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ABSTRACT

The purpose of the demonstration programs in intensive reading and mathematics instruction for low-achieving students was essentially to enable school districts to establish and operate exemplary and innovative projects to improve the competence of junior high school students in reading and mathematics. Projects were limited to students in grades seven, eight, and nine attending schools located in low-income areas. Participants were educationally disadvantaged students who would otherwise find difficulty in achieving success in high school. Project proposals were required to contain statements of specific goals with respect to student achievement and to show a level of cost effectiveness that would make it possible for other, similar school districts in California to adapt the projects to their needs. Projects that proved least cost effective were to be terminated. Seventeen projects were approved and 1970-71 was their second year of operation. Projects were continually reviewed by the Division of Compensatory Education regarding their effectiveness in improving the achievement level of students in reading and mathematics. Through reports, questionnaires, observations, and interviews, projects were evaluated on the basis of several criteria involving program development, student achievement, and cost analysis. (Author/JM)

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Reading and Mathematics Instruction for Low-achieving Students

A Report on Demonstration Programs in Intensive Instruction in Reading and Mathematics, 1970-71

CALIFORNIA STATE DEPARTMENT OF EDUCATION
Wilson Riles – Superintendent of Public Instruction
Sacramento 1972

Contents

Overview of the Demonstration Project

The California State Department of Education is in the process of creating more accountable educational programs throughout the state. The project described in this report -- a report required by Education Code Section 6497 -- is a step toward a model of accountability.

With the passage of Assembly Bill 938, the 1969 Legislature authorized the Division of Compensatory Education to establish demonstration programs in intensive reading and mathematics instruction that would improve the academic achievement of low-achieving students and be cost effective. Demonstration programs were established in 17 of the poorest schools in California with respect to their students' socioeconomic status and academic achievement. In terms of educational failure and lack of hope, these were the schools that had the greatest need for such programs.

The students in the most cost-effective demonstration programs have shown a rate of achievement seen in few compensatory education programs anywhere in the nation. These programs were designed with the objective of assisting students to attain a more normal range and distribution of achievement. This objective was achieved in almost all cases. The few programs that were not successful were terminated.

The programs are unique in many ways. They are planned and developed by the staff of each participating school. The principal, the project director, and a carefully selected staff of teachers, aides, and volunteers make decisions at the school level. Students with varying abilities are grouped together heterogeneously. They are usually taught individually or in groups of two or three at least part of each day by teachers and assistants. In many programs, each student spends some time each week in a learning laboratory where he works with highly trained teachers and assistants in specific learning activities -- activities designed especially for him.

Curriculum is developed and prescribed as needed and is based upon a careful diagnosis of learning disabilities. Success is the key to the program. The students are made aware of their successes rather than criticized for their failures. Students feel the high expectations and in turn are motivated to learn.

The program attempts to remove many obstacles that hinder learning; for example, sections of the Education Code may be waived if their provisions seem to interfere with an innovative program.

Another unique feature of the programs is that, unlike most other state or federal projects, those projects that are considered to be the least cost effective are terminated. Funds from terminated projects are being used to replicate cost-effective programs in more schools within districts that have already conducted successful projects.

The demonstration programs began at the seventh grade level in 1969-70, followed the participating students into grade eight in 1970-71, and is serving them in grade nine in 1971-72. All eligible students at the appropriate grade levels in each project school were served. As the state-funded programs moved from one grade to the next, the school districts established similar programs for incoming students in the grade no longer being served by the original programs. Because of the success of their demonstration programs, several districts have begun similar programs in additional junior high schools within their districts, generally with tremendous impact on traditional instructional programs in reading and mathematics.

Implementation of the Programs

The purpose of the demonstration programs in intensive reading and mathematics instruction for low-achieving students was essentially to enable school districts to establish and operate exemplary and innovative projects to improve the competence of junior high school students in reading and mathematics. Seventeen projects were approved, and 1970-71 was their second year of operation.

Projects were limited to students in grades seven, eight, and nine attending schools located in low-income areas. Participants were educationally disadvantaged students who would otherwise find difficulty in achieving success in high school.

Project proposals were required to contain statements of specific goals with respect to student achievement and to show a level of cost effectiveness that would make it possible for other, similar school districts throughout California to adapt the projects to their needs. Projects that proved least cost effective were to be terminated.

The most effective demonstration programs in reading were those in Colton, Los Angeles (Edison), Los Angeles (Pacoima), Riverside, and Santa Barbara. The most effective mathematics programs were in Colton, Los Angeles (Pacoima), Pasadena, and Riverside.

Effective demonstration programs in reading included those in El Monte, Fresno, Montebello, Oakland, San Diego, San Francisco, and San Jose. Effective mathematics programs were implemented in Fresno, Long Beach, Los Angeles (Edison), Montebello, Oakland, and San Jose.

The least effective demonstration programs included the projects in reading and mathematics at Los Angeles (Belvedere) and Stockton, the San Francisco mathematics program, and the Long Beach reading program.

Recommendations Regarding the Programs

Considering the purpose of the programs as defined by Assembly Bill 938, evaluation criteria, and evaluation results, the following recommendations are offered regarding the demonstration programs in reading and mathematics:

1. Demonstration programs in the following districts should be retained and extended; they should be commended as most effective; and efforts should be directed toward greater demonstration and dissemination of information regarding their most innovative and exemplary cost-effective elements:

Reading programs	Mathematics programs
Colton Joint Unified	Colton Joint Unified
Los Angeles Unified (Pacoima)	Los Angeles Unified (Pacoima)
Riverside Unified	Pasadena Unified
Santa Barbara City Elementary	Riverside Unified
Los Angeles Unified (Edison)	

2. The demonstration program in the Montebello Unified School District should be commended for its excellence, although the district did not apply for renewal of the project for 1971-72. The division of Compensatory Education should continue further dissemination of information about the program and this district's outstanding replication of exemplary elements in the seventh and eighth grades.

3. Effective demonstration programs in the following districts should be retained and strengthened, and efforts should be directed toward modifying these programs to improve their program effectiveness and cost effectiveness and increase their achievement gains:

Reading programs	Mathematics programs
San Francisco Unified	Long Beach Unified
El Monte Elementary	Los Angeles Unified (Edison)
Oakland City Unified	Oakland City Unified
San Jose Unified	San Jose Unified
San Diego City Unified	Fresno City Unified
Fresno City Unified	

4. Demonstration programs in the following districts should be terminated as least effective for the reasons indicated:

   a. Los Angeles Unified (Belvedere) (reading and mathematics). The Belvedere project rated low on organization and administration, program development, and fiscal management and lowest of all projects according to an overall evaluation questionnaire (rank: seventeenth). The project also rated low in project observation data, low on a visitation inventory, and low on overall program effectiveness (rank: fourteenth). The project ranked 12.5 out of 15 projects in reading achievement and eleventh out of 13 projects in mathematics achievement gains. The project ranked in the lowest quarter in

reading achievement, mathematics achievement, and program effectiveness. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), Belvedere ranked fifteenth out of 15 reading projects and 10.5 out of 13 mathematics projects.

b. Stockton City Unified (reading and mathematics). The Stockton project tied another district for lowest place on the program visitation inventory (rank: 15.5 out of 16). The project rated low in project observation data and in overall program effectiveness (rank order: 11.5). Baseline data for 1969-70 revealed low ratings in the evaluation report, in reading achievement gains, and in costs per student. The project rated lowest among 15 reading programs in reading achievement gains (0.8 year's growth per year) and rated second lowest in mathematics gains (rank: eleventh out of 13). The project showed high operating costs (rank: tenth) and, in cost effectiveness, ranked ninth out of 15 reading projects and ninth out of 13 mathematics projects. It ranked in the lowest quarter on reading and mathematics gains and below the median on operating costs and program effectiveness. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), Stockton ranked twelfth out of 15 reading projects and 10.5 out of 13 mathematics projects.

c. San Francisco Unified (mathematics). The San Francisco mathematics program rated low on the program evaluation questionnaire (rank order: twelfth out of 17 programs). It rated lowest of all programs in achievement gains (rank: thirteenth) -- achievement gains reported were equal to four months per year of instruction. High expenditures per student were reported for operating costs (second highest, ranking twelfth out of 13 mathematics programs) and for total expenditures per student. The program was the least cost effective of all 13 mathematics programs in mathematics, operating, and total costs and in overall cost effectiveness. The program ranked in the lowest quarter in mathematics achievement and operating costs. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), the San Francisco mathematics program placed last, ranking thirteenth out of 13 projects.

d. Long Beach Unified (reading). The Long Beach reading program rated high in program effectiveness, but relatively low in reading achievement (rank: 10.5 out of 15). The program ranked highest of 15 programs in reading costs, second highest in research and development costs, second highest in operating costs, and third highest in total expenditures per student. The program was the least cost effective of all 15 reading programs in reading, operating, and total costs and in overall cost effectiveness. The program ranked in the lowest quarter in operating costs per student. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), the Long Beach reading program ranked twelfth out of 15 projects.

Evaluation of Demonstration Projects

Projects were continually reviewed by the Division of Compensatory Education regarding their effectiveness in improving the achievement level of students in reading and mathematics. Through reports, questionnaires, observations, and interviews, projects were evaluated on the basis of several criteria involving program development, student achievement, and cost analysis.

Program development criteria included the extent to which the projects adhered to the intent of the legislation and State Department of Education guidelines on eligibility, selection of participants, waivers, project organization and administration, program content, demonstration concepts, staff development, and dissemination of information.

Student achievement criteria included the extent to which the projects met objectives, measured results, and demonstrated effectiveness in improving student achievement levels.

Cost analysis criteria included the extent to which the projects accounted for component costs and demonstrated cost effectiveness.

Program Development Criteria

Three separate ratings on program development criteria were combined to give a composite rank order of projects on program effectiveness. (See Table 1.*)

First, projects were rated on a 14-point program visitation inventory, assessing (1) cost-effective elements implemented in grade seven; (2) cost-effective elements implemented in grade eight; (3) proportion of students served by the program; (4) demonstration opportunities; (5) performance objectives; (6) grouping practices; (7) planning; (8) inservice education; (9) dissemination of information; (10) individualization of instruction; (11) use of material and personnel; (12) innovative and exemplary program content; and (13) staff support. Projects were compared and ranked according to the ratings they received on this inventory. Table 1 reveals that eight projects tied for highest place on the program visitation inventory: Santa Barbara, El Monte, Colton, Riverside, Long Beach (mathematics), Long Beach (reading), San Francisco, and San Diego. Projects rated lowest were Stockton and Pasadena. Fresno, Los Angeles (Pacoima), Los Angeles (Belvedere), Los Angeles (Edison), and San Jose were also rated low.

*All tables referred to in this publication will be found in Appendix A.

Projects were rated on a 78-item evaluation questionnaire, assessing the extent to which they adhered to guidelines on (1) eligibility; (2) selection of participants; (3) waivers; (4) program organization; (5) project administration; (6) program content; (7) demonstration activities; (8) staff development; (9) dissemination of information; (10) component costs; (11) evaluation procedures; and (12) research design. Projects were compared and ranked according to point scores on this questionnaire. As indicated in Table 1, Santa Barbara, El Monte, Colton, and Long Beach (mathematics) ranked highest on questionnaire ratings; Los Angeles (Belvedere), Fresno, Los Angeles (Pacoima), and Los Angeles (Edison) were rated lowest.

Projects were also rated on the basis of subjective observation notes on project operations, including interview data compiled during review team visits to project schools in the spring of 1971. Projects were compared and ranked according to observer ratings based on the general impressions obtained during these visits. Table 1 shows that highest observation ratings were given to the projects in Riverside, Santa Barbara, Montebello, and El Monte; lowest ratings were assigned to Pasadena, Fresno, Los Angeles (Pacoima), and Los Angeles (Belvedere).

These three separate ratings on program development were combined into one program effectiveness rating by determining each project's median rank order. Projects were then ranked according to this single overall rating. Table 1 summarizes these ratings, which placed the following projects highest according to the overall rating on program effectiveness: Santa Barbara, El Monte, Colton, Riverside, and Long Beach (mathematics). Projects rated lowest in program effectiveness were Fresno, Pasadena, Los Angeles (Pacoima), and Los Angeles (Belvedere).

On the informal questionnaire based on AB 938 guidelines, 38 items distinguished those projects rated highest from those projects rated lowest. The pattern of responses to those questions gave a rough composite profile of the factors that tended to differentiate the most effective from the least effective demonstration programs.

Profile of the Most Effective Projects

In the most effective projects, the programs were being operated in one school in the district. The educational needs of the students and the assessment of those needs were described in detail. Project data showed very clearly how the program met the students' needs. It was evident that the project emphasized creativity. The project proposal was excellent and clearly explained the use of existing facilities. Over 75 percent of the students in the appropriate grade were included in the program. The most general grouping practice used was that of random order or heterogeneous groups. Instruction was mostly individualized. The project director was located at the school. Most of the project planning was done by the whole program staff working with resource personnel. Planning included inservice training, a cooperative effort with a business or college, and collection of curricular materials.

The most effective projects were clearly innovative and exemplary. Their methods, techniques, and procedures were described in detail, and were clearly related to the program objectives. Evidence was usually given of the competence of any cooperating agency involved. The impact of the demonstration aspects of the programs was such that they were seen as exemplary by other districts, and opportunities for observation were well planned and built in. Inservice education programs were intensive and effective, continuous, and mandatory. The inservice programs were clearly related to the objectives of the projects, with schedules and calendars described in the proposals. Each staff was considered outstanding, and each program was innovative and unique. Provisions were made for dissemination of information through publications, observations, and other methods.

It was clearly demonstrated at the close of the project that the successful districts could maintain their programs, and strong intent was shown to do so.

The most effective projects showed a level of cost effectiveness that made it possible for other, similar school districts to adapt these projects to their needs. The average cost per student in the successful projects during the first year was from $250 to $500, and the average increase in achievement was from 11 to 15 months. Therefore, the calculated cost per student per month of growth was less than $50. The relationships between program, evaluation, project objectives, and expenditures were clearly indicated. The programs were very effective in improving the achievement level of students, with a degree of cost effectiveness best described as excellent.

Profile of the Least Effective Projects

In the least effective projects, the programs were being operated in more than one school in the district. The educational needs of the students and the assessment of those needs were poorly described. Project data showed fairly well how the program met these student needs. It was not evident that the unsuccessful projects emphasized creativity. The project proposals contained poor explanations of the use of existing facilities. From 25 to 75 percent of the students in the appropriate grade were included in the programs. The most general grouping practice used was that of homogeneous groups. Instruction was only slightly individualized. The project directors were not located at the participating schools. Most of the project planning was done by administrators not included in the program staff. Planning often omitted inservice training, a cooperative effort with a business or college, and collection of curricular materials.

The least effective projects were possibly innovative and exemplary. However, their methods, techniques, and procedures were poorly described and were only vaguely related to the program objectives. Evidence of the competence of any cooperating agency involved was usually lacking. The impact of the demonstration aspects of the program was such that the participating schools were visited by personnel from other schools in their respective districts but not by persons from other districts. Opportunities for observation were very

poor. The inservice education programs in the least effective projects were fair but perfunctory and neither continuous nor mandatory. The inservice programs were somewhat related to the objectives of the projects, but no schedules or calendars were described in the proposals. The staffs of the unsuccessful projects were considered fair or good. There was scant provision for the dissemination of information through publications, observations, or other methods.

In the least effective projects, comparison groups either were not used or were not described. The least effective projects were moderately successful during their first year but showed a level of cost effectiveness that made it difficult for other, similar school districts to adapt the projects to their needs. It was often uncertain whether the unsuccessful districts could maintain their programs at the close of the project, and only slight intent was shown to do so.

The average cost per student in the least effective projects during the first year was from $501 to $750, and the average increase in achievement was from six to ten months. Therefore, the calculated cost per student per month of growth was more than $50. The relationships between program, evaluation, project objectives, and expenditures were vaguely indicated. The programs were barely effective in improving the achievement level of students, with a degree of cost effectiveness best described as poor.

Student Achievement

Standardized test results, as reported for each project, were tabulated and compared to show increases in achievement in reading and mathematics. Achievement increases were expressed in terms of months of gain in mean grade placement for each month of instruction. Achievement was measured by the Comprehensive Tests of Basic Skills, Level 3, forms Q or R. This was administered as the pretest and post-test in all projects. Each project was rated separately for reading and mathematics.

As shown in Table 2, projects rated highest in mean achievement gains in reading were Colton, Oakland, Santa Barbara, and Los Angeles (Edison). Projects reporting lowest reading gains were Stockton, San Diego, Los Angeles (Belvedere), and Montebello.

In mathematics, the projects rated highest in mean achievement gains were Los Angeles (Pacoima), Colton, Pasadena, and Long Beach. The mathematics project showing the lowest achievement gain was San Francisco, followed by Stockton, Los Angeles (Belvedere), and Riverside.

To compare projects in which the number of months of instruction varied, a ten-month school year was considered the basis for determining instructional gain. Each monthly gain ratio reported was therefore converted to a yearly gain figure; for example, Colton's reported gain of 1.9/1 (1.9 months' gain per month) was converted to 19 months' gain for the school year. Similar figures were derived by multiplying each gain ratio in Table 2 by ten.

Cost Analysis

Cost-analysis ratings were compiled for per-student expenditures and cost effectiveness. Cost effectiveness was defined as the greatest increase in student achievement for the least cost per student. Projects were rated separately on reading and mathematics, with the least cost receiving the highest rating.

Per-Student Expenditures

Expenditures were summarized as reported. Costs were tabulated as of April 30, 1971, for the separate categories of (1) reading instruction; (2) mathematics instruction; (3) design and implementation (reported as "research and development"); (4) operating expenses; and (5) total expenditures per student. Projects were compared and ranked in order in each category of expenditures. These rankings are presented in tables 3 through 7.

Table 3 reveals that the projects with the least expenditures per student for reading instruction were Colton, Montebello, Los Angeles (Belvedere), and Los Angeles (Pacoima). Projects with the greatest expenditures were Long Beach, El Monte, Oakland, and Santa Barbara. The per-student expenditure in the "most expensive" project was 11 times that of the "least expensive" project.

Table 4 shows that projects with the least expenditures per student for mathematics instruction were again Colton, Montebello, Los Angeles (Belvedere), and Los Angeles (Pacoima). Projects reporting the greatest expenditures were Long Beach, Oakland, San Jose, and San Francisco. The average per-student expenditure in the "most expensive" project amounted to ten times that of the "least expensive" project.

Design and implementation costs ranged from $3 to $508 per student. Table 5 indicates that these expenditures were lowest in the Stockton, Pasadena, San Francisco, and Colton projects. They were highest in the San Jose, Long Beach, and San Diego projects.

Table 6 shows that the projects reporting the lowest per-student operating expenses were Colton and Montebello, followed by Riverside and Los Angeles (Belvedere). The highest operating expenses were recorded for Oakland, Long Beach (reading), San Francisco, and El Monte. Operating expenses for Oakland were 9.4 times those for Colton and Montebello.

As shown in Table 7, total expenditures per student were lowest in Colton, Montebello, Pasadena, and Los Angeles (Belvedere). Greatest expenditures were reported for Oakland, San Jose, and Long Beach. Total expenses ranged from $145 per student in the "least expensive" project to $1,320 per student in the "most expensive" project.

Cost Effectiveness

Increase in achievement per student was compared with expenditures per student to give a measure of cost effectiveness, as operationally defined. Cost effectiveness was expressed in two ways: (1) the number of months of achievement attained for each dollar spent per student; and (2) the cost in dollars per student of each month of achievement attained.

The cost effectiveness of projects in terms of per-student expenditures for reading instruction appear in Table 8 and for mathematics instruction in Table 9. Cost effectiveness data for design and implementation are given in tables 10 and 11, for operating expenses in tables 12 and 13, and for total expenditures in tables 14 and 15.

Table 8 reveals that the cost effectiveness of reading instruction ranged from one month of achievement for $3.74 per student (Colton) to one month of achievement for $79 (Long Beach). Table 9 shows that the cost effectiveness of mathematics instruction ranged from Colton's $3.95 per student for each month of achievement to San Francisco's $84.25 per student.

Table 10 shows that the cost effectiveness of design and implementation in reading projects ranged from 38 cents per student for each month of reading achievement (Stockton) to $39.08 per student (San Jose) Table 11 shows that the cost effectiveness of design and implementation in mathematics projects ranged from 33 cents per student for each month of mathematics achievement (Stockton) to $36.29 per student (San Jose).

As indicated in Table 12, the cost effectiveness of operating expenses in reading projects ranged from one month of reading achievement for $6.89 per student (Colton) to one month of achievement for each $79 (Long Beach). The cost effectiveness of operating expenses in mathematics projects, as shown in Table 13, ranged from Colton's $6.89 per student to San Francisco's $163.25 per student for each month of mathematics achievement.

Table 14 reveals that the cost effectiveness of total expenditures in reading projects ranged from one month of reading achievement for each $7.63 spent in Colton to one month for each $79 spent in Long Beach. Comparable figures for mathematics projects, as shown in Table 15, ranged from a cost of $7.63 per student in Colton to $165.75 per student in San Francisco.

After the projects were compared and ranked in order on the four cost-effectiveness measures, the median rank order and the composite rank of the projects were calculated. The median rank order assigned was the median of the ranking of each project on the four measures listed. The composite rank was the relative rank order of projects on median rank orders. The composite rank order of the projects on cost effectiveness is given in Table 16 and Table 17.

Table 16 shows that reading projects rated highest with respect to cost effectiveness were Colton, Montebello, Los Angeles (Pacoima), and Los Angeles (Edison). Reading projects rated as least cost effective included Long Beach, Oakland, San Jose, and Fresno.

The rank order of mathematics projects on cost effectiveness, given in Table 17, shows that the most cost-effective projects were Colton, Los Angeles (Pacoima), Montebello, and Pasadena. Least cost effective were San Francisco, Oakland, San Jose, Stockton, and Long Beach.

Combined Rank Order Rating of Projects

Following the suggestions of the State Advisory Committee on Program and Cost Effectiveness, projects were rated on overall effectiveness, combining their rank-order ratings on three factors weighted as follows: achievement gains, 40 percent; operating costs per student, 40 percent; and program effectiveness, 20 percent. The rankings that were combined to give the rating on overall effectiveness are presented in tables 18 and 19.

Table 18 indicates that the reading projects rated highest in overall effectiveness were Colton, Santa Barbara, Riverside, and Montebello; projects rated lowest were Los Angeles (Belvedere) and Fresno, then Stockton, Long Beach, and San Diego.

Mathematics projects ranked highest in overall effectiveness, as shown in Table 19, included Colton, Riverside, Long Beach, and Montebello; projects rated lowest were San Francisco, Fresno, Los Angeles (Belvedere), and Stockton.

It was agreed that no project could be considered cost effective that was not first of all effective in improving achievement. The criterion for effectiveness in achievement gains was arbitrarily set at the median gain for all projects, as reported. It was also agreed that projects falling in the lowest quarter on several separate ratings should be considered least effective. Quartile rankings of projects are summarized in Table 20.

It was further agreed that program effectiveness should be considered separately from cost effectiveness in determining the least effective projects. Projects were ranked in order of overall effectiveness and in order of cost effectiveness, as defined.

Evaluation Results

Evaluation results reveal that the projects rated highest on program effectiveness were Santa Barbara, El Monte, Colton, Riverside, and Long Beach (mathematics). Projects rated lowest in program effectiveness included Fresno, Pasadena, Los Angeles (Pacoima), and Los Angeles (Belvedere).

Reading projects rated highest on student achievement in reading were Colton, Oakland, Santa Barbara, and Los Angeles (Edison). Projects rated lowest on achievement in reading were Stockton, San Diego, Los Angeles (Belvedere), and Montebello.

Mathematics projects reporting highest student achievement included Los Angeles (Pacoima), Colton, Pasadena, and Long Beach. Mathematics projects rated lowest in achievement were San Francisco, Stockton, Los Angeles (Belvedere), and Riverside.

Projects reporting lowest operating expenses per student were Colton, Montebello, Riverside, and Los Angeles (Belvedere). Highest per-student operating costs were recorded for Oakland, Long Beach (reading), San Francisco, and El Monte.

Lowest total expenditures per student were reported by Colton, Montebello, Pasadena, and Los Angeles (Belvedere). Highest expenditures per student were for Oakland, San Jose, and Long Beach.

Reading projects rated highest on cost effectiveness were Colton, Montebello, Los Angeles (Pacoima), and Los Angeles (Edison). Reading projects rated as least cost effective included Long Beach, Oakland, San Jose, and Fresno.

Mathematics projects rated highest on cost effectiveness included Colton, Los Angeles (Pacoima), Montebello, and Pasadena. The least cost-effective mathematics projects were San Francisco, Oakland, San Jose, Stockton, and Long Beach.

Reading projects rated highest in overall effectiveness were Colton, Santa Barbara, Riverside, and Montebello. Those rated lowest included Los Angeles (Belvedere), Fresno, Stockton, Long Beach, and San Diego.

Mathematics projects rated highest in overall effectiveness included Colton, Riverside, Long Beach, and Montebello. Rated lowest in overall effectiveness were San Francisco, Fresno, Los Angeles (Belvedere), and Stockton.

Projects ranking above the highest quartile most often were Colton and Riverside. Projects placing below the lowest quartile most often were San Francisco and Los Angeles (Belvedere).

On the basis of these evaluations, it was recommended that (1) the most effective demonstration programs should be retained, extended, and commended; (2) effective programs should be retained, improved, and strengthened; and (3) the least effective programs should be terminated.

Appendix A

Statistical Data

TABLE 1

RANK ORDER OF PROJECTS ON PROGRAM EFFECTIVENESS

Spring, 1971

Project	Separate Rank-Order Ratings* (1)	(2)	(3)	Median Rating	Overall Rank Order
Santa Barbara	4.5	1	2	2	1
El Monte	4.5	2	4	4	2
Colton	4.5	3	8	4.5	4
Riverside	4.5	8	1	4.5	4
Long Beach (M)**	4.5	4	5	4.5	4
Long Beach (R)	4.5	5	6	5	6
Montebello	-	10	3	6.5	7
San Francisco	4.5	12	9	9	8.5
Oakland	9	9	7	9	8.5
San Jose	12	7	10	10	10
Stockton	15.5	6	11	11	11.5
San Diego	4.5	11	12	11	11.5
L.A. - Edison	12	14	13	13	13
L.A. - Belvedere	12	17	14	14	14
L.A. - Pacoima	12	15	15	15	15
Pasadena	15.5	13	17	15.3	16
Fresno	12	16	16	16	17

*Ratings: (1) Program visitation inventory
(2) Evaluation questionnaire
(3) Observation notes

**M=mathematics; R=reading

TABLE 2

RANK ORDER OF PROJECTS ON MEAN ACHIEVEMENT GAINS

1970-71

Reading Achievement (N=15)			Mathematics Achievement (N=13)		
Rank	Project	Gains*	Rank	Project	Gains*
1	Colton	1.9/1	1	L.A.-Pacoima	2.1/1
2	Oakland	1.7/1	2	Colton	1.9/1
3	Santa Barbara	1.6/1	3	Pasadena	1.7/1
4	L.A.-Edison	1.4/1	4	Long Beach (M)**	1.6/1
6.5	Riverside	1.3/1	6	Oakland	1.4/1
6.5	San Jose	1.3/1	6	San Jose	1.4/1
6.5	L.A.-Pacoima	1.3/1	6	Fresno	1.4/1
6.5	San Francisco	1.3/1	8	L.A.-Edison	1.1/1
9	El Monte	1.1/1	9	Montebello	1.0/1
10.5	Fresno	1.0/1	11	Riverside	0.9/1
10.5	Long Beach (R)†	1.0/1	11	L.A.-Belvedere	0.9/1
12.5	Montebello	0.9/1	11	Stockton	0.9/1
12.5	L.A.-Belvedere	0.9/1	13	San Francisco	0.4/1
14.5	San Diego	0.8/1			
14.5	Stockton	0.8/1			
	Median:	1.3/1		Median:	1.4/1

*Gains: Number of months of academic achievement gains reported per month of instruction.

**M=mathematics

† R=reading

TABLE 3

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Reading Instruction

(April 30, 1971)

Rank	Project	Amount
1	Colton	$ 71.00
2	Montebello	86.00
3	Belvedere	145.00
4	Pacoima	147.00
5	Edison	169.00
6	Riverside	200.00
7	Stockton	272.00
8	San Francisco	325.00
9	Fresno	381.00
10	San Diego	464.00*
11	San Jose	504.00
12	Santa Barbara	534.00
13	Oakland	660.00
14	El Monte	735.00
15	Long Beach	790.00

*Estimated

TABLE 4

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Mathematics Instruction

(April 30, 1971)

Rank	Project	Amount
1	Colton	$ 75.00
2	Montebello	89.00
3	Belvedere	145.00
4	Pacoima	147.00
5	Edison	169.00
6	Riverside	206.00
7	Pasadena	268.00
8	Stockton	272.00
9	Fresno	335.00
10	San Francisco	337.00
11	San Jose	504.00
12	Oakland	660.00
13	Long Beach	769.00

TABLE 5

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Design and Implementation

(April 30, 1971)

Rank	District	Program	Amount
1	Stockton	R & M*	$ 3.00
2	Pasadena	M	12.00
3.5	San Francisco	R & M	15.00
3.5	Colton	R & M	15.00
5	Pacoima	R & M	27.00
6	Belvedere	R & M	40.00
7	Montebello	R & M	44.00
8	Edison	R & M	45.00
9	Oakland	R & M	89.00
10	Santa Barbara	R	98.00
11	El Monte	R	110.00
12	Fresno	R & M	116.00
13	Riverside	R & M	155.00
14	San Diego	R	176.00**
15	Long Beach	M	215.00
16	Long Beach	R	278.00
17	San Jose	R & M	508.00

*R=reading; M=mathematics
**Estimated

TABLE 6

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Operating Expenses

(April 30, 1971)

Rank	District	Program	Amount
1.5	Colton	R & M*	$ 131.00
1.5	Montebello	R & M	131.00
3	Riverside	R & M	251.00
4	Belvedere	R & M	252.00
5	Pasadena	M	257.00
6	Pacoima	R & M	267.00
7	San Diego	R	288.00**
8	Edison	R & M	293.00
9	Santa Barbara	R	436.00
10	Long Beach	M	486.00
11	San Jose	R & M	500.00
12	Stockton	R & M	541.00
13	Fresno	R & M	599.00
14	El Monte	R	626.00
15	San Francisco	R & M	653.00
16	Long Beach	R	790.00
17	Oakland	R & M	1,231.00

*R=reading; M=mathematics
**Estimated

TABLE 7

RANK ORDER OF PROJECTS ON TOTAL EXPENDITURES PER STUDENT

(April 30, 1971)

Rank	District	Program	Amount
1	Colton	R & M*	$ 145.00
2	Montebello	R & M	175.00
3	Pasadena	M	268.00
4	Belvedere	R & M	291.00
5	Pacoima	R & M	294.00
6	Edison	R & M	338.00
7	San Diego	R	465.00 **
8	Riverside	R & M	486.00
9	Santa Barbara	R	534.00
10	Stockton	R & M	543.00
11	San Francisco	R & M	663.00 †
12	Fresno	R & M	716.00
13	El Monte	R	735.00
14	Long Beach	M	769.00 †
15	Long Beach	R	790.00 †
16	San Jose	R & M	1,008.00
17	Oakland	R & M	1,320.00

*R=reading; M=mathematics

**Estimated

† Includes amendments 6/10/71: San Francisco--$12,440
Long Beach--$15,735

TABLE 8

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
READING INSTRUCTION

Rank	Project	Number of Months of Achievement in Reading For Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Reading
1	Colton	0.27	$ 3.74
2	Montebello	0.10	9.56
3	L.A. - Pacoima	0.09	11.31
4	L.A. - Edison	0.08	12.07
5	Riverside	0.07	15.38
6	L.A. - Belvedere	0.06	16.11
7	San Francisco	0.04	25.00
8	Santa Barbara	0.03	33.38
9	Stockton	0.03	34.00
10	Fresno	0.03	38.10
11	San Jose	0.03	38.77
12	Oakland	0.03	38.82
13	San Diego	0.02	58.00
14	El Monte	0.01	66.82
15	Long Beach	0.01	79.00

TABLE 9

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
MATHEMATICS INSTRUCTION

Rank	Project	Number of Months of Achievement in Math for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Colton	0.25	$ 3.95
2	L.A. - Pacoima	0.14	7.00
3	Montebello	0.11	8.90
4	L.A. - Edison	0.07	15.36
5	Pasadena	0.06	15.76
6	L.A. - Belvedere	0.06	16.11
7	Riverside	0.04	22.89
8	Fresno	0.04	23.93
9	Stockton	0.03	30.22
10	San Jose	0.03	36.00
11	Oakland	0.02	47.14
12	Long Beach	0.02	48.06
13	San Francisco	0.01	84.25

TABLE 10

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
DESIGN AND IMPLEMENTATION

Rank	Project	Number of Months of Achievement in Reading For Each Dollar Spent	Cost in Dollars Per Student of Each Month of Reading Achievement
1	Stockton	2.67	$ 0.38
2	Colton	1.27	0.79
3	San Francisco	0.87	1.15
4	L.A. - Pacoima	0.48	2.08
5	L.A. - Edison	0.31	3.21
6	L.A. - Belvedere	0.23	4.44
7	Montebello	0.20	4.89
8	Oakland	0.19	5.24
9	Santa Barbara	0.16	6.13
10	El Monte	0.10	10.00
11	Fresno	0.09	11.60
12	Riverside	0.08	11.92
13	San Diego	0.05	22.00
14	Long Beach	0.04	27.80
15	San Jose	0.03	39.08

TABLE 11

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
DESIGN AND IMPLEMENTATION

Rank	Project	Number of Months of Achievement in Math for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Stockton	3.00	$ 0.33
2	Pasadena	1.42	0.71
3	Colton	1.27	0.79
4	L.A. - Pacoima	0.78	1.29
5	San Francisco	0.27	3.75
6	L.A. - Edison	0.24	4.09
7	Montebello	0.23	4.40
8	L.A. - Belvedere	0.23	4.44
9	Oakland	0.16	6.36
10	Fresno	0.12	8.29
11	Long Beach	0.07	13.43
12	Riverside	0.06	17.22
13	San Jose	0.03	36.29

TABLE 12

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
OPERATING EXPENSES

Rank	Project	Number of Months of Reading Achievement for Each Dollar Spent	Cost in Dollars per Student of Each Month of Reading Achievement
1	Colton	0.15	$ 6.89
2	Montebello	0.07	14.56
3	Riverside	0.05	19.31
4	L.A. - Pacoima	0.05	20.54
5	L.A. - Edison	0.05	20.93
6	Santa Barbara	0.04	27.25
7	L.A. - Belvedere	0.04	28.00
8	San Diego	0.03	36.00
9	San Jose	0.03	38.46
10	San Francisco	0.02	50.23
11	El Monte	0.02	56.91
12	Fresno	0.02	59.90
13	Stockton	0.01	67.63
14	Oakland	0.01	72.41
15	Long Beach	0.01	79.00

TABLE 13

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
OPERATING EXPENSES

Rank	Project	Number of Months of Math Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Math Achievement
1	Colton	0.15	$ 6.89
2	L.A. - Pacoima	0.08	12.71
3	Montebello	0.08	13.10
4	Pasadena	0.07	15.12
5	L.A. - Edison	0.04	26.64
6	Riverside	0.04	27.89
7	L.A. - Belvedere	0.04	28.00
8	Long Beach	0.03	30.38
9	San Jose	0.03	35.71
10	Fresno	0.02	42.79
11	Stockton	0.02	60.11
12	Oakland	0.01	87.93
13	San Francisco	0.01	163.25

TABLE 14

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT
TOTAL EXPENDITURES

Rank	Project	Number of Months of Reading Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Reading
1	Colton	0.13	$ 7.63
2	Montebello	0.05	19.44
3	L.A. - Pacoima	0.04	22.62
4	L.A. - Edison	0.04	24.14
5	L.A. - Belvedere	0.03	32.33
6	Santa Barbara	0.03	33.38
7	Riverside	0.03	37.38
8	San Francisco	0.02	51.00
9	San Diego	0.02	58.13
10	El Monte	0.01	66.82
11	Stockton	0.01	67.88
12	Fresno	0.01	71.60
13	San Jose	0.01	77.54
14	Oakland	0.01	77.65
15	Long Beach	0.01	79.00

TABLE 15

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT
TOTAL EXPENDITURES

Rank	Project	Number of Months of Math Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Colton	0.13	$ 7.63
2	L.A. - Pacoima	0.07	14.00
3	Pasadena	0.06	15.76
4	Montebello	0.06	17.50
5	L.A. - Edison	0.03	30.73
6	L.A. - Belvedere	0.03	32.33
7	Long Beach	0.02	48.00
8	Fresno	0.02	51.14
9	Riverside	0.02	54.00
10	Stockton	0.02	60.33
11	San Jose	0.01	72.00
12	Oakland	0.01	94.29
13	San Francisco	0.01	165.75

TABLE 16

RANK ORDER OF READING PROJECTS ON COST EFFECTIVENESS

Project	Four Cost-Effectiveness Measures				Median Rank Order on Four C/E Measures	Composite Rank (Relative Rank Order)
	Reading Costs	Research & Development	Operating Costs	Total Costs		
Colton	1	2	1	1	1	1
Montebello	2	7	2	2	2	2
L.A.-Pacoima	3	4	4	3	3.5	3
L.A.-Edison	4	5	5	4	4.5	4
L.A.-Belvedere	6	6	7	5	6	5.5
Riverside	5	12	3	7	6	5.5
Santa Barbara	8	9	6	6	7	7
San Francisco	7	3	10	8	7.5	8
Stockton	9	1	13	11	10	9
El Monte	14	10	11	10	10.5	10
San Diego	13	13	8	9	11	11
Fresno	10	11	12	12	11.5	12
San Jose	11	15	9	13	12	13
Oakland	12	8	14	14	13	14
Long Beach	15	14	15	15	15	15

TABLE 17

RANK ORDER OF MATHEMATICS PROJECTS ON COST EFFECTIVENESS

Project	Four Cost-Effectiveness Measures				Median Rank Order on Four C/E Measures	Composite Rank (Relative Rank Order)
	Math Costs	Research & Development	Operating Costs	Total Costs		
Colton	1	3	1	1	1	1
L.A.-Pacoima	2	4	2	2	2	2
Montebello	3	7	3	4	3.5	3.5
Pasadena	5	2	4	3	3.5	3.5
L.A.-Edison	4	6	5	5	5	5
L.A.-Belvedere	6	8	7	6	6.5	6
Riverside	7	12	6	9	8	7
Fresno	8	10	10	8	9	8
Long Beach	12	11	8	7	9.5	9.5
Stockton	9	1	11	10	9.5	9.5
San Jose	10	13	9	11	10.5	11
Oakland	11	9	12	12	11.5	12
San Francisco	13	5	13	13	13	13

TABLE 18

RANK ORDER RATING OF READING PROJECTS ON OVERALL EFFECTIVENESS

June, 1971

15 Projects	Rank Order on Contributing Factors			Rank Order On Overall Effectiveness
	Achievement Gains (Weighted 40%)	Program Effectiveness (Weighted 20%)	Operating Costs (Weighted 40%)	
Colton	1	3.5	1.5	1
Santa Barbara	3	1	8	2
Riverside	6.5	3.5	3	3
Montebello	12.5	6	1.5	4
Los Angeles-Pacoima	6.5	14	5	5
Los Angeles-Edison	4	12	7	6
Oakland	2	7.5	15	7.5
San Francisco	6.5	7.5	13	7.5
El Monte	9	2	12	9.5
San Jose	6.5	9	9	9.5
San Diego	14.5	10.5	6	12
Long Beach	10.5	5	14	12
Stockton	14.5	10.5	10	12
Fresno	10.5	15	11	14
Los Angeles-Belvedere	12.5	13	4	15

TABLE 19

RANK ORDER RATING OF MATHEMATICS PROJECTS ON OVERALL EFFECTIVENESS

June, 1971

13 Projects	Rank Order on Contributing Factors			Rank Order On Overall Effectiveness
	Achievement Gains (Weighted 40%)	Program Effectiveness (Weighted 20%)	Operating Costs (Weighted 40%)	
Colton	2	2	1.5	1
Riverside	11	2	3	2
Long Beach	4	2	8	3.5
Montebello	9	4	1.5	3.5
Pasadena	3	12	5	5
Los Angeles-Pacoima	1	11	6	6.5
Oakland	6	5.5	13	6.5
San Jose	6	7	9	8
Los Angeles-Edison	8	9	7	9
Stockton	11	8	10	10.5
Los Angeles-Belvedere	11	10	4	10.5
Fresno	6	13	11	12
San Francisco	13	5.5	12	13

TABLE 20

QUARTILE RANKING OF PROJECTS ON ACHIEVEMENT GAINS, PROGRAM EFFECTIVENESS, AND OPERATING COSTS

June, 1971

Quartile*	High Achievement Gains		High Program Effectiveness	Low Operating Costs Per Student	
	Reading (N=15)	Math (N=13)	(N=17)	Reading (N=15)	Math (N=13)
Highest Quarter	Colton Santa Barbara L.A.-Edison Oakland	Colton L.A.-Pacoima Pasadena	Colton Santa Barbara El Monte Riverside Long Beach **	Colton Montebello Riverside L.A.-Belvedere	Colton Montebello L.A.-Belvedere Riverside
Q_3					
Next to Highest Quarter	Riverside San Francisco L.A.-Pacoima San Jose	Fresno San Jose Oakland Long Beach	Montebello San Francisco Oakland Long Beach †	L.A.-Pacoima San Diego L.A.-Edison Santa Barbara	Pasadena L.A.-Pacoima L.A.-Edison
Q_2					
Next to Lowest Quarter	El Monte Fresno Long Beach	Montebello L.A.-Edison	Stockton San Diego L.A.-Edison San Jose	San Jose Stockton Fresno El Monte	Long Beach San Jose Stockton
Q_1					
Lowest Quarter	Montebello L.A.-Belvedere Stockton San Diego	L.A.-Belvedere Stockton Riverside San Francisco	L.A.-Belvedere L.A.-Pacoima Pasadena Fresno	San Francisco Long Beach Oakland	Fresno San Francisco Oakland

*Adjusted to allow for tied rank orders.

**M=mathematics

† R=reading

Appendix B

A Summary of the Most Effective Project: Demonstration Programs in Reading and Mathematics at Colton Junior High School

As documented in their 1970-71 annual report, the demonstration programs in reading and mathematics at Colton Junior High School were highly successful.[1] The following is a brief summary of the planning, program, and evaluation activities that resulted in the highest level of student performance and cost effectiveness of any demonstration project in California during 1970-71.

Project Planning at Colton

Colton Junior High School's demonstration project was planned in December, 1969, and implemented during the 1970 spring semester. It was designed primarily as a three-year spiraling program, with student skills built one upon the other to achieve the following goals: (1) allow students to assume more of the responsibility for their own education; (2) improve academic achievement in all subjects by improving reading and mathematics skills; and (3) improve student attitudes.

The original project proposal was written by a team of teachers, administrators, and school district personnel. This team approach has been continued through each year of the project's operation. There were two instructional teams, one composed of four reading teachers and one composed of four math teachers. These two groups scheduled, planned, and evaluated activities together. The project director scheduled approximately 120 students for each period of mathematics and each period of reading; then the teams assigned students to individual classes.

Three basic types of learning arrangements were used extensively in the Colton project: large group instruction, small group discussion, and independent study.

Program Innovations in the Colton Project

Since the reading program was ungraded and utilized miniunits, students were assigned to individual classes on the basis of interest and diagnosed needs.

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[1] "AB-938 Demonstration Program, Second Annual Report." Colton, Calif.: Colton Joint Unified School District, June 10, 1971 (mimeographed).

Miniunits were offered at five- or six-week intervals, and both students and teachers were allowed to sign up to study (or teach) the topics that appealed to them. Some of the units included during 1970-71 were propaganda devices, the newspaper, detective fiction, good grooming, motorcycles, vocations, scriptwriting, and reference skills. Paperbacks, field trips, reading machines, filmstrips, speakers, movies, newspapers, and teacher-prepared materials were used to help individualize the units.

The reading laboratory was used for a variety of instructional purposes, including remediation and teaching of the miniunits. The lab was equipped with controlled readers and accompanying filmstrips, listening centers, individual study carrels, tape recorders, a language master machine, and film equipment. Software items included programmed reading workbooks, paperbacks, Sullivan materials, selected stories, textbooks and brochures for individual study, and teacher-prepared pamphlets.

The mathematics program was not ungraded; team members met after the diagnostic testing, however, and assigned students to the instructors who stressed the areas of student need indicated by the tests. This team also prepared its own booklets and teaching materials so that students could progress at their own speed and work on the units they particularly needed. The math booklets emphasized basic skills, so that students could enter the regular state-adopted mathematics program as soon as possible.

Both teams met weekly for planning, inservice training, discussion, and evaluation. The project director, who was also the school principal, scheduled all teachers of a subject to the same conference period for these weekly meetings.

Continuous Evaluation

Outside evaluation was provided quarterly to give direction and recommendations and to assess the attainment of goals and objectives. Student and faculty interviews, questionnaires, observations, and test data were included, based upon weekly visits of the project evaluator.

Both standardized and nonstandardized tests were used in the evaluation. Standardized test data indicated significant gains in reading comprehension, vocabulary, and total reading scores. Student achievement in mathematics included significant gains in computation, concepts, and applications and in mathematics as a whole.

Colton's unique utilization of the outside project evaluator for weekly observations and quarterly reviews was outstanding. G. Keith Dolan of California State College, San Bernardino, visited the project each week and gathered data for program improvement. He presented these data to the project staff in writing once each quarter. The project staff replied with quarterly written reports, listing the actions they had taken in response to the evaluator's recommendations.

Program Revisions at Colton

After the evaluator's first quarterly report in November, 1970, the Colton staff listed program revisions in 18 areas, including those identified in the paragraphs that follow.

Additional inservice training time was devoted to individualized mathematics instruction, including released time for teachers to visit other schools; consultations with personnel in offices of county superintendents of schools and workshops with state college professors; use of SRA mathematics tapes; review of new materials; and individual teacher conferences. Instructors exchanged students to capitalize on individual teacher strengths. Teachers alternated their teaching strategies. The time of three teacher aides involved in the project was rescheduled to permit more individual tutoring, including four periods per day in the classroom. Classified employees were reevaluated to make full use of personnel strengths. Teacher aides were included in team planning meetings. Additional volunteer help was secured through the use of eighth grade students and student teachers to assist with reading. Mathematics goals were rewritten in terms of specific student performance and behavioral objectives. The use of parents as tutors outside the classroom was studied. The objectives of the counselor were redefined, and priorities were assigned to individual counseling and guidance. A test-scoring device was purchased to assist the staff with test correcting. General program objectives were restated in behavioral terms.

In addition, the meaning of individualized study trips was clarified. (The term "individualized study trips" means that only those students who are interested in the subject participate; it does not mean that only one or two students participate.) A calendar of study trips was prepared by the instructional teams. Guest speakers were scheduled for classroom visits. New instructional miniunits in reading were written and prepared for subsequent class sessions. Regular weekly staff meetings were scheduled separately for reading and mathematics teams. A student advisory committee was established. Efforts were directed toward expanding the group of parent volunteers, as recommended by the student advisory committee. Thank you notes and Christmas cards were sent in recognition of the efforts of the parent volunteers, and congratulatory notes were sent to the parents of students on the student advisory committee. A newsletter was published and sent home. Dr. Dolan presented a summary of his quarterly evaluation to the school faculty meeting. Inservice sessions were scheduled for regular staff meetings. Reading teachers reported on conferences attended. Regular biweekly meeting times and dates were established for the student advisory committee. Action was taken to remedy the weaknesses of the programs, as identified by the staff evaluation questionnaire -- weaknesses in communications, inservice training, use of planning time, and articulation with the senior high school.

"Consumer Reports"

Students reported their liking for the electives, the after school activities, the teachers, the "work-at-your-own-speed" booklets, the miniunits, and the eight different periods. They felt that some booklets were too long, some classes too short, and some vocabulary words too hard and that there were not enough paperbacks in the reading classes.

Reading teachers reported that the most effective elements of the program included the team effort, behavioral objectives (a better way to teach), miniunits, weekly planning meetings, qualified teacher aides, paperbacks and magazines, and the reading booklets. Mathematics teachers felt that the most effective elements of the program included the teacher aides, individualized teaching, the variety of materials, diagnostic testing and prescriptive planning, and the math booklets.

A principal's advisory group felt that the most effective elements of the program were individualized teaching, reading instruction, community aides, use of paperbacks, the miniunits, and the outside evaluator.

Final Evaluation of the Project

During the project year the project staff directed considerable effort to follow through on all the suggestions made by the project evaluator. From his point of view, "These dedicated efforts have done much to improve the project during the past several months."

In a final student evaluation of the project, there was a strong positive tone to the comments made, with favorable comments outnumbering the unfavorable by two to one. More than 64 percent of the students considered the program to be helpful, especially in reading. Positive comments referred most often to such components as the miniunits, "learning at my own rate," the use of paperbacks, and the variety of teachers and classes.

A final parent questionnaire revealed that the parents were overwhelmingly supportive of both the mathematics and reading programs, with nearly 90 percent of the respondents indicating that they would like to have their children continue in the programs. All but one parent considered the programs to be at least "moderately effective."

Overall, the results of the formal evaluation, student achievement data, behavioral objectives, and evaluator's surveys of faculty, students, and parents indicated a highly successful demonstration program in Colton for 1970-71.

Conclusion to the Colton Project

In an attempt to answer the question of how to obtain the greatest increase in student achievement for the least cost per student, this summary of the program and evaluation activities of the Colton project seems to lead to one conclusion: Improvement in student achievement appears to be more closely related to such factors as individualized instruction, use of local resources, teacher aides, a variety of teacher-made materials and methods, continuous evaluation, and parent-teacher-pupil interaction than it is to such costly items as plant remodeling, equipment, hardware, or technical assistance.

Appendix C

Education Code Sections on the Subject of Demonstration Programs

Article 5. Demonstration Programs in Intensive Instruction in Reading and Mathematics for Low Achieving Pupils

(Article 5 added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session)

Legislative Intent

6490. It is the intent and purpose of the Legislature that exemplary programs be established for intensive instruction in reading and mathematics to serve as demonstration projects aimed solely at developing, within pupils, above-average competence in these basic skill subjects. The program shall be developed to serve pupils in grade 7, 8, or 9 who attend school in designated areas of disadvantage, and who otherwise would find difficulty in achieving complete success in high school.

It is the further intent of the Legislature that these programs in intensive instruction in reading and mathematics be operated by school districts directly, or by school districts through contract for partial or complete operation with any competent public or private agency, foundation or corporation. It is also the intent of the Legislature that authority be granted to permit the waiver of any provision of the Education Code by the program approving agency, if such is necessary for the development of model demonstration programs in the intensive instruction in reading and mathematics.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Administration and Apportionment of Funds

6491. From the funds appropriated therefor by the Legislature to the Department of Education for the purposes of this article, the Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with the approval of the State Board of Education, shall administer this article and make apportionments to school districts to meet the total approved expense of the school districts incurred in establishing demonstration programs in the intensive instruction in reading and mathematics for pupils in grades 7, 8, or 9.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Application for Program by District

6492. The governing board of any district which maintains grades 7, 8, or 9 on account of any school or schools located in any area designated by the Director of Compensatory Education pursuant to the provisions of Education Code Section 6482, may make application to establish and operate a program under this article. The application shall be in the form and shall contain such data and information as the director shall specify.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Waiver of Provisions of this Code

6493. The governing board of a school district, in its application, may request waiver of the provisions of any section or sections of this code if such waiver is necessary to establish and operate a program under this article. The need for a waiver shall be explained and justified in the application. The Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with the approval of the State Board of Education, may grant, in whole, or in part, any such request.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Operation of Programs

6494. The governing board of the school district may make application to establish and operate a demonstration program under this article directly, or may make application to provide for partial or complete operation of such a program through a contract with any competent public or private agency, foundation or corporation.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Standards and Criteria by State Board of Education

6495. The State Board of Education shall adopt regulations setting forth the standards and criteria to be used in the evaluation of applications submitted by school districts. The standards and criteria adopted by the State Board of Education, among other items, shall include a statement of specific goals to be sought in the program both in terms of pupil achievement and for the purpose of establishing a model program, and the requirements for evaluation of the program.

Projects shall be approved only if it can be shown that, if successful, the cost effectiveness of the project will be such as to be adaptable within the budgets of other similar school districts throughout the state.

Projects shall be continually reviewed regarding their effectiveness in improving the achievement levels of pupils in reading and mathematics. Projects which are least cost effective shall be terminated and shall be replaced with ones of proven effectiveness or by new projects which hold promise of increased effectiveness.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Certification of and Amount of Apportionment

6496. Upon approval by the State Board of Education of an application under this article, the Superintendent of Public Instruction shall certify the amount to be apportioned to the applicant school district.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Evaluation Report

6497. No later than the fifth legislative day of each regular session of the Legislature, the Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with approval of the State Board of Education, shall submit a report to the Legislature on the implementation and evaluation of demonstration programs under this article, including the achievement of pupils, an analysis of the costs of each project detailed in terms of the costs of design, implementation and continuing operational expenses, including the degree of cost effectiveness of each project. The report shall also include recommendations concerning improvement, retention, extension or other aspects of the program.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Termination of Effect of This Article

6498. This article shall have no force or effect after the 91st day following the adjournment of the 1972 Regular Session of the Legislature.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

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ABSTRACT

The purpose of the demonstration programs in intensive reading and mathematics instruction for low-achieving students was essentially to enable school districts to establish and operate exemplary and innovative projects to improve the competence of junior high school students in reading and mathematics. Projects were limited to students in grades seven, eight, and nine attending schools located in low-income areas. Participants were educationally disadvantaged students who would otherwise find difficulty in achieving success in high school. Project proposals were required to contain statements of specific goals with respect to student achievement and to show a level of cost effectiveness that would make it possible for other, similar school districts in California to adapt the projects to their needs. Projects that proved least cost effective were to be terminated. Seventeen projects were approved and 1970-71 was their second year of operation. Projects were continually reviewed by the Division of Compensatory Education regarding their effectiveness in improving the achievement level of students in reading and mathematics. Through reports, questionnaires, observations, and interviews, projects were evaluated on the basis of several criteria involving program development, student achievement, and cost analysis. (Author/JM)

SG

Reading and Mathematics Instruction for Low-achieving Students

A Report on Demonstration Programs
in Intensive Instruction in Reading
and Mathematics, 1970-71

CALIFORNIA STATE DEPARTMENT OF EDUCATION
Wilson Riles — Superintendent of Public Instruction
Sacramento 1972

Contents

Overview of the Demonstration Project

The California State Department of Education is in the process of creating more accountable educational programs throughout the state. The project described in this report -- a report required by Education Code Section 6497 -- is a step toward a model of accountability.

With the passage of Assembly Bill 938, the 1969 Legislature authorized the Division of Compensatory Education to establish demonstration programs in intensive reading and mathematics instruction that would improve the academic achievement of low-achieving students and be cost effective. Demonstration programs were established in 17 of the poorest schools in California with respect to their students' socioeconomic status and academic achievement. In terms of educational failure and lack of hope, these were the schools that had the greatest need for such programs.

The students in the most cost-effective demonstration programs have shown a rate of achievement seen in few compensatory education programs anywhere in the nation. These programs were designed with the objective of assisting students to attain a more normal range and distribution of achievement. This objective was achieved in almost all cases. The few programs that were not successful were terminated.

The programs are unique in many ways. They are planned and developed by the staff of each participating school. The principal, the project director, and a carefully selected staff of teachers, aides, and volunteers make decisions at the school level. Students with varying abilities are grouped together heterogeneously. They are usually taught individually or in groups of two or three at least part of each day by teachers and assistants. In many programs, each student spends some time each week in a learning laboratory where he works with highly trained teachers and assistants in specific learning activities -- activities designed especially for him.

Curriculum is developed and prescribed as needed and is based upon a careful diagnosis of learning disabilities. Success is the key to the program. The students are made aware of their successes rather than criticized for their failures. Students feel the high expectations and in turn are motivated to learn.

The program attempts to remove many obstacles that hinder learning; for example, sections of the Education Code may be waived if their provisions seem to interfere with an innovative program.

Another unique feature of the programs is that, unlike most other state or federal projects, those projects that are considered to be the least cost effective are terminated. Funds from terminated projects are being used to replicate cost-effective programs in more schools within districts that have already conducted successful projects.

The demonstration programs began at the seventh grade level in 1969-70, followed the participating students into grade eight in 1970-71, and is serving them in grade nine in 1971-72. All eligible students at the appropriate grade levels in each project school were served. As the state-funded programs moved from one grade to the next, the school districts established similar programs for incoming students in the grade no longer being served by the original programs. Because of the success of their demonstration programs, several districts have begun similar programs in additional junior high schools within their districts, generally with tremendous impact on traditional instructional programs in reading and mathematics.

Implementation of the Programs

The purpose of the demonstration programs in intensive reading and mathematics instruction for low-achieving students was essentially to enable school districts to establish and operate exemplary and innovative projects to improve the competence of junior high school students in reading and mathematics. Seventeen projects were approved, and 1970-71 was their second year of operation.

Projects were limited to students in grades seven, eight, and nine attending schools located in low-income areas. Participants were educationally disadvantaged students who would otherwise find difficulty in achieving success in high school.

Project proposals were required to contain statements of specific goals with respect to student achievement and to show a level of cost effectiveness that would make it possible for other, similar school districts throughout California to adapt the projects to their needs. Projects that proved least cost effective were to be terminated.

The most effective demonstration programs in reading were those in Colton, Los Angeles (Edison), Los Angeles (Pacoima), Riverside, and Santa Barbara. The most effective mathematics programs were in Colton, Los Angeles (Pacoima), Pasadena, and Riverside.

Effective demonstration programs in reading included those in El Monte, Fresno, Montebello, Oakland, San Diego, San Francisco, and San Jose. Effective mathematics programs were implemented in Fresno, Long Beach, Los Angeles (Edison), Montebello, Oakland, and San Jose.

The least effective demonstration programs included the projects in reading and mathematics at Los Angeles (Belvedere) and Stockton, the San Francisco mathematics program, and the Long Beach reading program.

Recommendations Regarding the Programs

Considering the purpose of the programs as defined by Assembly Bill 938, evaluation criteria, and evaluation results, the following recommendations are offered regarding the demonstration programs in reading and mathematics:

1. Demonstration programs in the following districts should be retained and extended; they should be commended as most effective; and efforts should be directed toward greater demonstration and dissemination of information regarding their most innovative and exemplary cost-effective elements:

Reading programs	Mathematics programs
Colton Joint Unified	Colton Joint Unified
Los Angeles Unified (Pacoima)	Los Angeles Unified (Pacoima)
Riverside Unified	Pasadena Unified
Santa Barbara City Elementary	Riverside Unified
Los Angeles Unified (Edison)	

2. The demonstration program in the Montebello Unified School District should be commended for its excellence, although the district did not apply for renewal of the project for 1971-72. The division of Compensatory Education should continue further dissemination of information about the program and this district's outstanding replication of exemplary elements in the seventh and eighth grades.

3. Effective demonstration programs in the following districts should be retained and strengthened, and efforts should be directed toward modifying these programs to improve their program effectiveness and cost effectiveness and increase their achievement gains:

Reading programs	Mathematics programs
San Francisco Unified	Long Beach Unified
El Monte Elementary	Los Angeles Unified (Edison)
Oakland City Unified	Oakland City Unified
San Jose Unified	San Jose Unified
San Diego City Unified	Fresno City Unified
Fresno City Unified	

4. Demonstration programs in the following districts should be terminated as least effective for the reasons indicated:

   a. Los Angeles Unified (Belvedere) (reading and mathematics). The Belvedere project rated low on organization and administration, program development, and fiscal management and lowest of all projects according to an overall evaluation questionnaire (rank: seventeenth). The project also rated low in project observation data, low on a visitation inventory, and low on overall program effectiveness (rank: fourteenth). The project ranked 12.5 out of 15 projects in reading achievement and eleventh out of 13 projects in mathematics achievement gains. The project ranked in the lowest quarter in

reading achievement, mathematics achievement, and program effectiveness. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), Belvedere ranked fifteenth out of 15 reading projects and 10.5 out of 13 mathematics projects.

b. Stockton City Unified (reading and mathematics). The Stockton project tied another district for lowest place on the program visitation inventory (rank: 15.5 out of 16). The project rated low in project observation data and in overall program effectiveness (rank order: 11.5). Baseline data for 1969-70 revealed low ratings in the evaluation report, in reading achievement gains, and in costs per student. The project rated lowest among 15 reading programs in reading achievement gains (0.8 year's growth per year) and rated second lowest in mathematics gains (rank: eleventh out of 13). The project showed high operating costs (rank: tenth) and, in cost effectiveness, ranked ninth out of 15 reading projects and ninth out of 13 mathematics projects. It ranked in the lowest quarter on reading and mathematics gains and below the median on operating costs and program effectiveness. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), Stockton ranked twelfth out of 15 reading projects and 10.5 out of 13 mathematics projects.

c. San Francisco Unified (mathematics). The San Francisco mathematics program rated low on the program evaluation questionnaire (rank order: twelfth out of 17 programs). It rated lowest of all programs in achievement gains (rank: thirteenth) -- achievement gains reported were equal to four months per year of instruction. High expenditures per student were reported for operating costs (second highest, ranking twelfth out of 13 mathematics programs) and for total expenditures per student. The program was the least cost effective of all 13 mathematics programs in mathematics, operating, and total costs and in overall cost effectiveness. The program ranked in the lowest quarter in mathematics achievement and operating costs. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), the San Francisco mathematics program placed last, ranking thirteenth out of 13 projects.

d. Long Beach Unified (reading). The Long Beach reading program rated high in program effectiveness, but relatively low in reading achievement (rank: 10.5 out of 15). The program ranked highest of 15 programs in reading costs, second highest in research and development costs, second highest in operating costs, and third highest in total expenditures per student. The program was the least cost effective of all 15 reading programs in reading, operating, and total costs and in overall cost effectiveness. The program ranked in the lowest quarter in operating costs per student. In overall rank order (weighted 40 percent achievement, 40 percent costs, 20 percent program), the Long Beach reading program ranked twelfth out of 15 projects.

Evaluation of Demonstration Projects

Projects were continually reviewed by the Division of Compensatory Education regarding their effectiveness in improving the achievement level of students in reading and mathematics. Through reports, questionnaires, observations, and interviews, projects were evaluated on the basis of several criteria involving program development, student achievement, and cost analysis.

Program development criteria included the extent to which the projects adhered to the intent of the legislation and State Department of Education guidelines on eligibility, selection of participants, waivers, project organization and administration, program content, demonstration concepts, staff development, and dissemination of information.

Student achievement criteria included the extent to which the projects met objectives, measured results, and demonstrated effectiveness in improving student achievement levels.

Cost analysis criteria included the extent to which the projects accounted for component costs and demonstrated cost effectiveness.

Program Development Criteria

Three separate ratings on program development criteria were combined to give a composite rank order of projects on program effectiveness. (See Table 1.*)

First, projects were rated on a 14-point program visitation inventory, assessing (1) cost-effective elements implemented in grade seven; (2) cost-effective elements implemented in grade eight; (3) proportion of students served by the program; (4) demonstration opportunities; (5) performance objectives; (6) grouping practices; (7) planning; (8) inservice education; (9) dissemination of information; (10) individualization of instruction; (11) use of material and personnel; (12) innovative and exemplary program content; and (13) staff support. Projects were compared and ranked according to the ratings they received on this inventory. Table 1 reveals that eight projects tied for highest place on the program visitation inventory: Santa Barbara, El Monte, Colton, Riverside, Long Beach (mathematics), Long Beach (reading), San Francisco, and San Diego. Projects rated lowest were Stockton and Pasadena. Fresno, Los Angeles (Pacoima), Los Angeles (Belvedere), Los Angeles (Edison), and San Jose were also rated low.

*All tables referred to in this publication will be found in Appendix A.

Projects were rated on a 78-item evaluation questionnaire, assessing the extent to which they adhered to guidelines on (1) eligibility; (2) selection of participants; (3) waivers; (4) program organization; (5) project administration; (6) program content; (7) demonstration activities; (8) staff development; (9) dissemination of information; (10) component costs; (11) evaluation procedures; and (12) research design. Projects were compared and ranked according to point scores on this questionnaire. As indicated in Table 1, Santa Barbara, El Monte, Colton, and Long Beach (mathematics) ranked highest on questionnaire ratings; Los Angeles (Belvedere), Fresno, Los Angeles (Pacoima), and Los Angeles (Edison) were rated lowest.

Projects were also rated on the basis of subjective observation notes on project operations, including interview data compiled during review team visits to project schools in the spring of 1971. Projects were compared and ranked according to observer ratings based on the general impressions obtained during these visits. Table 1 shows that highest observation ratings were given to the projects in Riverside, Santa Barbara, Montebello, and El Monte; lowest ratings were assigned to Pasadena, Fresno, Los Angeles (Pacoima), and Los Angeles (Belvedere).

These three separate ratings on program development were combined into one program effectiveness rating by determining each project's median rank order. Projects were then ranked according to this single overall rating. Table 1 summarizes these ratings, which placed the following projects highest according to the overall rating on program effectiveness: Santa Barbara, El Monte, Colton, Riverside, and Long Beach (mathematics). Projects rated lowest in program effectiveness were Fresno, Pasadena, Los Angeles (Pacoima), and Los Angeles (Belvedere).

On the informal questionnaire based on AB 938 guidelines, 38 items distinguished those projects rated highest from those projects rated lowest. The pattern of responses to those questions gave a rough composite profile of the factors that tended to differentiate the most effective from the least effective demonstration programs.

Profile of the Most Effective Projects

In the most effective projects, the programs were being operated in one school in the district. The educational needs of the students and the assessment of those needs were described in detail. Project data showed very clearly how the program met the students' needs. It was evident that the project emphasized creativity. The project proposal was excellent and clearly explained the use of existing facilities. Over 75 percent of the students in the appropriate grade were included in the program. The most general grouping practice used was that of random order or heterogeneous groups. Instruction was mostly individualized. The project director was located at the school. Most of the project planning was done by the whole program staff working with resource personnel. Planning included inservice training, a cooperative effort with a business or college, and collection of curricular materials.

The most effective projects were clearly innovative and exemplary. Their methods, techniques, and procedures were described in detail, and were clearly related to the program objectives. Evidence was usually given of the competence of any cooperating agency involved. The impact of the demonstration aspects of the programs was such that they were seen as exemplary by other districts, and opportunities for observation were well planned and built in. Inservice education programs were intensive and effective, continuous, and mandatory. The inservice programs were clearly related to the objectives of the projects, with schedules and calendars described in the proposals. Each staff was considered outstanding, and each program was innovative and unique. Provisions were made for dissemination of information through publications, observations, and other methods.

It was clearly demonstrated at the close of the project that the successful districts could maintain their programs, and strong intent was shown to do so.

The most effective projects showed a level of cost effectiveness that made it possible for other, similar school districts to adapt these projects to their needs. The average cost per student in the successful projects during the first year was from $250 to $500, and the average increase in achievement was from 11 to 15 months. Therefore, the calculated cost per student per month of growth was less than $50. The relationships between program, evaluation, project objectives, and expenditures were clearly indicated. The programs were very effective in improving the achievement level of students, with a degree of cost effectiveness best described as excellent.

Profile of the Least Effective Projects

In the least effective projects, the programs were being operated in more than one school in the district. The educational needs of the students and the assessment of those needs were poorly described. Project data showed fairly well how the program met these student needs. It was not evident that the unsuccessful projects emphasized creativity. The project proposals contained poor explanations of the use of existing facilities. From 25 to 75 percent of the students in the appropriate grade were included in the programs. The most general grouping practice used was that of homogeneous groups. Instruction was only slightly individualized. The project directors were not located at the participating schools. Most of the project planning was done by administrators not included in the program staff. Planning often omitted inservice training, a cooperative effort with a business or college, and collection of curricular materials.

The least effective projects were possibly innovative and exemplary. However, their methods, techniques, and procedures were poorly described and were only vaguely related to the program objectives. Evidence of the competence of any cooperating agency involved was usually lacking. The impact of the demonstration aspects of the program was such that the participating schools were visited by personnel from other schools in their respective districts but not by persons from other districts. Opportunities for observation were very

poor. The inservice education programs in the least effective projects were fair but perfunctory and neither continuous nor mandatory. The inservice programs were somewhat related to the objectives of the projects, but no schedules or calendars were described in the proposals. The staffs of the unsuccessful projects were considered fair or good. There was scant provision for the dissemination of information through publications, observations, or other methods.

In the least effective projects, comparison groups either were not used or were not described. The least effective projects were moderately successful during their first year but showed a level of cost effectiveness that made it difficult for other, similar school districts to adapt the projects to their needs. It was often uncertain whether the unsuccessful districts could maintain their programs at the close of the project, and only slight intent was shown to do so.

The average cost per student in the least effective projects during the first year was from $501 to $750, and the average increase in achievement was from six to ten months. Therefore, the calculated cost per student per month of growth was more than $50. The relationships between program, evaluation, project objectives, and expenditures were vaguely indicated. The programs were barely effective in improving the achievement level of students, with a degree of cost effectiveness best described as poor.

Student Achievement

Standardized test results, as reported for each project, were tabulated and compared to show increases in achievement in reading and mathematics. Achievement increases were expressed in terms of months of gain in mean grade placement for each month of instruction. Achievement was measured by the Comprehensive Tests of Basic Skills, Level 3, forms Q or R. This was administered as the pretest and post-test in all projects. Each project was rated separately for reading and mathematics.

As shown in Table 2, projects rated highest in mean achievement gains in reading were Colton, Oakland, Santa Barbara, and Los Angeles (Edison). Projects reporting lowest reading gains were Stockton, San Diego, Los Angeles (Belvedere), and Montebello.

In mathematics, the projects rated highest in mean achievement gains were Los Angeles (Pacoima), Colton, Pasadena, and Long Beach. The mathematics project showing the lowest achievement gain was San Francisco, followed by Stockton, Los Angeles (Belvedere), and Riverside.

To compare projects in which the number of months of instruction varied, a ten-month school year was considered the basis for determining instructional gain. Each monthly gain ratio reported was therefore converted to a yearly gain figure; for example, Colton's reported gain of 1.9/1 (1.9 months' gain per month) was converted to 19 months' gain for the school year. Similar figures were derived by multiplying each gain ratio in Table 2 by ten.

Cost Analysis

Cost-analysis ratings were compiled for per-student expenditures and cost effectiveness. Cost effectiveness was defined as the greatest increase in student achievement for the least cost per student. Projects were rated separately on reading and mathematics, with the least cost receiving the highest rating.

Per-Student Expenditures

Expenditures were summarized as reported. Costs were tabulated as of April 30, 1971, for the separate categories of (1) reading instruction; (2) mathematics instruction; (3) design and implementation (reported as "research and development"); (4) operating expenses; and (5) total expenditures per student. Projects were compared and ranked in order in each category of expenditures. These rankings are presented in tables 3 through 7.

Table 3 reveals that the projects with the least expenditures per student for reading instruction were Colton, Montebello, Los Angeles (Belvedere), and Los Angeles (Pacoima). Projects with the greatest expenditures were Long Beach, El Monte, Oakland, and Santa Barbara. The per-student expenditure in the "most expensive" project was 11 times that of the "least expensive" project.

Table 4 shows that projects with the least expenditures per student for mathematics instruction were again Colton, Montebello, Los Angeles (Belvedere), and Los Angeles (Pacoima). Projects reporting the greatest expenditures were Long Beach, Oakland, San Jose, and San Francisco. The average per-student expenditure in the "most expensive" project amounted to ten times that of the "least expensive" project.

Design and implementation costs ranged from $3 to $508 per student. Table 5 indicates that these expenditures were lowest in the Stockton, Pasadena, San Francisco, and Colton projects. They were highest in the San Jose, Long Beach, and San Diego projects.

Table 6 shows that the projects reporting the lowest per-student operating expenses were Colton and Montebello, followed by Riverside and Los Angeles (Belvedere). The highest operating expenses were recorded for Oakland, Long Beach (reading), San Francisco, and El Monte. Operating expenses for Oakland were 9.4 times those for Colton and Montebello.

As shown in Table 7, total expenditures per student were lowest in Colton, Montebello, Pasadena, and Los Angeles (Belvedere). Greatest expenditures were reported for Oakland, San Jose, and Long Beach. Total expenses ranged from $145 per student in the "least expensive" project to $1,320 per student in the "most expensive" project.

Cost Effectiveness

Increase in achievement per student was compared with expenditures per student to give a measure of cost effectiveness, as operationally defined. Cost effectiveness was expressed in two ways: (1) the number of months of achievement attained for each dollar spent per student; and (2) the cost in dollars per student of each month of achievement attained.

The cost effectiveness of projects in terms of per-student expenditures for reading instruction appear in Table 8 and for mathematics instruction in Table 9. Cost effectiveness data for design and implementation are given in tables 10 and 11, for operating expenses in tables 12 and 13, and for total expenditures in tables 14 and 15.

Table 8 reveals that the cost effectiveness of reading instruction ranged from one month of achievement for $3.74 per student (Colton) to one month of achievement for $79 (Long Beach). Table 9 shows that the cost effectiveness of mathematics instruction ranged from Colton's $3.95 per student for each month of achievement to San Francisco's $84.25 per student.

Table 10 shows that the cost effectiveness of design and implementation in reading projects ranged from 38 cents per student for each month of reading achievement (Stockton) to $39.08 per student (San Jose) Table 11 shows that the cost effectiveness of design and implementation in mathematics projects ranged from 33 cents per student for each month of mathematics achievement (Stockton) to $36.29 per student (San Jose).

As indicated in Table 12, the cost effectiveness of operating expenses in reading projects ranged from one month of reading achievement for $6.89 per student (Colton) to one month of achievement for each $79 (Long Beach). The cost effectiveness of operating expenses in mathematics projects, as shown in Table 13, ranged from Colton's $6.89 per student to San Francisco's $163.25 per student for each month of mathematics achievement.

Table 14 reveals that the cost effectiveness of total expenditures in reading projects ranged from one month of reading achievement for each $7.63 spent in Colton to one month for each $79 spent in Long Beach. Comparable figures for mathematics projects, as shown in Table 15, ranged from a cost of $7.63 per student in Colton to $165.75 per student in San Francisco.

After the projects were compared and ranked in order on the four cost-effectiveness measures, the median rank order and the composite rank of the projects were calculated. The median rank order assigned was the median of the ranking of each project on the four measures listed. The composite rank was the relative rank order of projects on median rank orders. The composite rank order of the projects on cost effectiveness is given in Table 16 and Table 17.

Table 16 shows that reading projects rated highest with respect to cost effectiveness were Colton, Montebello, Los Angeles (Pacoima), and Los Angeles (Edison). Reading projects rated as least cost effective included Long Beach, Oakland, San Jose, and Fresno.

The rank order of mathematics projects on cost effectiveness, given in Table 17, shows that the most cost-effective projects were Colton, Los Angeles (Pacoima), Montebello, and Pasadena. Least cost effective were San Francisco, Oakland, San Jose, Stockton, and Long Beach.

Combined Rank Order Rating of Projects

Following the suggestions of the State Advisory Committee on Program and Cost Effectiveness, projects were rated on overall effectiveness, combining their rank-order ratings on three factors weighted as follows: achievement gains, 40 percent; operating costs per student, 40 percent; and program effectiveness, 20 percent. The rankings that were combined to give the rating on overall effectiveness are presented in tables 18 and 19.

Table 18 indicates that the reading projects rated highest in overall effectiveness were Colton, Santa Barbara, Riverside, and Montebello; projects rated lowest were Los Angeles (Belvedere) and Fresno, then Stockton, Long Beach, and San Diego.

Mathematics projects ranked highest in overall effectiveness, as shown in Table 19, included Colton, Riverside, Long Beach, and Montebello; projects rated lowest were San Francisco, Fresno, Los Angeles (Belvedere), and Stockton.

It was agreed that no project could be considered cost effective that was not first of all effective in improving achievement. The criterion for effectiveness in achievement gains was arbitrarily set at the median gain for all projects, as reported. It was also agreed that projects falling in the lowest quarter on several separate ratings should be considered least effective. Quartile rankings of projects are summarized in Table 20.

It was further agreed that program effectiveness should be considered separately from cost effectiveness in determining the least effective projects. Projects were ranked in order of overall effectiveness and in order of cost effectiveness, as defined.

Evaluation Results

Evaluation results reveal that the projects rated highest on program effectiveness were Santa Barbara, El Monte, Colton, Riverside, and Long Beach (mathematics). Projects rated lowest in program effectiveness included Fresno, Pasadena, Los Angeles (Pacoima), and Los Angeles (Belvedere).

Reading projects rated highest on student achievement in reading were Colton, Oakland, Santa Barbara, and Los Angeles (Edison). Projects rated lowest on achievement in reading were Stockton, San Diego, Los Angeles (Belvedere), and Montebello.

Mathematics projects reporting highest student achievement included Los Angeles (Pacoima), Colton, Pasadena, and Long Beach. Mathematics projects rated lowest in achievement were San Francisco, Stockton, Los Angeles (Belvedere), and Riverside.

Projects reporting lowest operating expenses per student were Colton, Montebello, Riverside, and Los Angeles (Belvedere). Highest per-student operating costs were recorded for Oakland, Long Beach (reading), San Francisco, and El Monte.

Lowest total expenditures per student were reported by Colton, Montebello, Pasadena, and Los Angeles (Belvedere). Highest expenditures per student were for Oakland, San Jose, and Long Beach.

Reading projects rated highest on cost effectiveness were Colton, Montebello, Los Angeles (Pacoima), and Los Angeles (Edison). Reading projects rated as least cost effective included Long Beach, Oakland, San Jose, and Fresno.

Mathematics projects rated highest on cost effectiveness included Colton, Los Angeles (Pacoima), Montebello, and Pasadena. The least cost-effective mathematics projects were San Francisco, Oakland, San Jose, Stockton, and Long Beach.

Reading projects rated highest in overall effectiveness were Colton, Santa Barbara, Riverside, and Montebello. Those rated lowest included Los Angeles (Belvedere), Fresno, Stockton, Long Beach, and San Diego.

Mathematics projects rated highest in overall effectiveness included Colton, Riverside, Long Beach, and Montebello. Rated lowest in overall effectiveness were San Francisco, Fresno, Los Angeles (Belvedere), and Stockton.

Projects ranking above the highest quartile most often were Colton and Riverside. Projects placing below the lowest quartile most often were San Francisco and Los Angeles (Belvedere).

On the basis of these evaluations, it was recommended that (1) the most effective demonstration programs should be retained, extended, and commended; (2) effective programs should be retained, improved, and strengthened; and (3) the least effective programs should be terminated.

Appendix A

Statistical Data

TABLE 1

RANK ORDER OF PROJECTS ON PROGRAM EFFECTIVENESS

Spring, 1971

Project	Separate Rank-Order Ratings*			Median Rating	Overall Rank Order
	(1)	(2)	(3)		
Santa Barbara	4.5	1	2	2	1
El Monte	4.5	2	4	4	2
Colton	4.5	3	8	4.5	4
Riverside	4.5	8	1	4.5	4
Long Beach (M)**	4.5	4	5	4.5	4
Long Beach (R)	4.5	5	6	5	6
Montebello	-	10	3	6.5	7
San Francisco	4.5	12	9	9	8.5
Oakland	9	9	7	9	8.5
San Jose	12	7	10	10	10
Stockton	15.5	6	11	11	11.5
San Diego	4.5	11	12	11	11.5
L.A. - Edison	12	14	13	13	13
L.A. - Belvedere	12	17	14	14	14
L.A. - Pacoima	12	15	15	15	15
Pasadena	15.5	13	17	15.3	16
Fresno	12	16	16	16	17

*Ratings: (1) Program visitation inventory
(2) Evaluation questionnaire
(3) Observation notes

**M=mathematics; R=reading

TABLE 2

RANK ORDER OF PROJECTS ON MEAN ACHIEVEMENT GAINS

1970-71

Reading Achievement (N=15)			Mathematics Achievement (N=13)		
Rank	Project	Gains*	Rank	Project	Gains*
1	Colton	1.9/1	1	L.A.-Pacoima	2.1/1
2	Oakland	1.7/1	2	Colton	1.9/1
3	Santa Barbara	1.6/1	3	Pasadena	1.7/1
4	L.A.-Edison	1.4/1	4	Long Beach (M)**	1.6/1
6.5	Riverside	1.3/1	6	Oakland	1.4/1
6.5	San Jose	1.3/1	6	San Jose	1.4/1
6.5	L.A.-Pacoima	1.3/1	6	Fresno	1.4/1
6.5	San Francisco	1.3/1	8	L.A.-Edison	1.1/1
9	El Monte	1.1/1	9	Montebello	1.0/1
10.5	Fresno	1.0/1	11	Riverside	0.9/1
10.5	Long Beach (R)†	1.0/1	11	L.A.-Belvedere	0.9/1
12.5	Montebello	0.9/1	11	Stockton	0.9/1
12.5	L.A.-Belvedere	0.9/1	13	San Francisco	0.4/1
14.5	San Diego	0.8/1			
14.5	Stockton	0.8/1			
	Median:	1.3/1		Median:	1.4/1

*Gains: Number of months of academic achievement gains reported per month of instruction.

**M=mathematics

† R=reading

TABLE 3

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Reading Instruction

(April 30, 1971)

Rank	Project	Amount
1	Colton	$ 71.00
2	Montebello	86.00
3	Belvedere	145.00
4	Pacoima	147.00
5	Edison	169.00
6	Riverside	200.00
7	Stockton	272.00
8	San Francisco	325.00
9	Fresno	381.00
10	San Diego	464.00*
11	San Jose	504.00
12	Santa Barbara	534.00
13	Oakland	660.00
14	El Monte	735.00
15	Long Beach	790.00

*Estimated

TABLE 4

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Mathematics Instruction

(April 30, 1971)

Rank	Project	Amount
1	Colton	$ 75.00
2	Montebello	89.00
3	Belvedere	145.00
4	Pacoima	147.00
5	Edison	169.00
6	Riverside	206.00
7	Pasadena	268.00
8	Stockton	272.00
9	Fresno	335.00
10	San Francisco	337.00
11	San Jose	504.00
12	Oakland	660.00
13	Long Beach	769.00

TABLE 5

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Design and Implementation

(April 30, 1971)

Rank	District	Program	Amount
1	Stockton	R & M*	$ 3.00
2	Pasadena	M	12.00
3.5	San Francisco	R & M	15.00
3.5	Colton	R & M	15.00
5	Pacoima	R & M	27.00
6	Belvedere	R & M	40.00
7	Montebello	R & M	44.00
8	Edison	R & M	45.00
9	Oakland	R & M	89.00
10	Santa Barbara	R	98.00
11	El Monte	R	110.00
12	Fresno	R & M	116.00
13	Riverside	R & M	155.00
14	San Diego	R	176.00**
15	Long Beach	M	215.00
16	Long Beach	R	278.00
17	San Jose	R & M	508.00

*R=reading; M=mathematics
**Estimated

TABLE 6

RANK ORDER OF PROJECTS ON EXPENDITURES PER STUDENT

Operating Expenses

(April 30, 1971)

Rank	District	Program	Amount
1.5	Colton	R & M*	$ 131.00
1.5	Montebello	R & M	131.00
3	Riverside	R & M	251.00
4	Belvedere	R & M	252.00
5	Pasadena	M	257.00
6	Pacoima	R & M	267.00
7	San Diego	R	288.00**
8	Edison	R & M	293.00
9	Santa Barbara	R	436.00
10	Long Beach	M	486.00
11	San Jose	R & M	500.00
12	Stockton	R & M	541.00
13	Fresno	R & M	599.00
14	El Monte	R	626.00
15	San Francisco	R & M	653.00
16	Long Beach	R	790.00
17	Oakland	R & M	1,231.00

*R=reading; M=mathematics
**Estimated

TABLE 7

RANK ORDER OF PROJECTS ON TOTAL EXPENDITURES PER STUDENT

(April 30, 1971)

Rank	District	Program	Amount
1	Colton	R & M*	$ 145.00
2	Montebello	R & M	175.00
3	Pasadena	M	268.00
4	Belvedere	R & M	291.00
5	Pacoima	R & M	294.00
6	Edison	R & M	338.00
7	San Diego	R	465.00 **
8	Riverside	R & M	486.00
9	Santa Barbara	R	534.00
10	Stockton	R & M	543.00
11	San Francisco	R & M	663.00 †
12	Fresno	R & M	716.00
13	El Monte	R	735.00
14	Long Beach	M	769.00 †
15	Long Beach	R	790.00 †
16	San Jose	R & M	1,008.00
17	Oakland	R & M	1,320.00

*R=reading; M=mathematics

**Estimated

† Includes amendments 6/10/71: San Francisco--$12,440
Long Beach--$15,735

TABLE 8

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
READING INSTRUCTION

Rank	Project	Number of Months of Achievement in Reading For Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Reading
1	Colton	0.27	$ 3.74
2	Montebello	0.10	9.56
3	L.A. - Pacoima	0.09	11.31
4	L.A. - Edison	0.08	12.07
5	Riverside	0.07	15.38
6	L.A. - Belvedere	0.06	16.11
7	San Francisco	0.04	25.00
8	Santa Barbara	0.03	33.38
9	Stockton	0.03	34.00
10	Fresno	0.03	38.10
11	San Jose	0.03	38.77
12	Oakland	0.03	38.82
13	San Diego	0.02	58.00
14	El Monte	0.01	66.82
15	Long Beach	0.01	79.00

TABLE 9

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
MATHEMATICS INSTRUCTION

Rank	Project	Number of Months of Achievement in Math for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Colton	0.25	$ 3.95
2	L.A. - Pacoima	0.14	7.00
3	Montebello	0.11	8.90
4	L.A. - Edison	0.07	15.36
5	Pasadena	0.06	15.76
6	L.A. - Belvedere	0.06	16.11
7	Riverside	0.04	22.89
8	Fresno	0.04	23.93
9	Stockton	0.03	30.22
10	San Jose	0.03	36.00
11	Oakland	0.02	47.14
12	Long Beach	0.02	48.06
13	San Francisco	0.01	84.25

TABLE 10

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
DESIGN AND IMPLEMENTATION

Rank	Project	Number of Months of Achievement in Reading For Each Dollar Spent	Cost in Dollars Per Student of Each Month of Reading Achievement
1	Stockton	2.67	$ 0.38
2	Colton	1.27	0.79
3	San Francisco	0.87	1.15
4	L.A. - Pacoima	0.48	2.08
5	L.A. - Edison	0.31	3.21
6	L.A. - Belvedere	0.23	4.44
7	Montebello	0.20	4.89
8	Oakland	0.19	5.24
9	Santa Barbara	0.16	6.13
10	El Monte	0.10	10.00
11	Fresno	0.09	11.60
12	Riverside	0.08	11.92
13	San Diego	0.05	22.00
14	Long Beach	0.04	27.80
15	San Jose	0.03	39.08

TABLE 11

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
DESIGN AND IMPLEMENTATION

Rank	Project	Number of Months of Achievement in Math for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Stockton	3.00	$ 0.33
2	Pasadena	1.42	0.71
3	Colton	1.27	0.79
4	L.A. - Pacoima	0.78	1.29
5	San Francisco	0.27	3.75
6	L.A. - Edison	0.24	4.09
7	Montebello	0.23	4.40
8	L.A. - Belvedere	0.23	4.44
9	Oakland	0.16	6.36
10	Fresno	0.12	8.29
11	Long Beach	0.07	13.43
12	Riverside	0.06	17.22
13	San Jose	0.03	36.29

TABLE 12

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
OPERATING EXPENSES

Rank	Project	Number of Months of Reading Achievement for Each Dollar Spent	Cost in Dollars per Student of Each Month of Reading Achievement
1	Colton	0.15	$ 6.89
2	Montebello	0.07	14.56
3	Riverside	0.05	19.31
4	L.A. - Pacoima	0.05	20.54
5	L.A. - Edison	0.05	20.93
6	Santa Barbara	0.04	27.25
7	L.A. - Belvedere	0.04	28.00
8	San Diego	0.03	36.00
9	San Jose	0.03	38.46
10	San Francisco	0.02	50.23
11	El Monte	0.02	56.91
12	Fresno	0.02	59.90
13	Stockton	0.01	67.63
14	Oakland	0.01	72.41
15	Long Beach	0.01	79.00

TABLE 13

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT EXPENDITURES FOR
OPERATING EXPENSES

Rank	Project	Number of Months of Math Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Math Achievement
1	Colton	0.15	$ 6.89
2	L.A. - Pacoima	0.08	12.71
3	Montebello	0.08	13.10
4	Pasadena	0.07	15.12
5	L.A. - Edison	0.04	26.64
6	Riverside	0.04	27.89
7	L.A. - Belvedere	0.04	28.00
8	Long Beach	0.03	30.38
9	San Jose	0.03	35.71
10	Fresno	0.02	42.79
11	Stockton	0.02	60.11
12	Oakland	0.01	87.93
13	San Francisco	0.01	163.25

TABLE 14

COST EFFECTIVENESS OF READING PROJECTS
IN TERMS OF PER-STUDENT
TOTAL EXPENDITURES

Rank	Project	Number of Months of Reading Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Reading
1	Colton	0.13	$ 7.63
2	Montebello	0.05	19.44
3	L.A. - Pacoima	0.04	22.62
4	L.A. - Edison	0.04	24.14
5	L.A. - Belvedere	0.03	32.33
6	Santa Barbara	0.03	33.38
7	Riverside	0.03	37.38
8	San Francisco	0.02	51.00
9	San Diego	0.02	58.13
10	El Monte	0.01	66.82
11	Stockton	0.01	67.88
12	Fresno	0.01	71.60
13	San Jose	0.01	77.54
14	Oakland	0.01	77.65
15	Long Beach	0.01	79.00

TABLE 15

COST EFFECTIVENESS OF MATH PROJECTS
IN TERMS OF PER-STUDENT
TOTAL EXPENDITURES

Rank	Project	Number of Months of Math Achievement for Each Dollar Spent	Cost in Dollars Per Student of Each Month of Achievement in Math
1	Colton	0.13	$ 7.63
2	L.A. - Pacoima	0.07	14.00
3	Pasadena	0.06	15.76
4	Montebello	0.06	17.50
5	L.A. - Edison	0.03	30.73
6	L.A. - Belvedere	0.03	32.33
7	Long Beach	0.02	48.00
8	Fresno	0.02	51.14
9	Riverside	0.02	54.00
10	Stockton	0.02	60.33
11	San Jose	0.01	72.00
12	Oakland	0.01	94.29
13	San Francisco	0.01	165.75

TABLE 16

RANK ORDER OF READING PROJECTS ON COST EFFECTIVENESS

Project	Four Cost-Effectiveness Measures				Median Rank Order on Four C/E Measures	Composite Rank (Relative Rank Order)
	Reading Costs	Research & Development	Operating Costs	Total Costs		
Colton	1	2	1	1	1	1
Montebello	2	7	2	2	2	2
L.A.-Pacoima	3	4	4	3	3.5	3
L.A.-Edison	4	5	5	4	4.5	4
L.A.-Belvedere	6	6	7	5	6	5.5
Riverside	5	12	3	7	6	5.5
Santa Barbara	8	9	6	6	7	7
San Francisco	7	3	10	8	7.5	8
Stockton	9	1	13	11	10	9
El Monte	14	10	11	10	10.5	10
San Diego	13	13	8	9	11	11
Fresno	10	11	12	12	11.5	12
San Jose	11	15	9	13	12	13
Oakland	12	8	14	14	13	14
Long Beach	15	14	15	15	15	15

TABLE 17

RANK ORDER OF MATHEMATICS PROJECTS ON COST EFFECTIVENESS

Project	Four Cost-Effectiveness Measures				Median Rank Order on Four C/E Measures	Composite Rank (Relative Rank Order)
	Math Costs	Research & Development	Operating Costs	Total Costs		
Colton	1	3	1	1	1	1
L.A.-Pacoima	2	4	2	2	2	2
Montebello	3	7	3	4	3.5	3.5
Pasadena	5	2	4	3	3.5	3.5
L.A.-Edison	4	6	5	5	5	5
L.A.-Belvedere	6	8	7	6	6.5	6
Riverside	7	12	6	9	8	7
Fresno	8	10	10	8	9	8
Long Beach	12	11	8	7	9.5	9.5
Stockton	9	1	11	10	9.5	9.5
San Jose	10	13	9	11	10.5	11
Oakland	11	9	12	12	11.5	12
San Francisco	13	5	13	13	13	13

TABLE 18

RANK ORDER RATING OF READING PROJECTS ON OVERALL EFFECTIVENESS

June, 1971

15 Projects	Rank Order on Contributing Factors			Rank Order On Overall Effectiveness
	Achievement Gains (Weighted 40%)	Program Effectiveness (Weighted 20%)	Operating Costs (Weighted 40%)	
Colton	1	3.5	1.5	1
Santa Barbara	3	1	8	2
Riverside	6.5	3.5	3	3
Montebello	2.5	6	1.5	4
Los Angeles-Pacoima	6.5	14	5	5
Los Angeles-Edison	4	12	7	6
Oakland	2	7.5	15	7.5
San Francisco	6.5	7.5	13	7.5
El Monte	9	2	12	9.5
San Jose	6.5	9	9	9.5
San Diego	14.5	10.5	6	12
Long Beach	10.5	5	14	12
Stockton	14.5	10.5	10	12
Fresno	10.5	15	11	14
Los Angeles-Belvedere	12.5	13	4	15

TABLE 19

RANK ORDER RATING OF MATHEMATICS PROJECTS ON
OVERALL EFFECTIVENESS

June, 1971

13 Projects	Rank Order on Contributing Factors			Rank Order On Overall Effectiveness
	Achievement Gains (Weighted 40%)	Program Effectiveness (Weighted 20%)	Operating Costs (Weighted 40%)	
Colton	2	2	1.5	1
Riverside	11	2	3	2
Long Beach	4	2	8	3.5
Montebello	9	4	1.5	3.5
Pasadena	3	12	5	5
Los Angeles-Pacoima	1	11	6	6.5
Oakland	6	5.5	13	6.5
San Jose	6	7	9	8
Los Angeles-Edison	8	9	7	9
Stockton	11	8	10	10.5
Los Angeles-Belvedere	11	10	4	10.5
Fresno	6	13	11	12
San Francisco	13	5.5	12	13

TABLE 20

QUARTILE RANKING OF PROJECTS ON ACHIEVEMENT GAINS, PROGRAM EFFECTIVENESS, AND OPERATING COSTS

June, 1971

Quartile*	High Achievement Gains		High Program Effectiveness	Low Operating Costs Per Student	
	Reading (N=15)	Math (N=13)	(N=17)	Reading (N=15)	Math (N=13)
Highest Quarter	Colton Santa Barbara L.A.-Edison Oakland	Colton L.A.-Pacoima Pasadena	Colton Santa Barbara El Monte Riverside Long Beach **	Colton Montebello Riverside L.A.-Belvedere	Colton Montebello L.A.-Belvedere Riverside
Q_3					
Next to Highest Quarter	Riverside San Francisco L.A.-Pacoima San Jose	Fresno San Jose Oakland Long Beach	Montebello San Francisco Oakland Long Beach †	L.A.-Pacoima San Diego L.A.-Edison Santa Barbara	Pasadena L.A.-Pacoima L.A.-Edison
Q_2					
Next to Lowest Quarter	El Monte Fresno Long Beach	Montebello L.A.-Edison	Stockton San Diego L.A.-Edison San Jose	San Jose Stockton Fresno El Monte	Long Beach San Jose Stockton
Q_1					
Lowest Quarter	Montebello L.A.-Belvedere Stockton San Diego	L.A.-Belvedere Stockton Riverside San Francisco	L.A.-Belvedere L.A.-Pacoima Pasadena Fresno	San Francisco Long Beach Oakland	Fresno San Francisco Oakland

*Adjusted to allow for tied rank orders.

**M=mathematics

† R=reading

Appendix B

A Summary of the Most Effective Project: Demonstration Programs in Reading and Mathematics at Colton Junior High School

As documented in their 1970-71 annual report, the demonstration programs in reading and mathematics at Colton Junior High School were highly successful.[1] The following is a brief summary of the planning, program, and evaluation activities that resulted in the highest level of student performance and cost effectiveness of any demonstration project in California during 1970-71.

Project Planning at Colton

Colton Junior High School's demonstration project was planned in December, 1969, and implemented during the 1970 spring semester. It was designed primarily as a three-year spiraling program, with student skills built one upon the other to achieve the following goals: (1) allow students to assume more of the responsibility for their own education; (2) improve academic achievement in all subjects by improving reading and mathematics skills; and (3) improve student attitudes.

The original project proposal was written by a team of teachers, administrators, and school district personnel. This team approach has been continued through each year of the project's operation. There were two instructional teams, one composed of four reading teachers and one composed of four math teachers. These two groups scheduled, planned, and evaluated activities together. The project director scheduled approximately 120 students for each period of mathematics and each period of reading; then the teams assigned students to individual classes.

Three basic types of learning arrangements were used extensively in the Colton project: large group instruction, small group discussion, and independent study.

Program Innovations in the Colton Project

Since the reading program was ungraded and utilized miniunits, students were assigned to individual classes on the basis of interest and diagnosed needs.

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[1] "AB-938 Demonstration Program, Second Annual Report." Colton, Calif.: Colton Joint Unified School District, June 10, 1971 (mimeographed).

Miniunits were offered at five- or six-week intervals, and both students and teachers were allowed to sign up to study (or teach) the topics that appealed to them. Some of the units included during 1970-71 were propaganda devices, the newspaper, detective fiction, good grooming, motorcycles, vocations, scriptwriting, and reference skills. Paperbacks, field trips, reading machines, filmstrips, speakers, movies, newspapers, and teacher-prepared materials were used to help individualize the units.

The reading laboratory was used for a variety of instructional purposes, including remediation and teaching of the miniunits. The lab was equipped with controlled readers and accompanying filmstrips, listening centers, individual study carrels, tape recorders, a language master machine, and film equipment. Software items included programmed reading workbooks, paperbacks, Sullivan materials, selected stories, textbooks and brochures for individual study, and teacher-prepared pamphlets.

The mathematics program was not ungraded; team members met after the diagnostic testing, however, and assigned students to the instructors who stressed the areas of student need indicated by the tests. This team also prepared its own booklets and teaching materials so that students could progress at their own speed and work on the units they particularly needed. The math booklets emphasized basic skills, so that students could enter the regular state-adopted mathematics program as soon as possible.

Both teams met weekly for planning, inservice training, discussion, and evaluation. The project director, who was also the school principal, scheduled all teachers of a subject to the same conference period for these weekly meetings.

Continuous Evaluation

Outside evaluation was provided quarterly to give direction and recommendations and to assess the attainment of goals and objectives. Student and faculty interviews, questionnaires, observations, and test data were included, based upon weekly visits of the project evaluator.

Both standardized and nonstandardized tests were used in the evaluation. Standardized test data indicated significant gains in reading comprehension, vocabulary, and total reading scores. Student achievement in mathematics included significant gains in computation, concepts, and applications and in mathematics as a whole.

Colton's unique utilization of the outside project evaluator for weekly observations and quarterly reviews was outstanding. G. Keith Dolan of California State College, San Bernardino, visited the project each week and gathered data for program improvement. He presented these data to the project staff in writing once each quarter. The project staff replied with quarterly written reports, listing the actions they had taken in response to the evaluator's recommendations.

Program Revisions at Colton

After the evaluator's first quarterly report in November, 1970, the Colton staff listed program revisions in 18 areas, including those identified in the paragraphs that follow.

Additional inservice training time was devoted to individualized mathematics instruction, including released time for teachers to visit other schools; consultations with personnel in offices of county superintendents of schools and workshops with state college professors; use of SRA mathematics tapes; review of new materials; and individual teacher conferences. Instructors exchanged students to capitalize on individual teacher strengths. Teachers alternated their teaching strategies. The time of three teacher aides involved in the project was rescheduled to permit more individual tutoring, including four periods per day in the classroom. Classified employees were reevaluated to make full use of personnel strengths. Teacher aides were included in team planning meetings. Additional volunteer help was secured through the use of eighth grade students and student teachers to assist with reading. Mathematics goals were rewritten in terms of specific student performance and behavioral objectives. The use of parents as tutors outside the classroom was studied. The objectives of the counselor were redefined, and priorities were assigned to individual counseling and guidance. A test-scoring device was purchased to assist the staff with test correcting. General program objectives were restated in behavioral terms.

In addition, the meaning of individualized study trips was clarified. (The term "individualized study trips" means that only those students who are interested in the subject participate; it does not mean that only one or two students participate.) A calendar of study trips was prepared by the instructional teams. Guest speakers were scheduled for classroom visits. New instructional miniunits in reading were written and prepared for subsequent class sessions. Regular weekly staff meetings were scheduled separately for reading and mathematics teams. A student advisory committee was established. Efforts were directed toward expanding the group of parent volunteers, as recommended by the student advisory committee. Thank you notes and Christmas cards were sent in recognition of the efforts of the parent volunteers, and congratulatory notes were sent to the parents of students on the student advisory committee. A newsletter was published and sent home. Dr. Dolan presented a summary of his quarterly evaluation to the school faculty meeting. Inservice sessions were scheduled for regular staff meetings. Reading teachers reported on conferences attended. Regular biweekly meeting times and dates were established for the student advisory committee. Action was taken to remedy the weaknesses of the programs, as identified by the staff evaluation questionnaire -- weaknesses in communications, inservice training, use of planning time, and articulation with the senior high school.

"Consumer Reports"

Students reported their liking for the electives, the after school activities, the teachers, the "work-at-your-own-speed" booklets, the miniunits, and the eight different periods. They felt that some booklets were too long, some classes too short, and some vocabulary words too hard and that there were not enough paperbacks in the reading classes.

Reading teachers reported that the most effective elements of the program included the team effort, behavioral objectives (a better way to teach), miniunits, weekly planning meetings, qualified teacher aides, paperbacks and magazines, and the reading booklets. Mathematics teachers felt that the most effective elements of the program included the teacher aides, individualized teaching, the variety of materials, diagnostic testing and prescriptive planning, and the math booklets.

A principal's advisory group felt that the most effective elements of the program were individualized teaching, reading instruction, community aides, use of paperbacks, the miniunits, and the outside evaluator.

Final Evaluation of the Project

During the project year the project staff directed considerable effort to follow through on all the suggestions made by the project evaluator. From his point of view, "These dedicated efforts have done much to improve the project during the past several months."

In a final student evaluation of the project, there was a strong positive tone to the comments made, with favorable comments outnumbering the unfavorable by two to one. More than 64 percent of the students considered the program to be helpful, especially in reading. Positive comments referred most often to such components as the miniunits, "learning at my own rate," the use of paperbacks, and the variety of teachers and classes.

A final parent questionnaire revealed that the parents were overwhelmingly supportive of both the mathematics and reading programs, with nearly 90 percent of the respondents indicating that they would like to have their children continue in the programs. All but one parent considered the programs to be at least "moderately effective."

Overall, the results of the formal evaluation, student achievement data, behavioral objectives, and evaluator's surveys of faculty, students, and parents indicated a highly successful demonstration program in Colton for 1970-71.

Conclusion to the Colton Project

In an attempt to answer the question of how to obtain the greatest increase in student achievement for the least cost per student, this summary of the program and evaluation activities of the Colton project seems to lead to one conclusion: Improvement in student achievement appears to be more closely related to such factors as individualized instruction, use of local resources, teacher aides, a variety of teacher-made materials and methods, continuous evaluation, and parent-teacher-pupil interaction than it is to such costly items as plant remodeling, equipment, hardware, or technical assistance.

Appendix C

Education Code Sections on the Subject of Demonstration Programs

Article 5. Demonstration Programs in Intensive Instruction in Reading and Mathematics for Low Achieving Pupils

(Article 5 added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session)

Legislative Intent

6490. It is the intent and purpose of the Legislature that exemplary programs be established for intensive instruction in reading and mathematics to serve as demonstration projects aimed solely at developing, within pupils, above-average competence in these basic skill subjects. The program shall be developed to serve pupils in grade 7, 8, or 9 who attend school in designated areas of disadvantage, and who otherwise would find difficulty in achieving complete success in high school.

It is the further intent of the Legislature that these programs in intensive instruction in reading and mathematics be operated by school districts directly, or by school districts through contract for partial or complete operation with any competent public or private agency, foundation or corporation. It is also the intent of the Legislature that authority be granted to permit the waiver of any provision of the Education Code by the program approving agency, if such is necessary for the development of model demonstration programs in the intensive instruction in reading and mathematics.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Administration and Apportionment of Funds

6491. From the funds appropriated therefor by the Legislature to the Department of Education for the purposes of this article, the Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with the approval of the State Board of Education, shall administer this article and make apportionments to school districts to meet the total approved expense of the school districts incurred in establishing demonstration programs in the intensive instruction in reading and mathematics for pupils in grades 7, 8, or 9.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Application for Program by District

6492. The governing board of any district which maintains grades 7, 8, or 9 on account of any school or schools located in any area designated by the Director of Compensatory Education pursuant to the provisions of Education Code Section 6482, may make application to establish and operate a program under this article. The application shall be in the form and shall contain such data and information as the director shall specify.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Waiver of Provisions of this Code

6493. The governing board of a school district, in its application, may request waiver of the provisions of any section or sections of this code if such waiver is necessary to establish and operate a program under this article. The need for a waiver shall be explained and justified in the application. The Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with the approval of the State Board of Education, may grant, in whole, or in part, any such request.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Operation of Programs

6494. The governing board of the school district may make application to establish and operate a demonstration program under this article directly, or may make application to provide for partial or complete operation of such a program through a contract with any competent public or private agency, foundation or corporation.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Standards and Criteria by State Board of Education

6495. The State Board of Education shall adopt regulations setting forth the standards and criteria to be used in the evaluation of applications submitted by school districts. The standards and criteria adopted by the State Board of Education, among other items, shall include a statement of specific goals to be sought in the program both in terms of pupil achievement and for the purpose of establishing a model program, and the requirements for evaluation of the program.

Projects shall be approved only if it can be shown that, if successful, the cost effectiveness of the project will be such as to be adaptable within the budgets of other similar school districts throughout the state.

Projects shall be continually reviewed regarding their effectiveness in improving the achievement levels of pupils in reading and mathematics. Projects which are least cost effective shall be terminated and shall be replaced with ones of proven effectiveness or by new projects which hold promise of increased effectiveness.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Certification of and Amount of Apportionment

6496. Upon approval by the State Board of Education of an application under this article, the Superintendent of Public Instruction shall certify the amount to be apportioned to the applicant school district.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106. Effective until 91st day after adjournment of 1972 Regular Session.)

Evaluation Report

6497. No later than the fifth legislative day of each regular session of the Legislature, the Superintendent of Public Instruction, upon recommendation of the Director of Compensatory Education, with approval of the State Board of Education, shall submit a report to the Legislature on the implementation and evaluation of demonstration programs under this article, including the achievement of pupils, an analysis of the costs of each project detailed in terms of the costs of design, implementation and continuing operational expenses, including the degree of cost effectiveness of each project. The report shall also include recommendations concerning improvement, retention, extension or other aspects of the program.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended in identical language by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

Termination of Effect of This Article

6498. This article shall have no force or effect after the 91st day following the adjournment of the 1972 Regular Session of the Legislature.

(Added by Stats. 1966 (1st Ex. Sess.), Ch. 106; amended by Stats. 1969, Ch. 1578 and Ch. 1596. Effective September 6, 1969, until 91st day after adjournment of 1972 Regular Session.)

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