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ABSTRACT

Conventional achievement measurement instruments were not adequate for optimum coordination between classroom and television studio personnel in El Salvador. A more rapid feedback system was tried in 14 seventh grade classrooms. The key factor of this feedback system was that the test results be compiled quickly, preferably within three days, and analyzed sufficiently to give the classroom teacher a useful corrective tool. The feedback strategy was based on the students' previously determined learning performance and designed specifically to overcome the inflexibility of existing semi-annual achievement tests. The basic measuring instrument was the multiple choice test constructed to cover seven mathematical and four social studies concepts. The drafting of questions, the most difficult chore of the experiment, required several pretests to establish the most appropriate questions. The investigators found the severe space limitation of the television screen detrimental, the timing of the questions crucial, and that the collection of test results required a high level of organization and a considerable number of people and vehicles. (MC)

FEEDBACK ON STUDENT LEARNING FOR INSTRUCTIONAL TELEVISION IN EL SALVADOR

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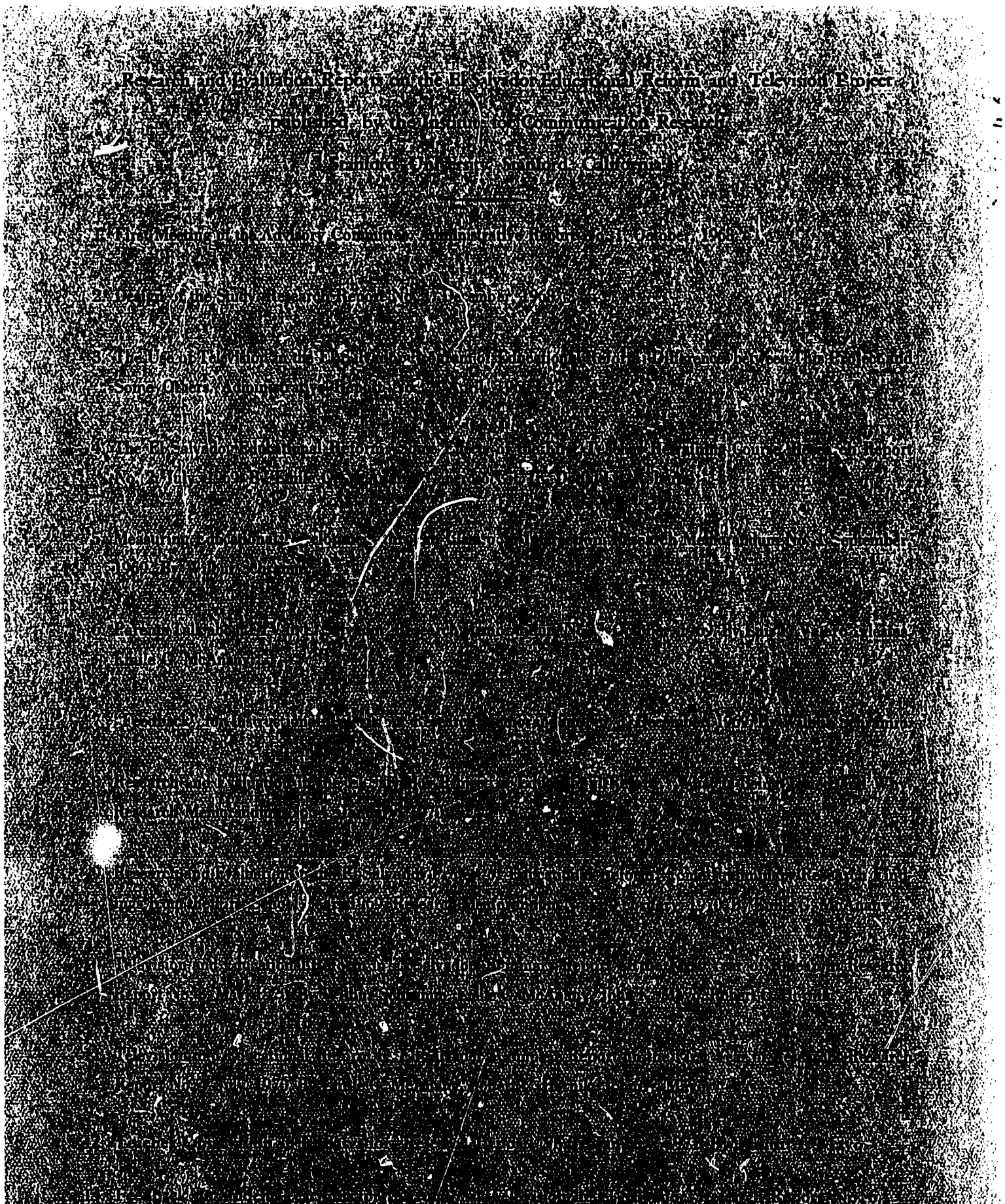

FEEDBACK ON STUDENT LEARNING FOR INSTRUCTIONAL TELEVISION IN EL SALVADOR

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Research Report No. 6

This is one of a series of reports of research on the Educational Reform Program of El Salvador, and especially its use of instructional television. This report has been prepared by members of the Institute for Communication Research, Stanford University, on behalf of the Academy for Educational Development, under contract with the U. S. Agency for International Development.

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FEEDBACK ON STUDENT LEARNING FOR INSTRUCTIONAL TELEVISION IN EL SALVADOR

In the 1970 school year, the evaluation team experimented with a method for obtaining rapid "feedback" on how much students had learned from a given unit of a course. Tests were made, pretested, and administered by television near the end of a given unit of the course, and results were reported to the studio in time to permit the preparation of special review or remedial broadcasts. The methods worked very well in two courses, and they are being expanded to cover more courses and more units during the 1971 school year.

In the hope of saving time and unnecessary trial and error for other ITV systems that may wish to install learning feedback systems, we are going to set down in this report some of the thinking behind El Salvador's trial of its new feedback method, and the procedures followed and problems encountered in putting it into effect.

The reason for wanting this kind of feedback

All efficient instructional television systems try to maintain as close a contact as possible between their studio production personnel and the teachers and students who receive televised lessons in the schools. Through frequent and purposeful monitorings of their classroom audiences and comments solicited from classroom teachers,

television teachers and program planners are better able to diagnose and respond to teaching and learning problems. Such monitorings and the techniques that have been used to facilitate them are commonly referred to as "feedback." To a large extent, the flexibility of any instructional television system depends upon its feedback mechanisms and anyone concerned with improving the effectiveness of instructional television must pay special attention to the development of such mechanisms.

Numerous feedback mechanisms have been designed over time and in many different situations to measure the quality of televised instruction. Some have focused on the content of television classes, others have concentrated on teacher and student ratings of individual courses, and still others have dealt with the mechanics of program transmission and reception. A description of the wide range of feedback methods currently in use throughout the world may be found in our Research Memorandum No. 3, "'Feedback' for Instructional Television," by Dr. Wilbur Schramm.

In the first two years of the El Salvador project (1969-70), a number of feedback mechanisms were put into practice. Attitude surveys were administered at the beginning and end of each school year to teachers as well as students. These provided evidence that television teaching had been well received by both groups. Another kind of questionnaire was administered to a random sample of teachers to check on their reactions to various program series. The results of these subject-specific surveys provided useful information about

the strengths and weaknesses of each production team. In addition, the project's evaluation team conducted an extensive program of pupil testing at the beginning and end of both years in order to obtain firm measures of student achievement in the context of El Salvador's broad educational reform.

Despite the utility of its attitude and achievement testing programs, the El Salvador project's evaluators were not satisfied with the quality or quantity of the feedback they were providing the production teams on a short range basis. As the project expanded, it became clear that the production teams needed more kinds of information from the schools, information that would better guide the day-to-day tasks of lesson development and presentation. Neither final exam grades nor year-end attitudinal data were found to be particularly helpful in pinpointing the concepts within specific content areas that were giving students the most difficulty or, on the other hand, the concepts that were being mastered with relatively little trouble. Similarly, more information seemed to be needed to guide the production teams in the selection of the most appropriate teaching techniques for their subject specialties.

In response to the clear need for more immediate information from the schools, a new kind of feedback mechanism was proposed by the evaluation team in the second half of the 1970 school year. It was to be based on students' learning performance and was designed specifically to overcome the inflexibility of the existing achievement tests.

The results of achievement tests are known to reflect the influence of many intervening factors in both the learning and testing processes. The influence of such factors had made it difficult for the evaluation team to extract the kinds of specific recommendations that the television production people needed to improve the teaching of their series. Therefore, a new feedback strategy was called for to assist the individual production teams assess student progress in the midst of a particular content unit. The evaluators believed that if reliable data on student learning could be collected, analyzed, and presented to the production teams in a very short time, the teams would be in a better position to diagnose learning problems and, where necessary, take immediate corrective action.

Four general questions guided the evaluation team in their approach to the development and pretest of a learning feedback system in El Salvador:

(1) Could a periodic check on student learning be established that would provide information of practical use to the television production teams both on a short and long-range basis?

(2) Could this periodic check on learning provide information in a convenient and fast enough way?

(3) Would it be possible to develop learning feedback techniques that would be applicable eventually to all subjects throughout the school year?

(4) What use, if any, could individual classroom teachers be expected to make of the learning feedback results?

With the hope of answering these basic questions, a preliminary plan for a learning feedback system was proposed to the project director in July, 1970. The plan took the form of an experiment to be conducted during the second semester of the same school year. The project director heartily endorsed the proposals set down by the evaluation team and work began soon after on their implementation. The remainder of this report will summarize El Salvador's experience with learning feedback to date and will conclude by outlining the various functions which we now believe such a system can serve.

Background

In many respects, the situation in El Salvador was ideal for the development and pretest of a learning feedback system for instructional television. The country is small and its population is highly concentrated. The distance between the television production facilities at the San Andres Normal School and the farthest television school is not more than three hours journey by car. This permits good communication with the schools and facilitates data collection.

Through the extensive retraining of teachers, El Salvador had solidified the support of its teaching corps in the educational reform. Classroom teachers had been kept up to date on new developments in the television component of the reform and the

majority had even collaborated in previous projects sponsored by the evaluation team. In short, cooperation in the learning feedback experiment was virtually guaranteed by the Salvadorean teachers who as a group had been quite receptive to a vast number of educational innovations during the past two years.

It was decided that the basic instrument of the learning feedback system should be a short test or exercise presented via television. This format, it was believed, would encourage the television production teams to become involved in the process from the very beginning. They would, in fact, be able to oversee the entire process. The use of television to test television learning also had an appealing logic. Furthermore, it would reduce the number of steps required to administer the tests. A simple correction procedure that would not burden the classroom teacher was also decided upon, for the evaluators were determined, above all, to keep the mechanics of the system as simple as possible.

Careful thought also went into anticipating student reactions to the learning feedback idea. Traditionally, Salvadorean students have been quite fearful of any test situation. From experience, they have learned that semester and final exams represent critical moments in their educational careers. The right to pass on to a higher grade may well rest on one exam administered at the end of a particular course.

Because the test situation in El Salvador is so antithetical to the diagnostic and corrective objectives of the learning feedback

system, it was decided that the short TV tests should in no way be tied to the traditional patterns of student evaluation and promotion. To insure this division, teachers and students were informed about the purpose of the learning feedback strategy and its non-punitive connotations were emphasized. Wherever possible, the expression "learning exercise" was used in place of "test" to help convey the difference.

Procedures

Two 20-minute tests, one in 7th grade Mathematics, the other in 7th grade Social Studies, were broadcast during scheduled class hours in September, 1970. Planning for the experimental telecasts had begun approximately six weeks before the first transmission. The following sections outline the numerous considerations and steps that went into the selection of the participating subject area teams, the construction and administration of the tests themselves, and finally, the action taken by the program planners as a result of the learning feedback obtained in the experiment.

Selection of subject areas. All of the 7th grade production teams had made semester as well as final examinations for television classes during the project's first year (1969). This practice had been discontinued in 1970 because of lack of time on the part of television personnel and a long standing principle of locally made tests. However, the prior experience of the television production teams in the test construction did not, in the opinion of the

evaluation staff, constitute adequate preparation for the learning feedback experiment. For this reason and because time was limited, the evaluation team decided to work with only two of the 7th grade subject areas. The wisdom of this decision was borne out during the test construction phase, which proved to be not only difficult, but quite time-consuming as well.

Limiting the size of the first trial to two subjects also had the advantage of allowing the evaluators to observe in detail the problems confronting an instructional television system that decides to embark on a learning feedback strategy.

Salvadorean secondary teachers who use television receive training in two broad specializations -- Humanities and Science. It was decided to include one subject from each specialization in the experiment. Accordingly, two 7th grade production teams -- Mathematics and Social Studies -- were invited to participate. These teams had been working together for over a year and a half and they were felt to be generally more open to experimentation.

Construction of the television tests. The first step in the construction of the television tests was the selection of the main concepts that would be taught by television during the period in which the learning feedback tests would apply. This task was performed by the Math and Social Studies specialists. After considerable delay and change of mind, seven concepts were chosen for the Math and four for Social Studies (see Table One).

TABLE ONE

Concepts explored in the experimental feedback tests, by area

Concepts in Mathematics	Questions
1. Properties of the addition of fractions	1, 2.
2. Operations with fractions	3, 4, 11, 12.
3. Decimals: operations and equivalence to fractions	6, 9, 13.
4. Fractions: equivalence and simplication	7, 10.
5. The number line and rational numbers	5, 8.
6. Problem: the properties of fractions	15.
7. Problem: equivalence of fractions	14.

Concepts in Social Studies	Questions
1. Agruculture and livestock	1, 2, 3, 4, 5.
2. Common market and economic integration	6, 7, 8, 9, 10.
3. Industry	11, 12, 13.
4. Science and technology	14, 15.

The second step was the actual drafting of the questions or items which would appear in the television broadcasts. This turned out to be a very difficult chore involving many different people. The initial work on this phase was done by a group of teachers who were being trained in tests and measurements at the San Andres Normal School. Fortunately, their interest in developing a question bank for their subject specialties coincided with the need for test items for the television tests. The San Andres teachers, working with the concepts that had been singled out by the television teams, constructed a large number of questions for both Math and Social Studies. Unfortunately, not all these questions fulfilled the criteria that the evaluation team had established -- i.e., that each item test but one concept, that they be in a multiple choice format, and that the alternative responses be concisely worded so that they could be presented within the strict space limitations of the television screen. Additional effort was required on the part of the evaluation team to put the questions in shape for pretest.

A series of pretests constituted the third step in the construction process. The primary function of the pretests was to determine the difficulty of potential questions as well as their ability to discriminate between students who had mastered a particular concept and those who had not. Secondly, the pretests provided an opportunity to try out the timing of different questions, their sequence, and the procedural directions which would accompany their presentation by the television teacher. Finally, the pretests gave

the evaluation team a chance to experiment with different correction procedures. All the pretest work was conducted at the San Andres Plan Basico school where members of the evaluation staff were able to observe all aspects of the simulated feedback tests.

A complete analysis of the pretest results along with recommendations of the evaluation team were presented and discussed with the Math and Social Studies teams two weeks before the broadcast of the first feedback test. With a few exceptions, the recommendations were accepted by the production teams. Work then began on the final draft of the test questions and, subsequently, on the actual test tapes. The taping sessions went quite smoothly and the tests were completed in time for their scheduled broadcast to the schools.

The television tests

The formats for the 15-question television tests in Mathematics and Social Studies were virtually identical (see Appendices A and B). In a few brief introductory remarks, the television teachers greeted their students and described the nature of the special "review exercise." Students were then told in some detail how to prepare a simple answer sheet using their regular notebook paper. While students were preparing the answer sheets, the television teachers alerted the classroom teachers to the fact that the correct answers to all the questions would be read at the conclusion of the test. The classroom teachers were encouraged to

copy down the correct answers for use in interpreting the performance of their own classes.

The television teachers then presented the test, reading each test question twice. Alternative answers to each question were presented immediately after each reading. The readings of the alternative answers were accompanied by their graphic display on the television screen. Alternative answers were limited to three so that they would all fit in an abbreviated form on the television screen. In this manner, a child taking the test in a television school heard the questions and answers repeated twice by the television teacher. He was then asked to select and note down the corresponding letter (A, B, or C) of the alternative he believed to be the correct answer. To help the student keep the alternative answer straight in his own mind, these were left on the television screen for approximately 30 seconds after the second reading of the question by the teleteacher. Students were requested not to dwell on particular questions for which they did not know the answer, but to keep up with the teleteacher as he presented each new question.

Collection, tabulation, and interpretation of test results

Although all 7th grade Math and Social Studies teachers were notified of the special test broadcasts and instructed how to participate, the evaluation team randomly selected 14 classes for intensive analysis. Members of the evaluation team visited these classes during both test transmissions for the purpose of (1) obtaining test

results as quickly as possible, (2) observing the mechanics of test administration, and (3) gathering the reactions of both teachers and students.

The answers from the 14 classes were tabulated and analyzed by the evaluation staff immediately following the test broadcasts. The results of this work were presented to the production teams within three days. The speed of this work convinced the evaluation staff that learning feedback from the field could be collected and summarized in a very short time.

The test results made it possible to isolate the concepts which required the additional attention of the television teams (see Appendices C and D). In Mathematics, for example, where the average number of correct responses on the test was only 57 per cent, it was immediately apparent that more study and practice on the use of fractions was required. In Social Studies, where the average number of correct responses was somewhat higher (63 per cent), the students seemed to have experienced most difficulty with certain terminology and in the application of certain concepts to concrete situations.

Although there was not sufficient time remaining in their 1970 taping schedules to prepare review classes based on their conclusions from the learning feedback data, both the Mathematics and Social Studies teams did broadcast special resumes of their findings and suggestions to the classroom teachers. These resumes

complemented the printed instructions that the classroom teachers had received to help guide them in their own interpretation of the results.

Results of the learning feedback experiment

The learning feedback experiment in El Salvador provided affirmative answers to the questions that were posed at the beginning of this report. Procedures for obtaining short range, yet detailed, information on student learning from television were established. This information helped the television production personnel identify concepts that had not been adequately learned by students within a specific unit of material. Limited corrective action was taken by the subject area teams to remedy the learning deficiencies.

The new feedback system proved to be easy to administer, considering the number of different people and talents that had to be coordinated. The construction of the television tests proved to be the most time-consuming step, for it demanded a range of highly specialized skills which are still in rather short supply in El Salvador.

Participants in the experiment were encouraged by the enthusiastic reactions of both students and teachers to the television tests. In a survey administered soon after the experiment, the vast majority of classroom teachers requested that similar

learning feedback tests be instituted in each unit of every subject for the following year.

Yet, the task of expanding the learning feedback system will be a hard one, requiring much more planning and experimentation. The first trial of the new system was a valuable learning experience for all concerned. It illuminated the problems which an expanded system would be likely to enounter. Through participant observation in all phases of the project, the evaluation team identified the following kinds of problems which must be corrected if the learning feedback system is to function smoothly on a larger scale:

(1) The lack of experience or training in modern test construction, particularly test construction for television, was reflected in the content, form, and expression of the questions that were initially drawn up for the feedback experiment. In the future, considerable thought and effort will be required to train people in the sophisticated craft of test construction and analysis.

Such training is likely to involve a considerable amount of concomitant attitude change on the part of television teachers and program planners. Good test construction depends to a large extent upon adequate definition of the behavioral objectives of each new content area. The notion of behavioral objectives itself implies a new attitude toward teaching, one that turns away from the traditional reliance on teacher exposition followed by student memorization and repetition. In the final analysis, the successful implementation

of a learning feedback system would seem to require a critical reevaluation of all the steps involved in lesson planning and presentation.

(2) There is a severe limitation on the number of letters that can be presented at any one time on the television screen. This affected the clarity and exposition of the televised questions. It was necessary for the teleteacher to read each question, while displaying only the alternative answers on the screen. In addition, and again due to space limitations, alternatives had to be kept to three, thereby sacrificing some test validity.

(3) The timing of test questions is another potential obstacle to validity. In the Math test, students were given too little time to respond to certain questions. This situation may have made them nervous or caused them to guess at answers unnecessarily.

(4) The rapid collection of test results from schools requires a high level of organization and a considerable number of people and vehicles. Yet, it is essential that the test results be obtained as quickly as possible from sample schools so that they may be analysed and presented to the television production teams as soon as possible. In the future, when a larger or more distant sample of schools may be necessary to guarantee the accuracy of conclusions, some other way of gathering results may have to be developed. The cooperation of school supervisors in the collection

process offers perhaps the best solution to this problem at the present time.

(5) Learning feedback must not only be studied, but also acted upon if it is going to have a positive influence on student achievement and improvement of program quality. After proper analysis, teleteachers and subject area specialists must decide which concepts within a specific content unit deserve review and/or amplification. They must be prepared to act upon these decisions either through coordinated work with the classroom teachers or through review sessions on television. When additional television programming is called for, it should ideally be prepared and broadcast before a new content area is introduced.

(6) Corrective action resulting from learning feedback could lead to a difficult concept being over-reviewed or overemphasized at the expense of concepts in the same or other content units. On the other hand, the lack of corrective action could lead to disenchantment on the part of students and teachers. The tests could be dismissed as intellectual exercises, lacking in any practical application. Obviously, both situations must be avoided if the positive functions of the learning feedback are to be preserved.

Conclusions: the applications of learning feedback

On the basis of the promising results of the El Salvador experiment, we believe that periodic feedback on student learning

can serve a number of important diagnostic and corrective functions within an instructional television system. It can provide both short and long-range information and it can provide it to several key audiences simultaneously. We conclude our discussion of the El Salvador experiment by suggesting five basic purposes which a learning feedback program, when successfully established, might serve:

1. To provide information to television production teams about student learning in time for immediate corrective action to be taken.

When the results of feedback testing indicate that one or more concepts have not been adequately mastered by the students, several remedies may be called for. If the evauation and production teams believe that the student errors are not widespread or that they represent a confusion of terminology snd not basic concept, the production team might suggest that the topic be reviewed by individual classroom teachers. If, on the other hand, the subject specialists feel the problem is indeed more fundamental to the logical development of their course, they might decide to reteach it in a full review session by television. This strategy would naturally depend on the ability of the production teams to set aside a number of broadcast times at the end of each content unit for just such a contingency.

2. To help guide the periodic revision of television classes and related teaching materials by providing empirical data on the learning of various topics within a specific course.

The review procedure described in the preceding example is large a stopgap measure. It informs a particular subject team that a concept has not been understood, but it in no way guarantees that the same situation will not recur in the future. To prevent a repetition of the problem, the presentation of the concept may have to be changed. This may require substantial alteration in the television lessons as well as their accompanying teachers' guides and student workbooks. This is not to suggest that responsibility for learning problems rests only with the television production teams. More often than not, the source of learning problems involves a combination of factors including the televised lessons, the course curriculum, and preparedness of the classroom teacher. However, television often enjoys the advantage of being the most flexible component of an educational system. If well managed, it can respond to the need for review quickly and with the best chance of effecting change on a broad scale.

3. To alert evaluators to the existence of problems in the teaching of particular courses and to help discover the cause(s) of those problems.

If poor performance on learning feedback tests is not restricted to particular concepts, but is rather generalized across an entire course, it becomes necessary for evaluators as well as

project administrators to think in broad terms. It may be that the quality of the television programs is inadequate. Then again, the curriculum that the television teams use may be too advanced. The poor preparation of students in lower grades may leave them without an adequate base on which to build understanding of what the curriculum writers demand they be taught. There are, of course, many possible reasons for a learning problem to develop within a particular course. Using the kinds of empirical data that the feedback system provides, the possible reasons for learning failure can be investigated. No explanation should be assumed correct until careful research has proven it so.

4. To provide information about what sorts of subjects and teaching styles are most successfully adapted for television.

Researchers know that children do learn quite well with instructional television. But they have little evidence about which subjects or teaching techniques are most effective and which ones inherently cause the most difficulty. Does Social Studies lend itself to television more readily than Mathematics? Are abstract concepts any more difficult to teach by television than by normal classroom presentation? Under what circumstances is a straightforward lecture approach more conducive to student learning than a visually rich, but potentially more confusing, presentation of material. A learning feedback system gathering data over time, over subject matter, and over different teaching styles might well provide answers to these kinds of questions.

5. To provide immediate feedback to production teams who wish to experiment with different teaching methods and who need to know as precisely as possible the learning results.

So far we have discussed the flexibility that learning feedback data provides an instructional television system. If the feedback procedures are themselves kept flexible, they could be expected to assist the production teams in yet another way. We have recognized in the preceding section our ignorance concerning just what subject areas and teaching styles are most suited for instructional television. In order to achieve the most suitable methods for presenting their lessons, it has been suggested that television production teams experiment more often with different formats and teaching techniques. Because such experimentation creates the possibility of hindering as well as enhancing student learning, rapid feedback is essential. If experimental lessons could be planned with the help of trained evaluators, and a special feedback test scheduled for that lesson alone, the success or failure of such experimentation could be known immediately. If successful, the new method could be expanded to other classes; if it proved to be unsuccessful, the problem could be discovered and repaired with no damage to student progress.

6. To help classroom teachers identify learning problems within their own classes in time so that they too can take corrective action.

Although the learning feedback techniques described in this report have been designed primarily to evaluate an instructional television system, and not individual students, the results of the feedback tests could be used by classroom teachers to identify those content areas which merit additional attention or review within their own classes. With the knowledge of how a class performed on specific questions, the classroom teacher could reinforce whatever corrective action is decided upon by the television production teams. In the cases where certain classes experience learning difficulties which are not common across an entire grade (and therefore do not deserve special emphasis or review via television), the classroom teachers would naturally be responsible for diagnosing the problems and taking subsequent remedial action.

Appendix A

MATHEMATICS TEST

1. In the following expression, what law has been applied?

   $1/2 + 3/4 + 4/5 = 4/5 + 3/4 + 1/2$

   a) Associative Law
   b) Commutative Law — 77%*
   c) Law of Identity

2. If we add 3/5 with the neutral additive element, we would obtain:

   a) 0
   b) 3/5 — 64%
   c) 1

3. If we subtract 1/4 from 7/8, the result will be:

   a) 5/8
   b) 3/4 — 21%
   c) 6/8

4. If we multiply 1/2 by 3, the result will be:

   a) 2/3
   b) 1/6 — 66%
   c) 3/2

5. In this graphic, R and S represent natural numbers. Which of the following alternatives is correct?

   a) R<S
   b) R=S — 55%
   c) R>S

6. If we subtract 0.06 from 18.5, the result will be:

   a) 17.90
   b) 18.494 — 58%
   c) 18.44

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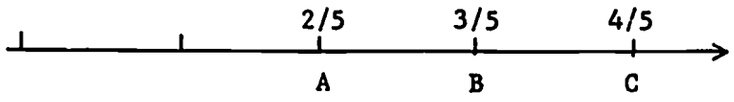
*Percentages represent the average number of correct responses to each item.

7. a/d + b/d + c/d. Which of the following alternatives is equal?

a) $\frac{a \div b + c}{d}$ b) $\frac{a + b + c}{3 \times d}$ c) $\frac{a \times b \times c}{d}$ 69%

8. In this graphic, which letter indicates the fraction equivalent to 16/20?



a) A
b) B 66%
c) C

9. If we multiply 1.5 by 0.3, the result will be:

a) 4.5
b) 3.45 48%
c) 0.45

10. One-fourth is equal to how many eighths?

a) 2
b) 4 57%
c) 8

11. If we divide 2/3 by 1/2, the result will be:

a) 1/3
b) 4/6 58%
c) 4/3

12. If to 1 3/4 we add 2 1/2, the result will be:

a) 3 3/4
b) 4 1/8 29%
c) 4 1/4

13. When 60 is divided by 1.5, the result is:

a) 40
b) 90 23%
c) 4.0

14. If John has $100, and he gives $25 to each of his four friends, what fraction of the $100 will he have left?

a) 25/100
b) 0/100 85%
c) 4/100

15. If the numerator and denominator of any fraction are each divided by 3, the fraction obtained, with respect to the original fraction, is:

a) Greater
b) Smaller 81%
c) Equivalent

Appendix B

SOCIAL STUDIES TEST

1. Select the product that is cultivated in the Pacific coastal plains and interior lowlands of Guatemala, El Salvador, and Nicaragua:

   a) Coffee
   b) Bananas — 71.6%*
   c) Cotton

2. In Central America, the most appropriate region for the cultivation of coffee is:

   a) The coasts
   b) The mountains — 51.1%
   c) The valleys

3. The type of agriculture that is characterized by the use of machinery, fungicides, and fertilizers to improve productivity is called:

   a) Commercial agriculture
   b) Subsistence agriculture — 32.9%
   c) Extensive agriculture

4. The type of livestock-raising practiced in regions of low population where natural pastures abound is called:

   a) Intensive
   b) Extensive — 21.6%
   c) Creole

5. According to this map, what product is cultivated in the striped areas?

   a) Coffee
   b) Cotton — 85.5%
   c) Bananas

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*Percentages represent the average number of correct responses to each item.

6. What organization has for its objective the promotion of economic and social development, with a view toward the political unification of Central America?

a) O. A. S.
b) O. D. E. C. A. 77.8%
c) U. N.

7. Which of the following factors could upset the functioning of the Central American Common Market?

a) Unification of the monetary system
b) An increase in exports 59.1%
c) Independent economic policies of each country

8. Which of the following supports investments in the Central American Common Market?

a) Central American Bank of Economic Integration (BCIE)
b) Central Reserve Bank (BCR) 85.5%
c) Interamerican Development Bank (BID)

9. Rapid growth of the Central American Common Market theoretically should stimulate an increase in:

a) prices
b) exports 69.3%
c) taxes

10. One of the objectives of the Central American Common Market is:

a) to increase taxes
b) to stimulate investments 61.3%
c) to establish customs stations

11. The factor that impedes better development of Salvadorean industry is the lack of:

a) workers
b) raw materials 73.9%
c) communication

12. Which of the following Central American industries is the most developed?

a) the textile industry
b) the mining industry 74.4%
c) the machinery industry

13. A country whose economy does not produce enough to satisfy its own needs is known internationally as:

a) Unproductive
b) Antieconomic 61.9%
c) Underdeveloped

14. Machines are useful in agriculture and industry because they permit an increase in:

a) production
b) prices 96.1%
c) workers

15. Of the following Salvadoreans, which has contributed to the field of historical investigation?

a) Alberto Sanchez
b) David J. Guzman 25.4%
c) Jorge Larde

Appendix C

MATHEMATICS RESULTS

Mathematics Test, September 4, 1970
(Percentages of correct responses by question and classroom.)

Classrooms	Questions 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Ave. %
Atiquizaya	87	78	34	66	41	70	70	73	49	46	58	29	24	80	85	59.3
Chalchuapa	68	98	27	45	61	59	73	59	39	41	59	34	25	86	86	57.3
San Vicente	89	48	0	96	63	63	100	81	78	48	56	4	11	93	93	61.5
Leopoldo Nunez	72	55	26	51	40	53	58	66	40	75	72	58	17	89	70	55.9
Santa Ana	78	56	25	72	36	72	67	61	61	47	72	47	36	81	78	57.3
San B. Perulapia	44	44	22	66	66	39	56	39	28	72	61	11	28	89	83	49.7
Francisco Menendez	74	67	40	67	60	76	64	88	62	71	62	43	43	90	79	65.6
Apopa P. B.	73	52	6	42	52	30	64	39	27	61	36	27	18	100	70	46.3
Quezaltepeque	57	62	11	73	54	30	70	62	38	57	49	14	22	89	89	51.7
San Julian	91	62	24	49	51	53	62	80	56	47	35	29	33	84	64	54.5
Santa Lucia	90	82	26	77	56	64	74	82	51	74	59	38	10	87	90	63.8
Francisco Morazan	82	71	14	82	33	69	71	75	47	55	53	16	35	63	82	56.4
Romero Alvergue	93	64	21	71	88	64	76	71	45	62	71	38	7	81	88	62.6
Coatepeque	80	56	24	72	72	68	64	52	52	44	68	16	16	80	76	55.9
Average Percent	77	64	21	66	55	58	69	66	48	57	58	29	23	85	81	57

Appendix D

SOCIAL STUDIES RESULTS

Social Studies Test, September 8, 1970
(Percentages of correct responses by question and classroom.)

Classrooms	Questions 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Ave. %
Apopa	74	31	43	46	80	77	66	83	69	57	72	69	46	100	37	63.3
Atiquizaya	66	76	5	24	76	66	51	93	66	64	76	76	56	93	29	61.1
Quezaltepeque	69	38	43	26	90	79	55	86	71	52	76	76	67	98	5	62.1
I. N. Santa Ana	70	36	28	33	97	61	70	92	72	70	86	75	22	100	67	65.3
Leopoldo Nunez	76	52	46	20	87	89	74	87	74	54	74	76	93	95	17	67.6
Francisco Morazan	73	45	14	16	94	84	39	74	71	73	63	80	76	92	29	61.5
Romero Alvergue	86	77	28	23	84	91	33	93	77	86	84	68	82	100	21	68.9
Santa Lucia	65	48	25	15	83	75	88	90	60	48	60	58	55	98	10	58.5
Coatepeque	65	62	50	19	89	77	46	92	73	65	85	89	46	100	35	66.2
Chalchuapa	69	67	33	22	67	73	67	93	75	67	47	58	42	93	16	59.3
San Vicente	72	38	23	15	85	72	53	72	55	60	70	81	77	89	38	60.0
San B. Perulapia	70	40	60	25	85	75	40	80	75	50	80	95	75	95	20	64.3
San Julian	85	37	29	15	87	81	62	69	54	44	87	62	46	94	29	58.7
Francisco Menendez	62	69	33	4	93	89	84	93	78	69	75	78	84	98	2	67.4
Average Percent	72	51	33	22	85	78	59	85	69	61	74	74	62	96	25	63