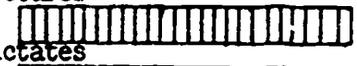
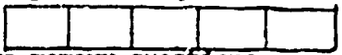
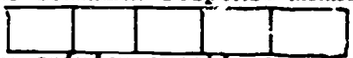
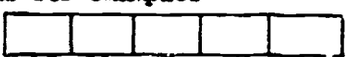
THEME OF LESSON _____ [*Specify material or activity, by number]

TEACHER

1. Teacher behavior during teleclass:

_____

_____

2. Lectures 
3. Dictates 
4. Explains (Responding to Spanish question 
5. Asks procedure questions 
6. Asks memory questions 
7. Asks stimulus-response memory questions 
8. Asks opinion questions 
9. Asks thought questions 
10. Asks for examples 
11. Uses blackboard 
12. Uses audio-visual materials 
*13. Reads from reference works 
*14. Supervises individual seat-work 
*15. Works individually with students 
*16. Supervises group work 
17. Suggests group projects 
18. Assigns homework 
19. Assigns investigations as homework 
20. Checks homework 
21. Chaos or silence 
22. The teacher had prepared his class in advance

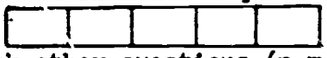
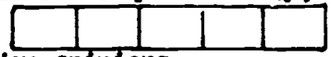
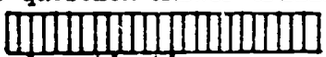
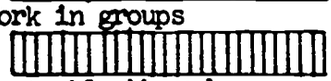
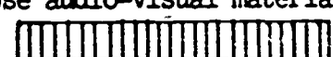
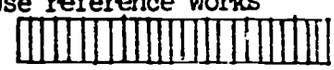
Yes ☐ No ☐

STUDENTS

1. Student behavior during teleclass:

_____

_____

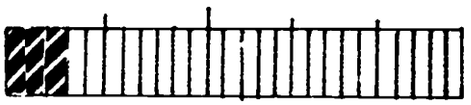
*2. Expound 
*3. Dictate 
4. Ask clarification questions 
5. Ask other questions (p,m,o,r) 
6. Give opinions 
7. Do question-answer drills 
8. Do dramatizations 
9. Do repetition drills 
10. Translate 
*11. Work individually 
12. Work in groups 
13. Go to blackboard 
*14. Use audio-visual materials 
*15. Use textbooks 
*16. Use reference works 

Other comments: _____

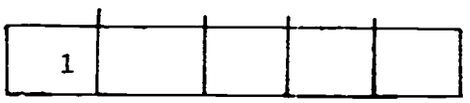
on a new math formula. He then asked a student where the chalk was, spent a minute writing problems concerning the new formula on the board, and afterwards directed students to solve the problems in their notebooks. For those five minutes, the observer would have marked the following items in this way:

TEACHER:

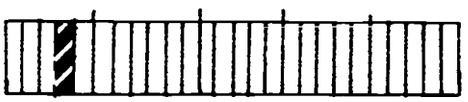
2. Lectures



4. Asks procedure questions



11. Uses blackboard



STUDENTS:

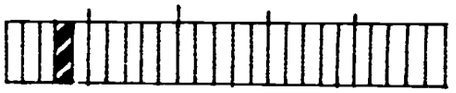
1. Work individually

As will be noted, for those activities requiring an accurate time measure (Lectures, Uses blackboard, etc.), each five-minute box is subdivided into one-minute segments. In cases where frequency

is more important than duration (Asks procedure questions, etc.), the observer marks each separate occurrence. It is also worth noting that, in the above example, had the teacher continued to lecture at the same time he was writing on the blackboard, the form would have been marked as follows:

2. Lectures:

11. Uses blackboard



Observations are recorded in the same fashion during each of the four remaining five-minute periods.

In any given 50-minute class period, observations are recorded for only half that time. It was decided to do this to obtain equivalent observation time in television and non-television classrooms. In classes with television, the first 10 minutes are taught by the classroom teacher, the teleclass consumes the next 20 minutes, and the final 20 minutes are again taught by the classroom teacher. Being primarily interested in the classroom teacher, the supervisors decided not to record behavior during the 20-minute teleclass. In a classroom with television, observations are recorded for the following five-minute periods:

8:00 - 8:05	no recording
8:05 - 8:10	first box
8:10 - 8:30	teleclass (no recording)
8:30 - 8:35	second box
8:35 - 8:40	third box
8:40 - 8:45	fourth box,
	etc.

In non-television classes, observations are made by alternating five minutes of recording with five minutes of non-recording throughout the 50-minute class:

8:00 - 8:05	no recording
8:05 - 8:10	first box
8:10 - 8:15	no recording
8:15 - 8:20	second box
8:20 - 8:25	no recording
8:25 - 8:30	third box

etc.,etc.

In practice, alternating recording periods in this manner presented no problems. Twenty-five minutes seems sufficient to record most significant classroom behavior.

Training observers

The first step in training observers was to familiarize them thoroughly with the meaning of each item on the observation form. Once this was done, they were instructed in the mechanics of recording observations. Several classes were then viewed from an observation room while observers practiced recording activities on the form. Difficulties and uncertainties were discussed whenever they occurred, until all the observers learned to mark the form in the same way. These steps required approximately two hours' training time to achieve inter-observer reliability.

The remaining four hours of training were spent achieving reliability on question classification. Written samples of questions from real classes were discussed and classified.

To ensure reliability among the nine observers trained in Mexico, a "practice-study" was undertaken in which observations were conducted of 20 TS coordinators in the Federal District and the Valley of Mexico (including parts of the states of Mexico and Toluca). Observers were paired for these observations, but each observer marked his observation form independently of his partner. In this way, reliability between each pair of observers could be measured and, by changing partners, among the entire group of nine. Reliability among all observers exceeded 85 per cent.

Planning the investigation

Ninety-seven 9th grade teachers were included in the study of classroom teaching behavior. They were selected from a random sample of TS and ED teachers from the Federal District, the Valley of Mexico, and the nearby states of Hidalgo and Morelos, with the purpose of measuring their students' achievement in Mathematics, Chemistry, and Spanish through pre- and post-tests administered at the beginning and end of the second semester of the 1971-72 school year.

Theoretically, these teachers should have been observed two or three times in each of the three subjects; however, limitations of personnel, transportation, and time resulted in the complete elimination of observations in Chemistry classes, and the number of

observations in Mathematics and Spanish was reduced to one per teacher.

The composition of the sample is illustrated in the following table.

TABLE 1

Observation Sample[1]

State	Telesecundaria			Enseñanza Directa		
	# teachers	Observations		# teachers	Observations	
		Math.	Span.		Math.	Span.
Federal District	15	13	15	17	8	9
Valley of Mexico	12	11	11	7	4	3
Hidalgo	15	13	9	10	5	5
Morelos	13	11	11	8	3	5
Totals	55[2]	48	46	42[2]	20	22

Total Number of teachers 55 + 42 = 97

Total Number of Observations 94 + 42 = 136

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[1] In TS, a single coordinator teaches all of the 9th grade subjects included in the official curriculum, while in ED each subject is taught by a different teacher, each of whom specializes in one subject matter.

[2] The 42 observations completed in ED represent one observation of each of 42 different individuals; the 94 observations in TS represent only 55 different individuals: 39 coordinators observed both in Math and Spanish, and 16 coordinators observed in only one of those subjects.

RESULTS OF THE STUDY

The complete tabulation of the 136 observations finished may be found on Page 15, Table II. What follows is a resume of the most important similarities and differences between the two groups of teachers, taken by subject matter.

Mathematics

In this subject, very few important differences in teaching style were encountered between TS coordinators and teachers in the regular secondary school system. Both TS coordinators and ED teachers employed slightly more than half the observed class time in lecturing. Both groups used the blackboard a great deal (about 40 per cent of observed class time), and almost never used any other audio-visual teaching aids. They were similar, also, in the average number of teacher-asked questions, averaging 13 per class in TS and 16 per class in ED, although the ED teachers asked more reasoning questions (averaging 6.2 per class) than did the coordinators (3.8 per class).

Both groups of instructors allowed their students little opportunity to participate actively in the learning process, and student participation was limited almost entirely to individual seat work. While ED students spent twice as much time on individual work (averaging 11.2 minutes per class) as did TS students (who averaged 5.6 minutes per class), the coordinators of TS supervised a greater portion (11 per cent) of such work than did the ED teachers (3 per cent).

TABLE II

Observation Scores — Averages for each group of teachers

Group observed	TEACHERS: Lectures - % class time	Dictates	Procedure questions	Memory questions	Opinion questions	Reasoning questions	Asks for examples	Uses blackboard	Uses audio-visual aids	Reads reference works	Supervises indiv. work	Works indiv. w. students	Supervises groups	Silence/chaos	Previous preparation	STUDENTS: Expound	Asks for clarification	Asks questions	Gives opinions	Works individually	Works in groups	# students at blackboard	Amt. time at blackboard	Uses learning aids	Uses textbooks	Uses reference works
Telesecundaria[1]	56%	3%						39%	5%	3%	3%	3%	1%	1%	24	5%				28%	2%		25%	8%	1%	1%
Math (N=48)	111	.6	22	59	14	38	.1	7.7	.9	.6	.7	.6	.3	.1	of 48	.9	.3	.2	1.4	5.6	.4	23	49	15	.1	.3
Ensenanza Directa	52%	5%						38%	6%	2%	1%	1%		5%	17	2%				45%	3%		15%	3%	1%	9%
Math (N=20)	130	13	25	51	24	62	.1	9.6	15	.4	.3	.2	0	1.3	of 20	.4	1.1	.3	.5	11.2	.7	23	3.7	.7	.2	23
Telesecundaria[1]	40%	11%						6%		12%	3%	1%	1%	6%	19	3%				16%	3%		5%	1%	13%	4%
Spanish (N=46)	7.9	21	26	68	13	.9	.4	1.2	0	24	.7	.1	.2	1.2	of 46	.6	.4	.2	.2	3.1	.6	.2	1.0	.1	2.5	.8
Ensenanza Directa	52%	7%						13%		3%	1%	2%	1%	7%	15	5%				14%	4%		4%		7%	3%
Spanish (N=22)	131	17	11	109	.7	18	.2	3.1	0	.6	.3	.5	.1	1.8	of 22	1.3	.8	.1	.2	4.6	.9	.5	.9	0	1.8	.6

[1]Note: Since almost none of the coordinators made an introduction prior to the telelessons, the first five minutes of observation time were lost. Therefore, the averages for TS are based on an observation time of 20 minutes, while the averages for the ED are for an observation time of 25 minutes.

As might be expected in Mathematics, the majority of students' individual seat work consisted of copying problems or formulae from the blackboard and solving problems.

Teachers in both the TS and ED systems sent an average of two students per class to the blackboard, although the coordinators allowed their students 10 per cent more working-time at the blackboard than did the ED teachers. In addition, neither group of teachers allowed its students much use of learning materials, textbooks, or reference works. Nevertheless, coordinators allowed their students more class time to use learning materials such as rulers and compasses (an average of one and one-half minutes per observed class), while ED teachers allowed students more class time to use reference works (two minutes per observed class).

One important difference between the two groups of teachers was that 85 per cent of the ED teachers had pre-planned their lessons, while only half of the TS coordinators had done so.*

Spanish

As has already been explained, TS coordinators teach Spanish as well as Mathematics. The observations demonstrated, however, that their behavior changed markedly from one subject to the other. In fact, when an individual coordinator's classroom behavior in Math is compared with his/her teaching behavior in Spanish, one finds more

*A fact to be taken into consideration, among others, is that the coordinators are responsible for all 9th grade subjects and their corresponding classroom activities, which implies that they should pre-plan each one; ED teachers customarily have an advantage in this respect, since they are responsible for only one 9th grade subject.

differences than are evident by comparing the behaviors of different teachers in the ED system. This suggests that the nature of a subject matter, or the manner in which it is presented in the official curriculum, affects the classroom behavior of the instructors who teach it.

In Spanish, both the coordinators of TS and the ED teachers employed an average of 63 per cent of the observed class time in lecturing, although important differences were discovered in the activities implied in lecturing; in the TS system, less class time was spent on straight exposition than in the ED system (averaging 40 per cent of observed class time in TS versus 52 per cent in the ED). This may result from the presence of television in the coordinators' classrooms: telelessons, averaging 20 minutes in length, are comprised mainly of lecturing by the teleteachers, and this relieves coordinators from spending so much of their own class time lecturing.

Further, the coordinators used more class time to dictate to students than did ED teachers (11 per cent in TS versus 7 per cent in ED), and they also spent more time reading aloud from reference works than did the ED teachers (12 per cent of the observed class time in TS compared to 3 per cent in ED). The two latter facts imply that coordinators felt a need to embellish the lessons presented by teleteachers, possibly because classroom coordinators better understand their own pupils' learning idiosyncracies than do the far-distant teleteachers, who rarely — if ever — visit teleaulas outside Mexico City.

The average number of teacher-asked questions was slightly lower in TS classrooms than in ED classes (averaging 12 per TS class versus 15 per ED class). The most evident difference between coordinators and ED teachers in the type of questions asked consisted in the following: coordinators asked fewer memory (single-answer) questions than did their counterparts in the ED system (averaging 6.8 per class in TS and 10.9 per class in ED). For both groups, the number of procedure questions asked was relatively low, averaging 2.2 per class in TS and 2.5 per ED class.

For both groups of teachers, the average number of teacher-asked opinion and reasoning questions (multiple-answer) was three times less in Spanish, averaging 4.7 per observed class, than in Mathematics, which averaged 13.7 per class. This fact reinforces the previously-stated notion that the nature of the subject matter, or the way in which it is presented to teachers, influences their teaching of it.

In the realm of learning aids, the blackboard was the only tool used by either group of teachers, although it was used less frequently here than in Mathematics (averaging 6 per cent of observed class time in Spanish and 13 percent in Mathematics classes).

Student participation was rare, and student individual seat-work occurred less frequently than it had in Mathematics classes (15 per cent of observed class-time in Spanish against 35 per cent in Mathematics), with little difference between TS coordinators and

ED teachers (14 per cent of observed class time versus 16 per cent respectively). Nonetheless, an important difference was found in the amount of student individual seat-work that was teacher-supervised: in the TS, coordinators supervised an average of 23 per cent of their students' seat work, as compared with 6 per cent supervision by teachers in the ED system.

Very few students were encouraged to use the blackboard in Spanish classes, although this activity did occur two and one-half times as frequently in ED classrooms as it did in TS classrooms — averaging one student for every two classrooms observed in ED as compared with one student for every five classes observed in TS.

Student use of learning and reference materials was also rare in the Spanish classes observed in both systems. Textbooks were the most frequently-used material, and their average class-time use was 2.5 minutes per TS class and 1.8 minutes in ED classes (Two and one-half minutes in TS represents 13 per cent of observed class-time, while 1.8 minutes in ED represents 7 per cent of observed class-time.).*

Regarding pre-planning of their lessons, 68 per cent of the ED Spanish teachers had done so, as compared with only 42 per cent of their counterparts in the TS system (see footnote, page 16).

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*The explanation for this difference appears on page 14, Table II, as footnote 1.

STUDENT ACHIEVEMENT** IN THE OBSERVED CLASSROOMS

Achievement scores were obtained in Mathematics and Spanish for students in the 136 classrooms observed. A full discussion of these results can be found elsewhere. (See "The Mexican Telesecundaria: A Cost-Effectiveness Analysis," published by Stanford University's Institute for Communication Research). At present, therefore, the discussion will deal only with the significant statistical relationships found to exist between different teaching and learning activities and various levels of student achievement. Mathematics and Spanish classes were analyzed independently, but without separating TS coordinators and ED teachers into different groups. This was done for two reasons: first, because no great differences in teaching style were found to exist between the groups; second, to avoid the problems of correlational analysis that occur when the groups being compared are too small in number to permit generalization from the results.

Mathematics:

This subject showed several statistically significant relationships between different teaching and learning activities and student achievement. Students having the greatest increase in their achievement (as measured by the pre- and post-tests of achievement previously described) were found to be in classrooms with the

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**Pre and post-tests based on the official 9th grade program of studies were prepared and pre-tested by members of the DGEAD evaluation section, with the advice of the Institute for Communication Research of Stanford University and the Mexican Instituto Nacional de Investigacion Educativa (National Institute of Educational Research).

following characteristics:

(1) Their teachers lectured, dictated, and read reference material less frequently than other teachers. Teachers who lectured a great deal generally produced students with lower achievement levels than teachers who lectured less ($p < .01$).

(2) Their teachers used the blackboard less than other teachers. A teacher who talked a great deal also tended to use the blackboard a great deal, and both activities had a negative correlation with student learning (lecturing $p < .01$; blackboard $p < .07$).

(3) Their teachers gave students the opportunity to expound and dictate problems and/or formulae during class. An increase in these two forms of student participation was positively correlated with increased student learning ($p < .06$).

(4) Their teachers organized student group work. This activity was very highly correlated with increased student learning, but less than 10 per cent of the teachers observed organized such work ($p < .001$).

(5) Their teachers allowed more students to work at the blackboard during class than did other teachers. This kind of student participation also was positively correlated with an increase in student learning ($p < .05$).

(6) Their teachers encouraged students to use learning materials (compasses, rulers, etc.), reference works, and textbooks, and the use of all three types of learning aids was positively correlated with increased student learning ($p < .05$).

(7) When their teachers organized individual student seat work, they supervised that work. The quantity of individual seat work, in itself, had no significant correlation with student learning; however, those teachers who took an interest in what their students were actually accomplishing during periods of seat work and who showed their interest by supervising that activity did achieve a significant increase in student learning ($p < .01$). Seventy per cent of the teachers observed organized individual student seat work, but only 20 per cent of those teachers actually supervised the students' seat work.

(8) Their teachers asked more procedure questions than did other teachers. At first glance, it is perhaps difficult to understand why asking this type of question was positively related to increased student learning ($p < .005$). One possible explanation is that, as student participation increases, the teacher needs to ask more questions related to the organization of student activities — questions to find out whether all the students understand the instructions given to carry out a certain activity, questions asked to make sure that all students have the necessary materials or books required for an activity, etc.

The pattern outlined above clearly shows the positive and significant relationship between increased student participation in the learning process and increased student learning. When a teacher dominates the classroom (by lecturing and writing on the blackboard, for example), supposedly imparting important information to his

students, he is — in reality — not contributing very much to their learning. In fact, the analyses done indicate that such a teacher has a negative effect on student learning.

If, on the other hand, a teacher stimulates student participation in the learning process through allowing students to go to the blackboard; allowing students to expound, comment, and ask questions; organizing students for group work; requiring them to read or study textbooks or reference works; and supervising or helping with individual student seat work, then there is clear evidence that such a teacher contributes a great deal toward increasing student learning.

Spanish

In this subject very few statistically significant relationships were found to exist between teaching behavior and student achievement. The only three teaching activities in Spanish that were significantly related to student learning were:

(1) As in Mathematics, the teachers' asking of procedure questions showed a significant, positive correlation with increased student learning ($p < .001$).

(2) As was also seen in Mathematics, the teachers' asking of students to pass to the blackboard showed a positive correlation with increased student learning ($p < .06$).

(3) Something that appeared only in Spanish was a negative correlation between the teacher's asking of memory questions and student learning ($p < .05$). That is, the teachers who asked many

memory questions achieved lower achievement scores in their students.

The results in Spanish are difficult to understand and explain. Why should Spanish present a picture so different from that discovered in Mathematics? Why were there so few significant correlations in Spanish between teaching behaviors and student learning?

As has already been noted, the nature of the subject matter and/or the way it is present in the official curriculum can have an influence on the results. Perhaps even more important, in this case, is the strong possibility that the achievement test in Spanish did not measure well what the students had actually learned in their classrooms, since there was not a strict relationship between the type of questions asked on the achievement test and the teaching behavior suggested implicitly in the official curriculum. In addition, it may well be that, in Spanish, the general ability of students is more closely related with what they learn than are the methods by which they are taught.

From the current data, it is impossible to deduce which explanation is correct -- it could be one of the two mentioned above, a combination of those two, or other, unknown factors. In any event, one can only say that in Spanish few significant correlations were found to exist between classroom teaching behavior and student learning.

Other factors related to student learning

Studies done in other countries (principally the United States)

have shown that, many times, personal characteristics of teachers and other school factors are related to student learning. Taking that fact into account, information was obtained about some of those personal and school factors for 78 of the 97 teachers observed.

The information obtained concerning the teachers included age, sex, level of general education, level of professional preparation, and their teaching experience at different levels within the school system. Data on school factors included the year of construction of the school building, the number of classrooms, the building's suitability as a school (many Mexican schools are located in rented, private homes), and the facilities available, such as science laboratories, libraries, mimeograph machines, etc.

It was found that, of these personal and school factors, only a few correlated significantly with student learning. In Mathematics, for example, students with women teachers tended to have higher achievement scores than students with men teachers ($p < .05$). No such similar relationship presented itself in Spanish classes.

In both Mathematics and Spanish, it was found that the level of general education of a teacher was positively correlated with higher student achievement ($p < .05$). This means that the more years of general education a teacher possessed, the better was his students' achievement in both Spanish and Math.

A very interesting finding was the negative relation between teaching experience in Mathematics in the ED system and student learning ($p < .05$). It appears that the longer one teaches in the

ED system, the more "traditional" his teaching methods become.

The analysis of school facilities and their relationship with student learning revealed nothing worth commentary. This may be due to the relatively small number (78) of cases in the analysis, or to the possibility that the school facilities in Mexico really do not have much to do with student achievement.

RESULTS OF THE OBSERVATION STUDY AND DR. BEEBY'S TYPOLOGY

It will be remembered that Dr. Beeby's hypothesis is that the levels of general education of teachers and their professional preparation are directly related to their level of educational development. Teachers at the First Stage of development have little general education and almost no professional training. When teachers acquire some professional preparation, they tend to advance to the Second Stage, where they closely follow the official curriculum. With more education and training, they pass to the Third Stage; in the Fourth Stage, one finds teachers with very high levels of general education and professional preparation.

All 97 Mexican teachers included in this study could be classified in Dr. Beeby's Second Stage. This can be demonstrated by examining the paucity with which activities representative of the Third and Fourth Stages occurred:

(1) Ninety-three per cent of the teachers in the sample never explained in response to student questions, because in 82 per cent of the classrooms observed the students never asked questions.

(2) Ninety per cent of the teachers never asked students to give examples related to their answers of teacher-asked questions.

(3) More than half the teachers asked none or only one multiple-answer question (opinion or reasoning question) per class.

(4) Eighty per cent of the teachers never used any teaching aids (maps, charts, etc.) except for the blackboard.

(5) Although 70 per cent of the teachers observed organized student individual seat work, 80 per cent of those teachers never supervised such work, and 90 per cent never offered their students any individual help with their work.

(6) In 80 per cent of the classrooms observed, students never expressed their own opinions and never used any learning materials or reference works. In 75 per cent of the groups, students never used their textbooks.

(7) In 92 per cent of the groups observed, students never did group work.

It will be recalled that those teachers who did employ certain teaching and learning activities representative of the Third and Fourth Stages — less lecturing, supervision of individual seat work, group work, use of textbooks and other learning aids by students, etc. — did achieve higher levels of student learning in Mathematics than did teachers who did not use those methods. This tends to reinforce an hypothesis implicit in Dr. Beeby's theory of educational development; that is, that teaching improves and learning increases as teachers and students move from one development stage to its successor.

It was also noted that the higher the level of general education of a teacher, the higher was the level of his students' achievement. This tends to confirm Dr. Beeby's hypothesis. At the same time, the study did not find any correlation between a teacher's level of professional preparation and his level of educational development. Part of the problem here lies in the fact that almost none of the teachers in the sample could be classified in the last two stages.

It may also be that, as far as professional training is concerned, the key factor may not be the number of years the teacher spends in that preparation, nor the educational level at which it occurs, but rather the quality of that training. From the evidence discussed thus far, it does seem possible to prepare a teacher in a "traditional" manner at any educational level -- pre-high school, high school, university, or post-graduate. As is known, a teacher typically teaches in the same manner in which he was taught. If one wants teachers to adopt and use "modern" methods, they must be trained by instructors who themselves use modern methods, and the teachers must be given the opportunity and support necessary to put those methods into practice.

IMPLICATIONS OF THE STUDY FOR THE TELESECUNDARIA SYSTEM

The study of teaching and learning behavior in the TS and ED systems indicates that the teaching activities of both groups are similar and that teachers' classroom behavior falls generally within Dr. Beeby's Second Stage of educational development. That is, the

teacher dominates the classroom, and student participation in the learning process is almost nil. At the same time, the results (especially in Mathematics) indicated that those teachers who used some teaching and learning activities representative of the Third and Fourth Stages (less lecture, more student exposition, student group work, etc.) achieved higher levels of learning in their students. Therefore, it is evident that the current, general classroom behavior of the TS coordinators could be improved. How could that be achieved?

First, the study indicated a positive correlation between the level of general education of a teacher and the learning of his students. This implies that the level of general education of a teacher should be an important criterion in the selection of new coordinators. For coordinators already employed in the system, one might attempt to motivate them to obtain additional education, helping them obtain scholarships to cover the costs of such education or, if possible, directly offering scholarships to state universities.

Another alternative is that DGEAD itself could offer in-service general education courses for coordinators. The purpose of these courses would be to increase the general knowledge of coordinators in the various subjects they teach. One could administer tests to determine which coordinators could most benefit from additional instruction in history, which need more knowledge of Mathematics, etc. Or one could even require that all coordinators with less than a specified level of general education (bachillerato, for example) attend such courses.

These general education courses could be prepared and presented by the teleteachers over television, or they could be prepared and presented in the centros estatales (state centers) by state television supervisors, granting academic credit for course completion. The possibilities for, and the costs of, these alternatives would have to be investigated, along with other considerations regarding the best day(s), time(s) and place(s) to present such courses. One would also have to study how long they should last, as well as determine the real possibility of granting academic credits to those who successfully complete the courses.

The results of the study also show that the great majority of coordinators give their students no introduction ("motivation") prior to the telelessons. This may be due, in part, to the fact that classroom coordinators no longer receive guides that give resumes of the content of telelessons and that, therefore, it is difficult for them to prepare a proper introduction. The lack of guides may also contribute to the fact that half of the coordinators observed had done no prior preparation for their own lessons that follow the televised lessons. These two situations imply that one should study the possibility of reintroducing pedagogical guides for classroom coordinators, or of preparing some sort of pamphlets (four or more per year) that contain concrete suggestions for improving teaching activities.

Third, concerning teaching methodology per se, the results indicate the need to provide in-service training for those coordinators

already working in the TS system. Taking into account that the employment of certain teaching and learning activities tended to increase student learning, such in-service training courses should include practical instruction in these areas:

(a) organization and supervision of individual student seat work;

(b) organization and supervision of group work;

(c) use of textbooks, learning and teaching aids, and reference works by students; and

(d) student participation in the learning process through exposition, questioning, giving opinions, and discussion.

Other activities representative of the Third and Fourth Stages — efficient use of audiovisual aids and more flexibility in the use and interpretation of the official curricula to meet the needs and abilities of individual students — should also be included in any in-service training program.

Any in-service training program should be considered a continuous long-term task. That is, instead of trying to teach in a single course the four activities mentioned above, as well as others deemed necessary, it would be better and more effective to take them <u>one at a time</u>, limiting the objective of a single course to giving knowledge and practice of <u>one</u> pedagogical activity. In-service training, then, should consist of a series of short courses rather than one, long course covering all topics.

Concerning how to present these courses, one logical and obvious way would be via television, with the coordinators organized in

reception groups in their respective state centers. Experience shows that in-service training courses have greater impact if the recipients receive them in groups directed by previously-trained personnel (such as the state supervisors), and if each televised lesson is followed by discussions and periods of practice.

To determine the degree to which new teaching behaviors are being put into practice, and to know when to begin introducing subsequent, desired teaching behaviors, the classroom teaching practices of the TS coordinators should be constantly evaluated. This could be done by randomly selecting a small sample of coordinators, as was done in this research, possibly with the help of the state supervisors, who could be trained for such work by DGEAD's evaluation section.

To insure that coordinators adopt the teaching behaviors that one wishes to teach them, it is important that the teacher-trainers follow instruction practices that, in themselves, are examples of "modern" teaching techniques. That is, if one wants to teach the organization and supervision of group work, one ought not do so by lecturing on the subject but rather by using that very method with the coordinators, organizing them in groups and supervising their group work. All of the above, referring to in-service training of coordinators already working in the TS system, applies equally to pre-service training courses for new coordinators.

Finally, the results of this research should be made known (perhaps in a condensed form) to all the teachers who participated

in it. Communicating the results will help dispell the notion that the purpose of research is to judge individuals; in reality, the purpose should be to better understand the whole Telesecundaria system, with the hope of improving it for the benefit of its students.

SUMMARY

Mexican secondary teachers in the Telesecundaria (with ITV) and Enseñanza Directa (without ITV) systems were observed in their classrooms to be better able to understand and systematically describe the type of teaching actually being done in the TS system, to determine similarities and differences between the two systems, and to examine statistically the degree to which various teaching and learning activities were related to student achievement.

The instrument used was one that had been developed previously in El Salvador to observe the classroom teaching behavior of that country's teachers who were using instructional television. It was adapted to suit the special conditions of Mexico, and nine Mexican observers were trained to carry out the field work and assist in analyzing and interpreting the data.

Ninety-seven 9th grade instructors were included in the observation study: 55 from TS (48 observed in Math and 46 observed in Spanish), and 42 from ED (20 observed in Math and 22 in Spanish). Each teacher was observed once over a period of approximately two months. Teachers were randomly selected from the states of Toluca, Hidalgo, Mexico, and Morelos and from the Federal District of Mexico City. Pre-and post-tests of achievement in Math and Spanish were administered to students during the second semester of the 1971-1972 school year, and data was also obtained on personal characteristics of teachers (age, sex, education, professional training, years of experience) and school

factors (year of school construction, number of classrooms, facilities available — such as science labs, libraries, mimeograph machines, etc.).

Data obtained showed that relatively little difference existed between the type of teaching done in the TS system and that found in the regular secondary system. Both groups of teachers tended to dominate their classrooms by lecturing and writing on the blackboard, allowing extremely little opportunity for students to participate in the learning process through exposition, asking questions, giving opinions, or discussion. Most teacher-asked questions were of the procedure or memory variety, although Math teachers did ask a substantial number of reasoning questions (averaging five per class) as compared with Spanish teachers (averaging 1.4 per class). Student participation was also limited by the fact that pupils rarely used textbooks, reference works, or other learning aids during the class period.

Both groups of teachers also relied heavily upon student individual seat-work, but while 80 per cent of the teachers observed organized this activity, only 20 per cent of those ever supervised the seat work or offered help to individual students in the course of that activity. Group work occurred in only eight per cent of the classrooms observed, and virtually none of the teachers observed used any learning or audio-visual aids outside of the blackboard.

While the above paints the picture of a highly "traditional" secondary school system, the study also found that some teachers did

employ more "modern" methods, and that when these newer methods were used, student learning, especially in Mathematics, increased. Analyses of achievement test gain scores in Math and correlations with teaching behavior showed that the highest levels of learning occurred in classrooms with the following characteristics:

(1) teachers lectured, dictated, and read aloud from reference material less frequently than other teachers;

(2) teachers used the blackboard less than others;

(3) teachers gave students the opportunity to participate by expounding, dictating problems and/or formulae;

(4) teachers organized student group work;

(5) teachers allowed more students to work at the blackboard during class than other teachers;

(6) teachers encouraged students to use learning materials, reference works and textbooks;

(7) teachers supervised students' individual seat-work;

(8) teachers asked more procedure questions than other instructors.

The above results were found to exist largely in Math classes; in Spanish, only three factors were related to student learning: (1) the teachers' asking of procedure questions; (2) the teachers' asking of students to work at the blackboard; and (3) a negative correlation between the teachers' asking of memory questions and student learning. From the different results in Spanish and Mathematics, it appears that the nature of the subject matter and/or the way it is presented in the official curriculum affects the results. It may also be that the achievement test in Spanish did not measure well what the students had learned since there was not a strict relationship between

the type of questions asked on the test and the teaching behavior suggested implicitly in the Spanish curriculum.

Of the teachers' personal characteristics and other school factors, only a few items were found to be related to student achievement. They were: (1) in Mathematics only, students with women teachers achieved better than students with men teachers; (2) in both subjects, a teacher's level of general education was positively correlated with student learning; (3) in Mathematics, there was a negative relationship between years of experience in the ED system and student learning. None of the school factor items were found to be related to student learning scores.

It is believed that the findings of the observation study have the following implications for the administrators of the TS system:

(1) The level of general education of teachers should be an important criterion in the selection of new coordinators, and an attempt should be made — by providing scholarships or in-service courses — to increase the general education of coordinators already employed by TS.

(2) The great majority of coordinators provide no introduction (or "motivation") prior to telelessons, and this fault may be due in part to the lack of teachers' guides. The latter should perhaps be reintroduced, and coordinators could be offered in-service and pre-service training in the ways in which introductions can be planned and carried out in the classroom.

(3) The great majority of coordinators do not pre-plan their classes, and they also require help in this aspect of their teaching.

(4) In- and pre-service training should include instruction and practice-teaching in the following areas related to increased student achievement: a) organization and supervision of individual seat work; b) organization and supervision of group work; c) use of textbooks, learning and teaching aids, and reference works by both students and teachers; and d) student participation in the learning process through exposition, questioning, giving opinions, and discussion.

Any in-service training program should be considered a continuous, long-term task, rather than a short-term problem; it would be better and more effective to offer the four activities enumerated above one at a time, limiting the objective of a single course to giving knowledge and practice of one pedagogical activity.

To determine the degree to which new teaching behaviors are being put into practice, and to know when to introduce subsequent behaviors, the classroom teaching of coordinators should be constantly evaluated.

Finally, it is felt that the results of this study should be made known to the teachers who participated in it. Communicating the results will help dispell the notion that the purpose of research is to judge individuals; in fact, the purpose should be to better understand the whole Telesecundaria system, with the hope of improving it for the benefit of its students.