DOCUMENT RESUME

ED 055 115 TM 000 853

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TITLE Experimental Assessment of an Incentive Program to Enhance School Learning: A Pilot Study. Final Report.

INSTITUTION American Institutes for Research in the Behavioral Sciences, Palo Alto, Calif.

SPONS AGENCY Franklin-McKinley School District, San Jose, Calif.

PUB DATE Jul 71

GRANT OEG-9-71-0027(056)

NOTE 98p.

EDRS PRICE MF-$0.65 HC-$3.29

DESCRIPTORS *Academic Achievement; Criterion Referenced Tests; Educational Accountability; Educational Objectives; *Incentive Systems; *Learning Motivation; Mathematics Instruction; Mexican Americans; Models; Parent Attitudes; Parent Participation; *Pilot Projects; Positive Reinforcement; *Primary Grades; Reading Improvement; Rewards; Student Attitudes; Student Motivation; Teacher Attitudes; Teacher Motivation

ABSTRACT

The following objectives of the study are discussed in detail: 1) to determine if a successful experimental field study of incentives could be implemented; 2) to develop and refine the methodology required to carry off a large-scale field study of incentives based on six models; and 3) to obtain a preliminary estimate of the effects of incentives on student achievement in order to better assess the potential pay-off of further research on the topic. A list of comprehensive objectives for mathematics and reading at the primary level and other projects documents are appended. (MS)

AIR-2054-7/71-FR

FINAL REPORT

to

Franklin-McKinley School District
400 Tully Road
San Jose, California

EXPERIMENTAL ASSESSMENT OF AN INCENTIVE PROGRAM TO ENHANCE SCHOOL LEARNING: A PILOT STUDY

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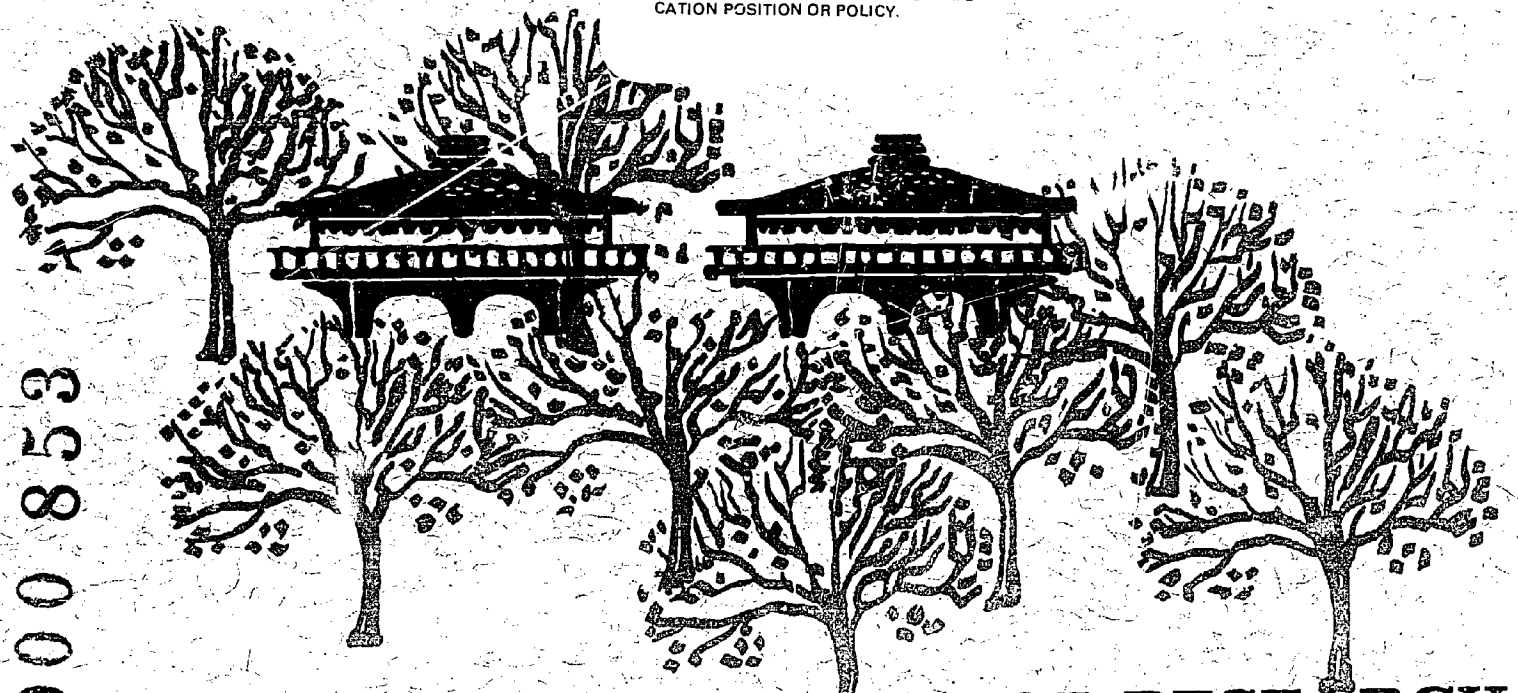

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FINAL REPORT

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EXPERIMENTAL ASSESSMENT OF AN INCENTIVE PROGRAM TO ENHANCE SCHOOL LEARNING: A PILOT STUDY

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July 15, 1971

Submitted to:
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PREFACE

This document reports on research activities which were carried out by the American Institutes for Research (AIR) under a subcontract from the Franklin-McKinley School District, San Jose, California. The district's project was funded by the U.S. Office of Education, under Title 3, Section 306, of the Elementary and Secondary Education Act, grant number EG-9-71-0027(056), project number 71-6885-0. General direction of the project was exercised by Dr. L.J. McClanahan, Assistant Superintendent for the Franklin-McKinley district.

The research was performed to try out, in a pilot study mode, certain educational incentive models which had been suggested and sketched out in a previous feasibility study conducted by AIR. The results of the present pilot study can be utilized in two ways. First, the incentive models which have been developed may be revised and utilized by district staff in their own continuing efforts to improve the quality of their primary grade educational program. Revisions and preliminary adoption decisions will be permitted by the data contained in this report.

Second, the implementation techniques and measurement procedures which were developed should be of interest to the U.S. Office of Education in planning and carrying out larger-scale field studies regarding incentives in education. Copies of this report will be made available to OE personnel involved in this area.

The concept of a pilot study was originated by the authors of this report early in December of 1970. Notitication of funding for the Title 3 proposal to the Franklin-McKinley District was not received until March 26, 1971. Since the preparation of detailed plans is contingent upon funding for the personnel to do this preparation, the planning activities for this study had to be compressed into an unreasonably short period in order to allow for a treatment period of six weeks (two weeks shorter than had been proposed). The authors nevertheless accept major responsibility for any errors of commission or omission in conducting and reporting this pilot study.

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Experimental Assessment of an Incentive Program to Enhance School Learning: A Pilot Study

The use of incentives in educational practice is universal. Incentives, whether or not they are identified as such, exist for all participants in the educational process. In the present context, incentives are thought of as identifiable consequences of behavior which act to guide the future form and frequency of that behavior. Such factors as money, security, knowledge of personal success, peer or authority figure approval, opportunity to engage in desirable activities, etc., are probably operating to influence a large percentage of the behaviors which could be observed and classified in any school in the country. In this sense, the educational enterprise is not unlike other forms of human enterprise. It should be especially noted that incentives, as the term is used in this report, go far beyond economic incentives in the simple monetary sense.

Recent events have stimulated serious interest in the use of incentives to improve academic performance. One such event is the flurry of contracts between school systems and private firms which bind the latter to produce specified reading and mathematics achievement gains in students in order to be paid for instructional services rendered (Education Turnkey Systems, 1970), giving rise to the notion that outside firms know something that school personnel do not know about causing students to learn. Central to these events is the belief that the educational programs of the past decade have not produced impressive results and have especially failed the so-called "deprived" student. Whereas these failures have produced a certain pessimism in some circles, other educators have thought enough of the power of currently available techniques to venture their own capital on a guaranteed-performance-or-no-pay basis. An examination of these techniques usually reveals a heavy emphasis on technological innovations and incentives to learners.

It appears, then, that incentives could be a significant factor in producing student learning gains. To investigate this possibility further, the American Institutes for Research was commissioned in July of 1970 to conduct a study of the use of incentives in education and the feasibility of incentive field experiments in school systems (Jung, Lipe, & Wolfe, 1971). The use of incentives reported in the bulk of the research which was reviewed was somewhat narrow. Most of the studies had been concerned with improving maladap-

tive and disruptive classroom behavior and nearly all studies provided incentives only to students. Furthermore, the dominant model that governed the design of these studies made the delivery of incentives to students contingent upon relatively short durations of the behaviors of interest.

It was concluded in the feasibility study that incentives, broadly interpreted, held great promise for motivating low-achieving students to acquire basic mathematics and reading skills. Further studies of this issue seemed warranted, including rather large multi-site studies comparing several incentive models. The feasibility study identified six such models and designated five of them as essentially breaking new ground in the systematic analysis of incentives in education.

The six experimental models proposed would provide incentives to students, teachers/administrators, and parents based upon student attainment of well defined performance objectives in the areas of reading and mathematics. Two incentive models would provide microincentives and macroincentives to students. The term microincentives was used to designate incentives that are delivered minutes, even seconds, apart and made contingent upon small increments in student behavior; the term macroincentives refered to incentives made contingent upon very large units of student performance, such as test gains over the school year. The microincentive model has received considerable research attention over the past decade. A "competitive" model and a "cooperative" model of incentives to teachers were proposed. The former involved incentives to individual teachers, whereas the latter would compensate teachers as a group for performance gains on the part of their classes. A third proposed teacher incentive model would go one step beyond incentives per se to involve teachers cooperatively in the diagnosis of student needs and prescription of remedial programs. Finally, a parent incentive model was proposed which would provide incentives to parents along with instructions on the type of student behaviors for parents to foster.

The purpose of this pilot-study was three-fold. The first purpose was simply to see whether or not a successful experimental field study of incentives could be implemented. The topic is potentially sensitive and could arouse cries of "teacher merit pay," "student bribery," and others. The second objective was to develop and refine the methodology which would be required to carry off a large-scale field study of incentives based on the six models. The third objective of the study was to obtain some preliminary estimate of the effects of incentives on student achievement in order to better assess

the potential pay-off of further research on the topic.

This study was designed to test the combined effects of three incentive models over a four to five week instructional period. The student macroincentive model, the competitive teacher incentive model, and the parent incentive model were combined, with incentives made contingent upon student mastery of specific instructional objectives. Primary level teachers from three participating schools selected or wrote the instructional objectives for reading and mathematics in grades 1, 2, and 3. One of those three schools provided teacher, student, and parent incentives. Student and teacher incentives were based upon demonstrated student achievement of certain of the objectives during the incentive earning period. Incentives to selected parents were made contingent upon their participation in the effort to enhance their children's mathematics achievement. Thus, the three models were confounded into a single treatment in which teachers, students, and parents (all) received incentives plus teacher involvement in the writing or selection of instructional objectives. Two active control schools were designated in which teachers participated in writing or selecting instructional objectives but did not receive the incentive treatment; a passive control school was also designated in which pre- and post-tests were administered but no other involvement occurred.

METHOD

Site

Franklin-McKinley School District is a small elementary district situated on the southeastern edge of San Jose, California. It serves children from pre-school to the eighth-grade. The past decade has witnessed a gradual urbanization of this area; now only thirty per cent of the former orchard lands remain undeveloped. Consequently, the district has experienced a steady increase in new housing development designed for lower income families. A survey made in December, 1970, revealed that there were 1,265 single and 1,626 multiple family dwellings planned or under construction within the district boundaries.

During this transitional period, the ethnic and demographic characteristics of the school population have changed. A study completed in October of 1970 showed that approximately thirty-eight per cent of school aged children had Spanish surnames, five per cent were classified as Negro and two per cent of other minorities. Of the 6,500 children enrolled in school, 1,175--or nineteen per cent--are on the AFDC list.

These changes are also reflected in the increasing numbers of underprivileged and underachieving students who move into the schools. For example, in the spring of 1970 the district median score for first grade students on the Cooperative Reading Test was 1.63 G.P. as compared to the publisher's norm of 1.9 G.P. For the same year the second grade median score on the Stanford Reading Test was 2.29 G.P. as compared again to the publisher's norm of 2.9 G.P. Achievement in other grades was similar.

Orientation to the Experiment

The nature of the proposed project was explained to the School Board of the Franklin-McKinley School District at two of its meetings. One concern of the Board was whether any existing evidence indicated that low achieving students had been helped by special projects designed to improve achievement. Publications selected from the It Works series compiled by the Bureau of Elementary and Secondary Education of the U.S. Office of Education were presented to the Board to document successful programs.

After the Board consented to allow district participation in the study, Dr. L.J. McClanahan, Assistant Superintendent, met with three district principals, who expressed strong interest in the study and asked to participate. First, second, and third grade teachers from those three schools were invited to a dinner meeting at which the objectives of the project were described and teacher responsibilities were outlined (see Appendix A-1). At that meeting Dr. Dan Meyerson discussed learning principles and behavior modification techniques that were being systematically applied at Slater School in Mountain View, where he was principal.

The community was informed about the project through the School Board meetings, which were open to the public, and through a story in the local newspaper which covered the teacher orientation dinner meeting (see Appendix A-2). All first, second, and third grade students in the experimental school received an explanatory letter to take home to their parents (see Appendix A-3). A second newspaper story appeared midway through the study and described actual events of the experiment (see Appendix A-4). Finally, some local business establishments were told about the study and were asked to make a contribution toward incentive payments to parents and students.

Participation

Four of the 8 elementary schools in the district participated in the study, one as the experimental school, two as active controls and one as a passive control. One of the three principals who attended the orientation meeting nominated his school as the experimental site and the other two, then, agreed to allow their schools to serve as the active control sites. The fourth school, designated as the passive control site, was selected by Dr. McClanahan based upon the similarity of its students to the three actively participating schools.

There were twelve classrooms in the experimental group; they comprised all first, second, and third grade classrooms, four classrooms per grade level, in Santee School. Sixteen teachers in the two active control schools, Robert Kennedy and Seven Trees, volunteered for the project. Six active control classrooms were first-grade level, five were second-grade level, and five were third-grade level. Six classrooms in Los Arboles School served as passive controls, two at the first-grade level, two at the second-grade level, and two at the third-grade level. Each teacher taught one mathematics class and two reading groups. The average size of the former was 29 students per class and the latter was 14 students per class.[1]

All teachers in grades one through three of the experimental school were pressed toward participation in the study, whereas only volunteers participated from active control schools. The passive control teachers were requested by their principal to participate. All participating teachers were female. Number of years teaching experience ranged from one to 27. Three teachers in the experimental school were in their first year of teaching; no other beginning teachers participated. All teachers had earned a bachelor's degree and all but four had graduate units beyond their bachelor's degree.

The racial and socio-economic composition of students in all schools were similar.

Objectives

All teachers and principals in the Franklin-McKinley School District were invited to an evening of lecture and discussion on the writing of in-

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[1] Two teachers in Robert Kennedy School taught two mathematics classes of 9, 29, 29, and 34 students respectively.

structional objectives presented by Dr. Robert Mager. Following this meeting, each participating teacher in the experimental and active control schools was given a document outlining the "Procedures for Stating Educational Objectives" (see (Apendix A-5) and a "Comprehensive Objectives List" of primary level reading and mathematics objectives (see Appendix A-6) and was asked to construct a list of objectives that she wanted 85% of her students to have mastered by the end of the school year. Each teacher could select objectives from the master list or write her own or both. Next, participating teachers in each of the three schools held grade level meetings to compile a single list of objectives appropriate for the students in that grade level. Finally, each group of teachers appointed one member to represent the school at a grade level meeting of representatives from the three participating schools, where a final list of objectives was negotiated. Each teacher was paid $40 for her work in selecting these objectives.

Criterion-referenced tests in mathematics and reading were then constructed by the American Institutes for Research to assess student attainment of the objectives that the teachers had selected. They were administered as a pre- and posttest to all students. Criterion performance items were developed for each objective. It was necessary to organize and sequence these items to reflect the prerequsite capabilities within the reading and mathematics subject areas. Such sequencing of objectives enables teachers to diagnose problems that arise when a student skips essential steps in the acquisition of knowledge of the content areas. For example, a child must learn to count before he learns to add, and to add before multiplying.

Although three grade levels were involved, it was decided to develop one test covering all objectives deemed appropriate for levels 1 through 3. Each topic-oriented set of objectives (e.g., place value, addition, subtraction) was analyzed by teacher level of selection and organized by level of difficulty. Occasionally, some objectives selected by the teachers were grouped. An example in mathematics were the objectives stating "Solve word problems in which two 1-digit numbers are added and the sum is 10 or less," and "Solve word problems for addition problems where the sum is not greater than 18." These were grouped under the latter objective, assuming if a student can solve a word problem adding to 18, he can solve one adding to 10.

Since the items in the test were sequenced with respect to the way in which a student learns the subject, first grade students started at the beginning of the test and went as far as they were able to go. Second or third level youngsters began on whatever page of the test their teacher

considered appropriate for the objectives of her course. In practice, the second and the third grade teachers decided to begin their students at page 9 of the test and allowed them to go as far as they could. Some exceptions were made for lower ability students. The items were identified directly on the test booklet by objective number. In this way the teacher knew exactly which items were testing which objectives.

Instructions to the student were carefully matched to the reading vocabulary of the primary level and the tests were intended to be self-administered. Instructions were standardized (e.g., "Match," "Draw lines, " "Mark an X." "Fill in the box"), and to minimize confusion, similar responses were grouped whenever possible. To further clarify response instructions in some items, examples were used with the correct answer illustrated by a broken line. The physical layout of the booklets was designed to give the student ample room for marking or writing his answer.

The tests were scored by objective, results were keypunched,and each experimental and active control teacher was provided with a computer printout of the scores of each student on each objective. This printout provided each teacher with a list of objectives that each of her students had already mastered and those that had not yet been mastered. Scores on this computer printout were indicated by "2," "1," or "0." "2" indicated 100% mastery of all items on the objective; "1" indicated partial mastery (defined here as at least 2/3 of the items correct for that objective but less than 100% correct) and "0" indicated non-mastery (i.e., less than 2/3 of the items correct per objective). Using this printout, as well as the test booklets themselves, teachers were able to pinpoint student weaknesses even more closely.

In addition, the Stanford Achievement Test, Word Study Skills and Arithmetic subscales, was administered to all experimental and control students as a pre- and posttest in order to estimate the results of the experiment in comparison with national norms.

Incentives

Student Macroincentives. While the basic system of student incentives (incentive periods, testing, delivery of incentives) was standardized across all teachers in the experimental school, the actual operationalization of the system was individualized according to the abilities, academic needs, and priorities of each class. Incentives were to be delivered to the class as

a group and were to be earned when 85% of the children in the class had mastered objectives deemed important for them.

The pretest scores on the criterion-referenced tests determined student objectives upon which each student was to work during each incentive period. Both the number of objectives assigned to each student and the actual objectives chosen were left to the teacher's judgment, based on the student's past performance in the subject as well as his pretest performance. The number and content of objectives assigned varied greatly between individual students and between classrooms, due to wide variability of individual aptitudes and individual ability to absorb new concepts. The teachers were instructed to assign objectives congruent with the child's ability, so that each child would be able to attain mastery of his objectives, but fast learners as well as slow learners would be required to work equally hard to earn the incentive. The individualization of the student incentive system, however, did not specify the instructional strategies to be employed by each teacher in working with her class. Stress was not placed on the instructional methods utilized to effect the student learning gains necessary to earn incentives. Therefore, teachers were free to choose teaching methods and materials freely. Pre- and posttest data on teaching practices were collected.

It was deemed important that each class have at least one success experience in working with objectives, i.e., all classes were to earn at least one incentive. Therefore, in assigning objectives for the first incentive period, teachers were instructed to establish less rigorous performance standards for students than in the three following incentive periods.

The first incentives period was on mathematics, the second period was on reading, the third period was on mathematics, and the final period was on reading. Each period was two school weeks in length; since the total experimental period had a duration of six weeks, there was some overlap of reading and mathematics incentive periods. (See Appendix B)

The final choice of incentive for each incentive period was made by the individual teacher and her class. The extent of the AIR project staff suggestions regarding incentives was limited to recommendations that a local field trip be the first incentive, a larger field trip be the final incentive, and that smaller incentives be chosen in the two intermediate incentive periods, as it was felt this pattern of incentive delivery would maximize student interest from the start and sustain a high level of student involvement. One meeting between project staff and teachers was devoted to

brainstorming on ideas for incentives--places to go and items to purchase. This list was printed and distributed to teachers as a source of ideas for class selection. Aside from project staff recommendations, the only other constraint on the selection of class incentives was financial. Each teacher had an incentives fund of approximately $115 which she was free to apportion among the four incentives periods.

The initial incentive period was preceded by an explanation of the program to the class by the teacher. Teachers were instructed to explain the program clearly to their students, emphasizing the direct relationship between hard work, mastery of their objectives (as measured by the criterion-referenced tests), and certain group rewards. Following the presentation of the program, the teacher and students selected their first incentive. The AIR research staff recommended a local field trip--a large incentive--to a place of each class' choosing as the initial incentive. It was felt desirable to attempt to evoke high initial student interest and involvement in the program.

Eight of the twelve experimental classes chose a trip to a Santa Cruz beach; 2 classes chose a trip to McDonald's Hamburgers (lecture and free samples); 2 classes chose a trip to the San Jose Zoo. As soon as selections had been made, the AIR research staff began to make tentative arrangements (subject to possible cancellation should students fail to earn the incentive) for all trips.

Each teacher was asked to submit to the research staff a list of which objectives (by number) she had assigned to each student for the incentive period. In assigning objectives, teachers generally picked key objectives (in their opinion) that had been missed by a number of students in order to minimize the individualized instruction required in the brief two-week incentive period. In this way, teachers could teach students in small groups on common objectives. This approach attenuated the demands on teachers for special lesson plans and drill sheets. While some teachers utilized material in the class texts for teaching objectives, many teachers found it necessary to develop supplementary materials. The objectives served as clues for the development of these materials.

At the end of each incentive period, each teacher constructed her own test on the objectives assigned. Often she constructed one big test and had each student do only specified pages, according to the objectives he had been assigned. As previously noted, the performance standard required in order for the class to receive the incentive was that 85% of the students had to attain complete mastery of all objectives assigned to them. Incentives were based on group performance and were awarded on a group basis--i.e., either the entire class went on the field trip or no one went.

In the final three incentive periods, the teachers adhered to the basic pattern established in the first incentive period--assigning student objectives, selecting incentive(s), submitting incentives and lists of students and their objectives to the AIR staff, and construction and administration of tests upon which 85% of the students were to demonstrate mastery of their assigned objectives for the entire class to earn the incentive.

Some differences did occur, however, in terms of number of groups involved in incentives periods, criterion for earning incentives, group vs. individual basis on which incentives were awarded, and the actual incentives earned.

Each teacher taught two reading classes. Therefore, in the reading incentive periods each teacher worked with two separate groups, with separate objectives, separate rewards, and separate earning of rewards. In most cases, the two reading groups differed significantly in terms of reading ability, since grouping into reading classes was based on reading ability.

While the AIR research staff indicated on a number of occasions that the criterion for receipt of group incentives was that 85% of students attain 100% mastery on their assigned objectives, some teachers interpreted this to mean that 85% of all objectives assigned were to be mastered. Eight of twelve teachers applied this criterion at some point in the study; this misunderstanding did produce some additional, useful feedback on the comparative effectiveness of these two criteria.

Another misunderstanding regarding the basis on which incentives were to be earned also yielded very interesting data. In the second and third incentive periods, teachers were given the option of providing individual incentives such as coloring books or group incentives such as a game for the entire class. This individual incentives option, if chosen, was intended

to be based, as was the first field trip, on overall class performance. In other words, if 85% of the students in the class mastered their own individual objectives, all students would receive individual prizes; if this group performance standard was not reached, no one would receive individual prizes. In actuality, ten of the teachers awarded individual incentives based on individual (100% mastery of student's own objectives) rather than group performance in the first reading incentive period. When this situation was detected, the intended system was clarified and individual incentives awarded in the second period were based on group performance. The use of this individual performance standard did furnish the project staff with some interesting, unanticipated comparisons.

Commonly selected individual incentive items in the second and third periods were such things as felt pens, clay, pencils, and erasers. In a few cases, classes did choose group incentives. For example, two classes purchased ingredients for, and made, homemade ice cream; one of these classes also purchased the ice cream freezer to make it. Another class purchased three craft books as a group incentive for the class' use. In a number of classes, free time and certain recreational activities were the group incentives, such as playing with clay for 20 minutes, painting pictures, a picnic on the school lawn and permission to go barefoot for it, and cookies and milk on the lawn during one hour of free time.

The use of individual incentives was introduced when each of the teachers visited Slater School in Mountain View. The visit commenced with a brief explanation of the school's programs by the principal, Dr. Dan Meyerson; the rest of the morning was devoted to a guided tour of four or five classrooms in session, as well as a short discussion of the behavior modification program with 1 or 2 of the participating students at the school. Each teacher was given release time on the day of her visit to Slater.

For the final incentive period, a larger field trip was selected by all classes. Four of the classes selected a trip to the San Francisco Zoo; the remaining eight classes chose a trip to Marine World in Belmont, an aquatic park with special shows, displays, etc.

Teacher Incentives. Participating teachers at the experimental school met with the assistant superintendent of the Franklin-McKinley District (the administrator chiefly responsible for the conduct of the study) and members

of the AIR research staff on April 26th to discuss and establish the teacher incentives system. The amount budgeted for the teacher incentives program amounted to approximately $280 for each of the 12 experimental teachers. The money, as stipulated by the research staff, was not to be distributed to teachers in the form of a personal stipend; it was to be used as credit toward the purchase of classroom supplies, toys, special equipment for the classroom, etc., of the teacher's choice. This equipment would stay with the teacher should she transfer within the district.

A system of graduated incentives was developed. Each teacher received a credit of $100 for her participation in the project; receipt of additional incentives was then based upon her class' achievement of agreed upon performance gains in reading and math.

The goals for the teacher incentives were adjusted for each teacher to account for the differing abilities of students in different classrooms. These goals were negotiated at individual conferences between the principal, a member of the project staff, and each teacher held during the week following the initial meeting. At each conference a special form developed and printed by AIR was filled out, indicating exact goals for each teacher. The goals were based on the teacher's estimate of the total number of objectives her class as a whole could achieve during the experimental period. Achievement was to be measured by the sum of mastery gains from the pre to the post experiment administrations of the criterion-referenced tests. Raising a student's pretest score of "0" to a posttest score of "1" counted as an increment of one, as did raising a score of "1" to "2".

At the April 29th meeting, it was decided to treat the two reading groups and the mathematics class as three separate groups with separate goals. A teacher could earn $60 if each of her three groups attained the goals which had been established; if the halfway mark was met in these three groups, the teacher could receive one-half payoff (i.e., $30 per group that reached the halfway mark). In this way, a teacher could earn a miximum of $180 in addition to the $100 that each was guaranteed.

After the individual conference to negotiate each teacher's goals for her three groups had been completed, teacher involvement in the teacher incentives program consisted solely of working with students on their objectives to maximize student achievement upon which receipt of teacher incentives was based.

blue card and what the parent provided as a treat or privilege. The parents were told to bring the completed parent record form back to school at the end of the two-week period and, when they did, they would receive another gift certificate.

The teachers' orientation to the parents strongly emphasized that a blue card indicated extra effort and especially good work on the part of the child. The child would not be expected to bring home a blue card every day. Parents were told not to say or do anything on the days that the child did not bring home a card. At the close of the brief orientation session the teacher thanked the parents for attending and then gave each parent a gift certificate to Newberry's Department Store. Mrs. Santiago, the school's secretary, translated the information into Spanish for those parents who did not completely understand English. All invited parents who did not attend the orientation meeting received a visit in their home from Mrs. Joyce Elmore, the school district's community laiason person, who explained the parent involvement program and invited the parents to participate.

A total of 49 out of the original 60 parents did elect to participate and returned thier completed parent record forms to the school. They filled out a brief questionnaire concerning their reactions to the project and then received a $12.00 dinner gift certificate for two at 17 West, a local restaurant.

One sidelight to the parent incentive treatment was the monetary commitment to the program by Newberry's Department Store and 17 West restaurant. Both contributed a portion of the incentive to parents as a jesture of support for the educational establishment and as evidence of their enthusiasm for the innovative project to improve student learning.

MONITORING THE INSTRUCTIONAL PROCESS

Incentives alone may provide motivation but they do not provide the means for improving student achievement. Nevertheless, during the interim between the time that incentive inducements are offered and the subsequent point in time when the target students' achievement outcomes are measured, something is expected to occur that will improve the target students' achievement. If greater than expected gains in student achievement occur, it is important to learn what the incentive receivers did to facilitate that gain. Specifically,

Parent Incentives. Since the Coleman report on equality of educational opportunity (Coleman, 1966) identified student's background prior to entering school as a major factor in school achievement, the home has come under study as a possible significant influence upon academic achievement. The purpose of the parent incentives treatment in this pilot study was to involve parents in the process of rewarding their children for academic success. It was assumed that parents command tremendous incentive resources for rewarding children because of their position of authority and reservoirs of affection and that academic success on the part of students might, in turn, be very reinforcing to parents.

The parent incentive treatment was initiated during the third week of the study. Every participating teacher in the experimental school nominated her five lowest achieving students, yielding a total of 60 nominees. The parents of these 60 children were contacted to participate in the study. Each of these parents was sent a letter inviting them to attend a late afternoon meeting at which the parent involvement program would be explained. The letter promised the parents a gift certificate for their attendance at the meeting (see Appendix A-7). In addition to the letter, every parent was also telephoned to reinforce the request, to offer a baby-sitting service at the school during the meeting, and to arrange transportation if needed. Those parents who did not have telephones were visited in person and invited to the meeting.

Thirty-seven of the 60 invited parents attended the orientation meeting. They were given a brief explanation of the project by the AIR research staff, and then adjourned to a brief meeting with their child's teacher during which the teacher explained the details of parent participation.

Parent involvement was two weeks in duration and corresponded to the second mathematics incentive earning period. During that two-week period, the five selected children in each class could earn a blue card by working especially hard in mathematics. The blue card stated, "(child's name) did very well in math class today. Please show how pleased you are by:

1. Praising your child, and
2. Offering your child a special treat."

Parents were asked to reward their child's extra effort with a treat or a privilege that they knew the child would want. Each parent was given a record form (see Appendix A-8) on which to record when their child brought home a

it would be important to learn to what extent the incentive receiver applied some form of pressure on students and/or to what extent innovative instructional techniques and equipment were employed.

Participating parents were involved only in reinforcing acceptable student performance and not in instructing their child. Furthermore, parent incentives were contingent only upon parent participation, not upon student achievement. Monitoring the instructional process in this study, therefore, concerned only the interactions between teacher and students and the interactions among students.

Two monitoring techniques were utilized. One was a self-report technique in the form of instructional practices questionnaires administered to teachers before and after the incentive treatment period; the other technique was classroom observation by outside observers using forms for recording ongoing teacher and student behaviors in the classroom.

Two instructional practices questionnaires were devised, one for mathematics instruction and an identical one for reading instruction (see Appendix A-9). Each experimental and active control teacher completed the questionnaires both before and after the incentive treatment period. The first part of each questionnaire solicited information about resources; the second part asked about teaching techniques. Teachers were asked to list materials, personnel, and special services. They were also asked to describe their classroom operation such as grading practices, parent involvement, and student motivation techniques.

The classrooms were observed by outside observers who entered the classrooms unannounced at random intervals. Before the study was instituted, teachers were told that observers would drop in from time to time, but teachers were not told what the observers would be looking for, so as not to intentionally bias classroom behaviors during observation periods.

During each visit to a classroom, the students were observed for five minutes, then the teacher was observed for five minutes, then students again for five minutes, and finally the teacher was observed for a second five-minute interval. Thus students were observed for a total of ten minutes and the teacher was observed for ten minutes during each classroom visit. The observer carried a clip board with stop watch mounted at the top. Clipped to the board was an observation form (see Appendix A-10) which listed the student and teacher beahvior categories down the

left-hand side of the form. When observing the teacher, the observer would make a tally mark every five seconds next to the category that best represented the teacher's behavior during that five-second interval. When observing students, the observer watched a different student in random sequence every five seconds. At the end of each five second interval, the observer made a tally mark next to the student behavior category that best represented what that student had been doing.

During the first phase of the study the student behavior categories and teacher behavior categories were selected, defined in detail so that they would be relevant to the population of potential teacher behaviors, and then tried out and revised. Next the inter-observer reliability of the form was checked before data collection was begun. A quick computation of Scott's π following each observation of the same teachers or students indicated the level of inter-observer reliability and, when reliability was low, points of disagreement were noted and appropriate refinements made in the category definitions. The last six reliabilities are shown in Table 1. Each practice observation shown in Table 1 was obtained in a different classroom.

The behavioral categories are defined in detail in Appendix A-10. The selection of categories was limited to behaviors that can be seen or heard without recourse to inference or interrogation. Student behavior categories are: (1) studying alone, (2) interacting with a peer, (3) interacting individually with the teacher, (4) interacting in a small group which includes the teacher, (5) interacting in a large group which includes the teacher, (6) non-productive or transitional behavior which is not obtrusive to any other students, and (7) non-productive or transitional behavior which is obtrusive to other students. Teacher behavior categories are: (1) not interacting with students, (2) attending to a student who is interacting with or performing for the teacher, (3) praising a student(s), (4) criticizing a student(s), (5) stipulating a future reward contingent upon future desirable student performance, (6) stipulating a future punishment contingent upon future undesirable student behavior, (7) verbal inquiry regarding a student's lesson, (8) extending a student's concepts beyond those of the immediate lesson, (9) giving answers or solutions to problems, and (10) other.

It was originally intended that extra personnel be hired and trained solely to obtain observational data. The budget did not permit this; therefore, AIR staff persons assigned to the project developed the observation forms and procedures, checked observer reliability, and collected as much

observational data as time permitted. Because of the budget and time constraints, it was not possible to obtain baseline observations prior to the study, observations in active and passive control classrooms, nor adequate time sampling throughout the experimental period. Observations were obtained in experimental classrooms during the second through the fifth weeks of the study. Approximately one hour's observation time was completed at each grade level in reading and in "other" (i.e., non-reading) classes. Observations were done in approximately 10 minute segments across randomly selected classrooms.

Table 1
The Final Six Observer Reliabilities
(Quick Method for Estimating Scott's π)

	Grade 1	Grade 2	Grade 3
Teacher Observation		.76	.84 .91
Student Observation	.88 .91	.99	

RESULTS

Participant's Attitudes Toward Project

Student Attitudes. The primary sources of information on student attitudes toward the project were teacher comments and teacher interviews. In addition, one student per experimental classroom was randomly selected for an interview with a project staff member. A final data source was a few random comments made by students to the AIR project staff.

While the teachers generally felt the student incentives were effective in motivating students to work harder in math and reading, a number of teachers voiced concern that students felt pressured by the project. One teacher observed, "They (students) were very tense on a test day for fear they wouldn't earn their incentive." Another teacher echoed this comment, stating that the incentives made low achievers "feel uptight if they might cause the entire class to lose the incentive due to their academic inability to do well on the tests." A third teacher said that both she and the children "were tired and feeling a bit harassed by the project." One teacher partially attributed the onset of stealing by a few students to the pressures the students were subjected to during the project.

Many teachers did comment on how pleased and excited the children were with the chance to earn incentives. Letters written to the project staff by one classroom (see Appendix E) and several casual conversations with students confirmed this predominantly favorable attitude. A number of students independently thanked the researchers for the incentives; a couple of students also mentioned their enjoyment of the parent incentives card system.

Student interviews revealed that all 12 sampled students would like to participate in an incentives program again, although two of them wanted to participate only in reading rather than both math and reading. Eleven of the 12 remembered at least some of the incentives they had earned, although all had some difficulty remembering which incentives had been earned in which subject. All students knew why they had earned the incentives (for working hard and for doing well on the tests); one student could not remember the prizes, but did recall how they had been earned!

When questioned about the type of incentive they liked best, seven students expressed a preference for group incentives such as field trips, while the other five stated they liked group incentives and individual incentives (like felt pens) equally well.

Nine students reported the occurence of peer tutoring to help the class earn its incentives; three students reported that no such peer help occurred. There was unanimous accord among the students questioned that other students in their classes had liked the incentives system. One student's explanation for this was, "because everyone doesn't like to work hard, but they like to earn prizes." One student said that students learn more without incentives "because there are no prizes in high school, so when you're little and don't get prizes, you still work hard." Further questioning on this point revealed that the student's mother had told him this. Despite his criticism, he did indicate a desire to participate in an incentives program again.

One other student said he thought students learned less with incentives in reading because "if you go on a trip, you spend the whole day out of school;" in math "you learn more with prizes because you work hard to earn it." Five students said learning increased with incentives; five students said incentives did not affect learning.

All students interviewed liked the reinforcement card system. Four students said they would work harder to earn reinforcement cards to take home and receive rewards from their parents, rather than for prizes in school like field trips. Six other students preferred the latter reward, while the remaining two said they would work equally hard for either reward.

Teacher Attitudes. The problems that a pilot study is designed to encounter and resolve were amply present in the incentives pilot study. The basic problem was the three-month delay in funding of the study. This delay shortened the experimental period, pushed the operation of the study to the end of the school year, and compressed the project's operations to the point that many staff decisions, of necessity, had to be made on a day-to-day basis. Teacher dissatisfaction with the study's timing and lack of organization was general.

In determining teacher attitudes toward the use of incentives, objectives, and behavior modification techniques, informal comments from teachers and

final interview data were gathered. In processing these data, it was necessary to extricate these general attitudes from the negative comments that were specifically related to the aforementioned timing problems of the pilot study. The following summary of teacher attitudes was derived in this manner.

Eleven of the 12 experimental teachers expressed a positive attitude toward the use of behavioral objectives. Behavioral objectives, they stated, gave them a definite idea of what students did and did not know and thus a definite idea of what to teach. One teacher commented that she found herself "diverging less." Another teacher commented that objectives "channeled efforts and goals" and "made students more aware" of their achievement. Another teacher emphasized the importance of objectives to teachers. She felt that objectives gave a set goal to work for, kept her more organized, and made her aware of exactly where the students were. One teacher noted that using objectives made her "realize the importance of frequent inventories to assess the child's progress and also the importance of working on a limited amount in a limited time span." Another stressed that objectives "made it so much easier to really individualize material to a child's own personal needs."

The one teacher who was not very enthusiastic about the use of objectives felt that she had been doing much the same things (using a system of behavioral objectives and criterion-referenced tests) prior to the study by giving achievement tests at the end of each academic unit. She admitted, however, that the objectives "did pinpoint some of the things we take for granted."

Closely related to the teachers' attitudes toward behavioral objectives are their attitudes toward the criterion-referenced tests. These attitudes were strikingly contrasted with their expressed attitudes toward the standardized achievement test (Stanford Achievement Test) also used in the study.

Eight of the teachers specifically expressed positive attitudes toward the criterion-referenced tests, despite minor criticisms, such as length of the tests and their lack of adjustment to the vocabulary and speech patterns of Spanish-speaking students. The criterion-referenced tests were generally viewed as well written tests that covered the objectives quite closely and contained good, simple directions. Several teachers noted that their students felt much more secure with the criterion-referenced tests than with standardized tests.

The teachers were divided as to their preference for a performance standard on the criterion-referenced tests. As indicated earlier 85% of all students had to exhibit 100% mastery of their individually assigned objectives for the class to receive the group incentive. This standard was the one chosen for use in the study by the project staff; however, some teachers misinterpreted this. They thought that 85% of all objectives assigned a student were to be mastered. Six of the teachers who had used both standards at a different time in the study stated that they preferred the latter. One teacher explained, "I tried both and the class seemed more comfortable or less pressured when 85% of the objectives are mastered." Another teacher felt that the 85% of students system was "unfair", while a third teacher liked the 85% of objectives standard better. "It is hard to get 100% right on a test." The remaining six teachers did, however, prefer the original standard of 85% of the students.

Dislike of the standardized test was widespread--nine of the teachers commented unfavorably on it. They generally felt that the test was much too difficult for the students and that the students were frightened and discouraged by it. A couple of teachers noted that this situation led many students to guess at answers. One teacher made the additional comment that the standardized test "did not have anything to do with the other things we were doing."

Ten of the 12 specifically expressed their approval, and their belief in the effectiveness of,incentives for academic achievement. The teachers felt that the students had worked harder to earn the incentives. Several teachers also endorsed the "positive" approach of incentives which "reinforced the successes they (students) earned." Some teachers did indicate that the project macroincentives delayed reinforcement too much for their students; in order to sustain student interest and motivation, a number of teachers developed and posted progress charts on objectives or gave students gold stars for extra effort to provide students with immediate, daily reinforcement.

Most of the teachers at some point in the study awarded individual incentives on an individual performance basis rather than on the intended group performance basis. Some interesting comparisons were made possible by this fact. Among the teachers who did award incentives on the basis of individual achievement, there was a fairly common positive feeling toward this system. Comments included the observation that "All tried harder" with

individual incentives, and that students "felt they were rewarded for success as an individual. That their own individual success was recognized on a personal basis. I (the teacher) thought it was much more meaningful to them and did so much for their self-esteem, well-being." One teacher who had stated that rewards based on group performance caused the children to react nervously ("Each was very worried about holding back the class") said that the use of rewards based on individual performance was liked much better by her students. "(They) liked the individual attention very much." Another teacher's feeling about the individual performance standard was "off and on, individual incentives are good to get everyone working." It is felt that these reactions toward the 85% of students vs. 85% of objectives standards, as well as toward the group performance basis vs. individual performance basis, yielded supplementary data that point up potential areas of further exploration.

In the final interview, several teachers commented on the surprising performances of some students during the project. During the experimental period other teachers had informally expressed their surprise and delight at the achievement of some of their students, especially the low-achievers.

Teacher reaction to student incentives was not entirely positive, however. One teacher reflected, "In the study, after awhile, kids began to ask, 'What am I going to get for it?'"; another expressed fear that students would "henceforth think they must be remunerated for anything they do!!" A third teacher revealed a similar concern that incentives gave a child the idea that in order to learn, he needs a reward. "Personal satisfaction is replaced by outer reward."

In the area of teacher incentives, five teachers made special note of their support for incentives to teachers as a successful device for intensifying their efforts. One of these teachers stated that recognition of her efforts was more important to her than the tangible teacher incentives.

Two other teachers remarked that teacher incentives did not substantially affect their efforts; one of them further explained that she had participated in the study for the experience rather than for teacher incentives per se.

Teacher attitudes toward parent incentives were generally favorable. Eight teachers stated that parent incentives had accomplished the intended purpose of involving parents, adding that this might well be the only way to involve them. A number of teachers said that through the parent incentives

program they were able to reach parents they had never reached before. One teacher mentioned that what she liked best about incentives to parents was that parents "were given recognition and rewards for their efforts . . . I'm sure it also gave them some motivation to follow through with the program."

Negative reactions to the parent incentives were expressed by two teachers. The first teacher was afraid that the parent incentives system "may insult parents' dignity if they feel they should be paid to help their child." She concluded that, "It was alright to use parent incentives in the pilot study since parents realized these incentives were part of a special project, but on a long-term basis, parent incentives are not a good idea." The second teacher stated, "Basically, I do not think parents should be rewarded for helping their own child."

Teacher receptivity toward the project's effort to expose and explain learning principles and behavior modification techniques to teachers was very high. This orientation included distribution of copies of Madeleine Hunter's Reinforcement Theory to each teacher, the showing of a film closely following the book, and a field trip to Slater School in Mountain View where an extensive range of behavior modification programs have been instituted.

The field trip was the most informative part of the behavior modification orientation according to the teachers. A number of teachers cited this trip as the single most worthwhile part of the project in their final interview. Eleven of the 12 teachers spoke very enthusiastically about their opportunity to watch the behavior modification program at Slater. The one dissenting teacher's reservations about the field trip were based on the fact that she felt that the classrooms visited had seemed staged; she stated interest in seeing a normal class in operation.

At Slater, and afterward in their comments on classroom practices, teachers demonstrated an openness to, and interest in, reinforcement techniques. The extent of this receptivity was evidenced by the fact that a number of teachers implemented token economies or other reinforcement practices, particularly after the trip to Slater. These reinforcement practices were based on academic achievement and/or classroom behavior, depending on the teacher. At Slater, the reinforcement system is almost exclusively based on classroom behavior. Thus, in instituting reinforcement systems for academic achievement, some of the experimental teachers extended the applications of the practices they had observed.

Most of the teachers found the reinforcement cards sent home with the children whose parents were participating in the parent incentives portion of the project so successful in motivating these children that they dittoed off cards for all their students. In the final interview, 10 of the teachers praised the reinforcement card system, although many of them added that the system should operate for all students, rather than the limited number selected for the study. One of the teachers stated that the card system was her favorite part of the program. Many teachers indicated their intention to use this system next year.

On the other hand, one teacher remarked that while, in general, she liked the card system and thought it a "good idea," she felt that "it didn't motivate all the kids." Another teacher commented that the system had no effect upon a couple of students in the parent incentives program.

Parent attitudes. Forty parent who participated in the parent incentive program filled out a brief parent questionnaire at the end of the parent incentives period. Thirty-six reported that they like the practice of rewarding their child at home for work done well in school, and the other four stated that it didn't matter one way or the other. All parents said their child liked being rewarded at home for bringing home a blue card. About half (n = 17) of the respondents reported that their child spent more time working in mathematics after he started bringing home the blue cards than he had spent before that program was started; the other half (n= 21) said the amount of time didn't change. Twenty parents said that giving gift certificates to parents for their participation didn't matter one way or the other; 19 said it was a good idea; and only one stated that it was not a good idea.

Five additional parents,selected at random from all of the students who participated in the experimental program, were interviewed in their homes. The concensus of four of them was that incentives to students was an effective means of improving their children's performance. The fifth parent was opposed to the program, mainly because a child in the program could (and in some cases did) brag to nonparticipating students about the great benefits of being in the experiment. Overall, however, the parent response to the program was judged highly favorable.

Monitoring the Instructional Process

Teaching practices. Reported here are the results of the pre- and post-experiment administrations of the teaching practices questionnaires in reading and mathematics.

Tables 2 and 3 present a description of the change in average hours experimental and active control teachers spent in preparation and in teaching over the course of the experimental period. An analysis of this data reveals a trend toward a comparative increase in time spent by the experimental teachers. This is in line with the added requirements of participating in the study.

Tables 4 and 5 present information on the change in percent of time experimental and active control teachers spent in various types of teaching activities. This data shows a somewhat surprising discrepancy in amount of pre-experiment individual tutoring between the experimental and control teachers, especially in mathematics. This discrepancy may be attributed to the large-group mathematics instruction utilized at Robert Kennedy School, which provided three-fourths of the active control teachers. Disregarding this initial discrepancy in math, there still seems to be a trend toward a gain in individual tutoring in the experimental school in reading. There also seems to be a visible increase in "large-group tutoring" in reading within the experimental school. These trends are probably due to the activities experimental teachers undertook to assist individual students and student groups in mastering sets of reading objectives which were identified for the student incentives model.

Classroom observations. Table 6 presents the distributions of teacher behavior and Table 7 shows the distributions of student behavior collected during the classroom observations.

As has been noted, approximately one hour was spent in observations at each grade level during reading and non-reading instruction in the experimental school. Few generalizations can be made based upon the results of such limited observations. The percentage of time spent by teachers and students in the various behavior categories is fairly consistent across grade levels and across reading and "other" classes. Much of student time (Table 7) was spent either studying alone or interacting with the teacher during large group instruction. About one-fifth of observed student time was spent in non-productive but unobtrusive behavior. Close to half of the observed teacher time was spent giving instructional information or directions to students.

Table 2

Average Number of Hours Preparing and Teaching Reading

	Experimental Teachers	Active Control Teachers
1 hour decrease	1	4
2 hour decrease	0	1
no change	5	8
1 hour increase	3	3
2 hour increase	2	0
3 or more hour increase	0	0
Total	11[1]	16

Table 3

Average Number of Hours Preparing and Teaching Mathematics

	Experimental Teachers	Active Control Teachers
1 hour decrease	1	2
2 hour decrease	0	1
no change	6	9
1 hour increase	2	0
2 hour increase	1	0
3 or more hour increase	1	0
Total	11[1]	12[2]

[1] no pretest data from 1 experimental teacher

[2] no posttest data from 2 active control teachers and 2 others do not teach math

Table 4

Average Percent[1] of Time Spent in Various Teaching Activities in Reading

Activity	Experimental Teachers		Active Control Teachers	
	Pre	Post	Pre	Post
Individual tutoring	26.9	33.9	23.6	17.6
Small group instruction	29.8	24.0	24.3	21.4
Large group instruction (less than entire class)	39.0	50.8	56.1	41.4
Entire class instruction	23.1	23.9	46.0	48.9

Table 5

Average Percent[1] of Time Spent in Various Teaching Activities in Mathematics

Activity	Experimental Teachers		Active Control Teachers	
	Pre	Post	Pre	Post
Individual tutoring	48.6	45.0	17.5	20.6
Small group instruction	24.1	16.7	29.1	20.2
Large group instruction (less than entire class)	33.8	30.0	43.0	35.5
Entire class instruction	29.5	34.5	54.3	55.5

[1] average of percent of time spent by each teacher; does not sum to 100%

Table 6

CLASSROOM OBSERVATION DATA

Teacher Behavior

	Grade 1		Grade 2		Grade 3	
	Reading	Other	Reading	Other	Reading	Other
Number of separate observation times:	5	6	8	8	5	4
Number of observation minutes:	50	46	77	69	51	41
Behavior Categories	%	%	%	%	%	%
(1) Not Interacting	20	8	13	16	13	20
(2) Attending	13	13	14	14	14	10
(3) Praise	2	4	2	3	1	1
(4) Criticism	5	10	4	8	3	11
(5) Reward Stipulated	1	-	-	-	-	-
(6) Punishment Stipulated	-	-	-	-	-	-
(7) Subject Matter Inquiry	11	7	12	11	11	14
(8) Facilitating & Extending	-	-	1	-	-	1
(9) Solution & Direction Giving	47	51	54	45	56	44
(10) Other	-	6	-	2	1	-

Table 7

CLASSROOM OBSERVATION DATA

Student Behavior

	Grade 1		Grade 2		Grade 3	
	Reading	Other	Reading	Other	Reading	Other
Number of separate observation times:	7	5	7	6	6	5
Number of minutes of observation:	73	50	69	60	62	50
Behavior Categories	%	%	%	%	%	%
(1) Studying Alone	34	40	31	23	26	41
(2) Interacting with Peers	9	14	7	6	15	6
(3) Interacting with Teacher (Individual)	3	3	3	2	3	2
(4) Interacting with Teacher (Small Group)	5	-	10	1	1	4
(5) Interacting with Teacher (Large Group)	25	27	26	56	37	27
(6) Non-Productive--Unobtrusive	23	14	22	13	18	20
(7) Non-Productive--Obtrusive	-	1	1	-	-	-

It is noteworthy that the frequency of behaviors which may be classified as "pressuring students" was very low. At no time was there any indication that teachers were, in fact, utilizing undue pressures on students in an attempt to earn their own incentives.

Standardized Tests

Data from the pre- and post-experiment administrations of subscales from the Stanford Achievement Test Battery are presented in Tables 8 through 15. The Form W battery was given as the pretest and the Form X battery as the post-test. Third grade posttest results were collected from the California state-wide testing program, which occurred the week prior to posttesting; separate administrations to third graders as part of this experiment were deemed neither feasible or necessary. Tables 8 and 9 present summary statistics for all students who took the standardized achievement tests in the four participating schools. General inspection of these statistics reveals that in reading the students are generally performing at or slightly above the average grade equivalent as determined by the national norms of this test. In arithmetic, they are at or slightly below average. Gains (or losses) over the six week period of the experiment are mixed, and undoubtedly reflect the combined effects of the experimental treatment, the expected decline of test performance levels during the last month of school, the effects of the large amounts of testing during this period--which coincided with end of school evaluations, the California statewide testing program, and the criterion-referenced testing.

To further investigate the significance of some of the differences which seem to exist in Tables 8 and 9, six analyses of covariance were performed on the adjusted posttest scores for each grade level. Analysis of covariance is a statistical technique which utilizes the correlation between pre- and post-test scores to investigate the differences between posttest means with the effect of pretest differences removed. The technique was utilized in view of the fact that classrooms participating in the pilot study were not strictly randomly assigned to the experimental and control conditions. Of necessity, these analyses were performed only on those students who took both the pre- and posttest. Results of the analyses are presented in Tables 10 through 15. Significant differences were obtained on the Word Study Skills subtest at grade 1 and the Arithmetic subtest at grade 3. Inspection of the adjusted means for these situations reveals that the first grade reading differences

exist primarily between Santee/Seven Trees and Kennedy/Los Arboles; the arithmetic differences at grade 3 are greatest between Santee and Los Arboles. Duncan's simplified multiple range test revealed that the Santee scores were significantly ($p < .05$) greater than the scores of Seven Trees and Kennedy, which, in turn, were significantly ($p < .05$) greater than the Los Arboles scores.

The educational significance of these statistically significant findings will be discussed in the next chapter.

Table 8

Summary Statistics for SAT Word Study Skills Grade Equivalent Scores by School and Grade

Grade		Santee	Seven Trees	Kennedy	Los Arboles
1	N	71	53	90	40
	pre mean	1.66	1.78	1.84	1.48
	pre sd.	.44	.77	.53	.35
	N	70	53	89	43
	post mean	1.99	2.13	1.88	1.61
	post sd.	.85	.95	.64	.40
2	N	96	47	62	35
	pre mean	2.92	3.16	3.18	2.69
	pre sd.	1.27	1.61	1.86	1.41
	N	94	42	63	*
	post mean	3.23	3.06	3.11	
	post sd.	1.44	1.34	1.30	
3	N	86	31	61	39
	pre mean	3.96	4.49	4.33	3.66
	pre sd.	1.72	2.17	1.64	1.55
	N	86	49	57	34
	post mean	3.99	4.11	4.15	3.48
	post sd.	1.75	1.94	1.67	1.61

*Los Arboles 2nd grade teachers did not complete SAT word study skills posttests

Table 9

Summary Statistics for SAT Arithmetic Grade Equivalent Scores by School and Grade

Grade		Santee	Seven Trees	Kennedy	Los Arboles
1	N	46	45	84	40
	pre mean	1.81	1.82	1.82	1.57
	pre sd.	.46	.40	.35	.30
	N	67	48	85	43
	post mean	1.82	2.00	1.93	1.76
	post sd.	.65	.54	.36	.31
2	N	92	48	57	34
	pre mean	2.30	2.32	2.51	2.11
	pre sd.	.66	.59	.95	.70
	N	97	45	*	33
	pre mean	2.61	2.58		.61
	post sd.	.80	.65		.76
3	N	86	50	61	37
	pre mean	3.13	3.39	3.13	3.23
	pre sd.	1.01	1.13	.89	.89
	N	86	50	61	39
	pre mean	3.74	3.48	3.39	3.20
	post sd.	1.17	1.18	1.04	.89

*Kennedy 2nd grade teachers did not administer SAT math posttests

Table 10

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Word Study Skills, Grade 1

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	2.03	.06	
Seven Trees	2.05	.07	6.46*
Kennedy	1.75	.05	
Los Arboles	1.85	.08	

*p < .01 (3, 244 df)

Table 11

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Word Study Skills, Grade 2

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	3.29	.09	
Seven Trees	3.04	.14	1.98
Kennedy	3.04	.11	
Los Arboles[1]			

Table 12

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Word Study Skills, Grade 3

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	4.11	.13	
Seven Trees	4.29	.22	0.85
Kennedy	3.94	.16	
Los Arboles	3.89	.20	

[1]Los Arboles 2nd grade teachers did not complete SAT word study skills posttest

Table 13

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Arithmetic, Grade 1

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	1.95	.04	0.49
Seven Trees	1.92	.04	
Kennedy	1.90	.03	
Los Arboles	1.97	.05	

Table 14

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Arithmetic, Grade 2

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	2.55	.07	.15
Seven Trees	2.60	.09	
Kennedy[1]			
Los Arboles	2.59	.11	

Table 15

Adjusted Posttest Means and Summary of Analysis of Covariance
SAT Arithmetic, Grade 3

School	Adjusted Posttest Mean	Standard Error of Adjusted Mean	F
Santee	3.81	.07	10.32*
Seven Trees	3.32	.09	
Kennedy	3.45	.08	
Los Arboles	3.17	.11	

*$p < .001$ (3,229 df)

[1]Kennedy 2nd grade teachers did not administer SAT math posttests

Criterion-Referenced Tests

Reported here are the results of the pre- and post-experiment administrations of the AIR-constructed criterion-referenced tests, upon which the teacher incentives were based. The points earned on these tests related directly to student mastery of the reading and mathematics objectives which had been identified by participating teachers as those which they felt were most important. Points were earned on the basis of 2 for 100% mastery of an objective, 1 for partial mastery, and 0 for non-mastery. Since there were 49 reading objectives and 63 mathematics objectives, the maximum score for a student was 98 on reading and 126 on mathematics. Table 16 presents the results of these tests for experimental and active control schools by grade and class. Tables 17 through 19 present summary statistics on the same data by school and grade. These figures represent the performance of only those students who took both pre- and post-experimental tests; this accounts for differences in N's between reading and math and for some of the very small N's in some of the schools. For example, in Los Arboles, a large number of the students in the six participating classes had different teachers for reading. In fact, only 18 students had both reading and math tests in the second grade of that school.

With the exception of that one class, there is a definite trend for greater gains in the experimental and active control schools, where teachers had access to the objectives upon which the criterion-referenced tests were based. This is especially true in mathematics at the first and second grades and reading at the third grade. There is also a clearly discernable trend in favor of the classes at the third grade and somewhat at the second grade where incentives were preoffered to pupils and teachers.

Table 20 depicts the results of the teacher incentive agreements which were negotiated with the experimental teachers. Each teacher could gain a possible $60 in math and $120 in reading good toward credits for the purchase of classroom materials for the 1971-72 school year. It is obvious that in math, the agreements were considerably under-negotiated; point gains were generally three to four times what had been predicted by the teachers. In reading, however, gains were not as pronounced. This seemed to reflect a general finding that smaller gains were made on the reading test and probably relates more to the nature of that test than to the nature of reading instruction in the participating classes. It will be noted that two classes just failed to reach the performance required in reading for full incentive credit.

Table 16

Criterion-Referenced Test Results by Classroom, Grade, and School

School	Grade	Classroom	Math				Reading			
			N	pre	post	ave. gain	N	pre	post	ave. gain
Santee (experimental)	1	1	19	518	772	13.37	25	578	727	5.96
		2	26	1308	1971	25.50	20	411	508	4.85
		3	19	428	674	12.95	19	251	305	2.84
		4	24	661	915	10.58	24	326	409	3.46
	2	1	27	1640	2384	27.56	24	1255	1467	8.83
		2	26	1684	2516	32.00	26	1341	1638	11.42
		3	27	1260	2031	28.56	25	1130	1330	8.00
		4	25	1161	1890	29.16	24	1143	1413	11.33
	3	1	23	1989	2622	27.52	23	1666	1982	13.74
		2	18	1558	1811	14.06	21	1512	1811	14.24
		3	22	2019	2383	16.55	6	311	386	12.50
		4	13	1032	1365	25.62	19	1477	1699	11.68
Kennedy (active control)	1	1	37	1096	1858	20.59	23	460	549	3.87
		2					18	306	443	7.61
		3	45	1803	2777	21.64	18	330	402	4.00
		4					22	382	531	6.77
	2	1	15	626	829	13.53	24	714	885	7.13
		2	22	1445	1865	19.09	21	592	750	7.52
		3	26	1401	1733	12.77	16	452	505	3.31
	3	1	24	2250	2498	10.33	17	1179	1346	9.82
		2	28	2315	2637	11.50	15	1065	1163	6.53
		3	14	953	1077	8.86	12	809	1005	16.33
Seven Trees (active control)	1	1	14	600	700	7.14	17	310	394	4.94
		2	20	407	993	29.30	17	353	419	3.88
	2	1	16	841	1318	29.81	13	363	404	3.15
		2	14	834	1186	25.14	18	974	1106	7.33
	3	1	19	1648	1793	7.63	14	947	992	3.21
		2	12	1103	1133	2.50	20	1558	1684	6.30
Los Arboles (control)	1	1	17	491	673	10.71	23	314	445	5.70
		2	18	474	573	5.50	7	110	172	8.86
	2	1	14	809	983	12.43	18	560	1004	24.67
		2	17	839	895	3.29				
	3	1	17	1250	1422	10.12	22	1431	1438	.32
		2	21	1737	1946	9.95	10	675	641	

Table 17

Average Gain on Criterion-Referenced Tests
Grade 1

School	Math			Reading		
	Total Gain	N	Average Gain	Total Gain	N	Average Gain
Santee	1417	88	16.18	383	88	4.35
Kennedy	1709	82	20.84	447	82	5.45
Seven Trees	686	34	20.18	150	34	4.41
Los Arboles	281	35	8.03	193	30	6.43

Table 18

Average Gain on Criterion-Referenced Tests
Grade 2

School	Math			Reading		
	Total Gain	N	Average Gain	Total Gain	N	Average Gain
Santee	3076	105	29.30	981	99	9.91
Kennedy	955	63	15.16	382	61	6.26
Seven Trees	829	30	27.63	173	31	5.58
Los Arboles	320	31	7.42	444	18	24.67

Table 19

Average Gain on Criterion-Referenced Tests
Grade 3

School	Math			Reading		
	Total Gain	N	Average Gain	Total Gain	N	Average Gain
Santee	1613	76	21.22	912	69	13.22
Kennedy	694	66	10.51	461	44	10.48
Seven Trees	175	31	5.64	171	34	5.03
Los Arboles	381	38	10.26	-27	32	0

Table 20

Teacher Incentives

Grade	Teacher	Math[1] Goal	Math Gain	Result	Reading[1] Goal	Reading Gain	Result
1	01	57	254	Full	89	149	Full
	02	156	663	Full	65	97	Full
	03	224	246	Full	67	54	1/2
	04	72	254	Full	96	83	1/2
2	05	174	744	Full	80	212	Full
	06	268	832	Full	212	297	Full
	07	108	771	Full	90	200	Full
	08	92	729	Full	81	272	Full
3	09	153	633	Full	129	316	Full
	10	118	253	Full	66	299	Full
	11	170	364	Full	50	75	Full
	12	37	333	Full	81	222	Full

[1]prorated to reflect the point total for the number of students who actually received both pre- and posttests

These teachers each received $60 credit in reading. Considerably more refinement is needed in the objectives-based procedures for stating teacher objectives such that they are challenging and easily understood. However, it is felt that these methods bear considerably more promise than other currently-used methods which are based predominantly on gains in standardized test scores, especially in view of the teacher and student reactions to the latter.

DISCUSSION

The most urgent need in reflecting upon the present study is to point out the potential dangers in overgeneralizing from the actual statistical results. It must be pointed put again that the study was run under somewhat unfavorable conditions, in that adequate planning time was not available and in view of the proximity of the compressed study to the end of the school year. The educational procedures utilized broke new ground, especially in the measurement area; the criterion-referenced tests were untried. The basic purpose of the pilot study was to try out and refine the methods for stating objectives, constructing measurement procedures, processing large amounts of interim and final outcome data, and implementing the student, teacher, and parent incentive models. It is encouraging that the obtained results, over a short six-week treatment period, both in terms of participant reactions and in terms of statistical findings, were generally supportive of the initial research hypothesis regarding the effectiveness of objectives-based incentive techniques in promoting student learning in the basic skill areas of primary-level reading and mathematics. In a sense, however, the pilot study had achieved its major objectives before the data were analyzed.

The diagnostic benefits to teachers have already been pointed out. However, one other major benefit which now accrues to the Franklin-McKinley District is the opportunity to refine and adopt the basic accountability model represented by these measurement procedures. Much of the current press toward school accountability is dependent on the development of procedures for identifying well-accepted student performance objectives for the educational process and techniques for measuring their attainment. For example, the finding that 87% of the students in a third grade class in Santee school can read with comprehension on a set of simple directions would seem to convey considerably more meaning to parents than the finding that the mean reading grade equivalent score for that class is 2.9. Similar statements could be generated for each of the 63 math and 49 reading

objectives identified in this study, and aggregates of reporting could be as small as the individual student or as large as the entire district. The statistical and non-statistical results of this study strongly support the potential of this model.

Considerably more research analysis of the data could be performed. For example, research hypotheses as to the differential effects of the three different treatments, the effects on Spanish-speaking children, or the actual achievement effects of the parent incentive model, could be investigated. Although the data now reside on a computer tape suitable for such analyses, it is felt that such research questions are beyond the scope of the current pilot study. Moreover, further analysis could only be suggestive, due to the less than optimal conditions under which data were collected.

Appendices C and D contain suggestions from participating teachers and the principal of the experimental school for improving upon procedures which were implemented during the pilot study. To these may be added several others. First, the problem of maintaining communication channels and passing along instructions in an orderly manner cannot be overestimated. Those who would attempt to replicate or enlarge upon the models represented here are urged to insure that all messages are complete, unambiguous, and <u>widely</u> distributed, including distribution <u>within</u> the research staff. The old adage of "tell them what you are going to tell them, tell them, then tell them what you told them" is appropriate. It is imperative that a full-time person be continually on hand to check on the understandings and correct the misconceptions of participants. Most of the problems encountered by the research staff could be directly traced either to the lack of adequate planning time or to the naive assumption that difficult-to-grasp concepts could be communicated in a brief memo or hallway conversation.

This implies that a specific staff development component, complete with objectives and evaluation criteria, should be included in future larger scale projects. Especially worthwhile would be pre-experimental workshops for teachers and administrators on stating behavioral objectives, testing and other evaluation procedures, reinforcement theory, parent involvement, etc. The fewer decisions that have to be made on-line in a crisis situation, the better.

Incentive concepts are becoming more and more widely accepted in education. The U. S. Office of Education will be spending over half a million dollars within the next year to further refine the incentive models first tried out in this pilot study. It is hoped that this report, with its appendices, will help point the way.

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APPENDIX A

PROJECT DOCUMENTS

RESPONSIBILITIES AND PAY-OFFS

Whenever anyone gets involved in a project, he knows he will have to do something and he expects that there will be some pay-off for his efforts. In this project some of the pay-offs are extrinsic such as the dinner here tonight; some are intrinsic such as the chance to meet and hear nationally recognized personages as Dan Meyerson here tonight and Robert Mager who will speak next week on the topic of instructional objectives. In a project such as this where all activities are clearly directed toward helping students acquire basic reading and mathematical skills, it is difficult indeed to separate responsibilities of participants from the pay-offs because the best pay-off of all is the real gain in student achievement.

I want to tell you how Steve and I approach our responsibilities in order to convey how we view your participation in this project. WE WORK VERY HARD AT AVOIDING ANYTHING THAT IS A GRIND. Stated positively, we find the project extremely fascinating and we will work at keeping it that way. We have been very pleased to work with Dr. McClanahan, Mr. Gist, Mr. Jorgenson, and Mr. Rice who obviously share this point of view.

The following are the activities that will involve some of the teachers in this project:

(1) Some of you will be asked to select goals in reading and mathematics that you want your students to achieve over the two months following March 15.

(a) Dr. Mager will conduct a short workshop for you on identifying and selecting "behavioral" objectives--i.e., measurable indicators of the above goals.

(b) Substitute teachers will be provided to allow you time to complete this activity. Steve or I or Mac will work with you.

(2) Diagnostic reading and mathematics tests will be provided for you to give to your students next week. Those tests will indicate the current needs of your students and thus help you to decide what objectives would be appropriate for each individual.

(3) Some of you might be asked to meet with parents to get them involved in helping their children achieve these objectives.

(4) Some of you would set up certain rewards as incentives for students who achieve their objectives. We would, of course, meet with you beforehand to help you select the kinds of rewards that would work best in your classroom situation.

(5) Some of you will be asked, yourselves, to participate in an arrangement in which you would be given some form of extrinsic reward based on the amount of your students' achievement progress.

(6) Since this project is a pilot study to prepare for a large study next fall, we want to learn all we can about what happens.

(a) We will be developing and testing forms to be used by observers who will record events in your classrooms. In the beginning we would ask some of you to allow observers to come into your classrooms to check their reliability of observation. Later the observers would spend a certain amount of time in each classroom to tally the frequency various activities in the classroom.

(b) We will want to learn your candid reactions to all aspects of the project.

(1) We will sit down with some of you to get your first hand reports.

(2) We will give questionnaires to all participants for their comments.

(7) Obviously at the end of the project we all will want to know how

well the students did. We would ask you to give or to permit someone to come to your classroom to give post-tests to the students.

(8) We would want to interview a few randomly selected students to find out their reaction's to the project. Students would also be asked to repond to questionnaires.

NOT ALL OF YOU WOULD BE ASKED TO DO ALL OF THESE THINGS. A key factor in this experiment is the mutual planning of the various steps such that you will participate in the final decision about what objectives will be selected, what incentives will be provided, and what order of gains will be required in order to earn the incentives.

south san jose-edenvale

SUN

A-2

Vol. 7 No. 9 696 Kings Row, San Jose, Calif. 95112 Wednesday, March 3, 1971

Funding sought

Plan to improve reading, math with incentives in F-M district

Plans are now being made for three Franklin-McKinley district schools to participate in a federally funded pilot project using "incentive" to improve basic skills in reading and mathematics.

The project will be attempted through the rest of the school year, should funding be approved, at Kennedy, Santee and Seven Trees eleme[illegible]ary schools.

Out[illegible]ing the project briefly to [t]eachers at a dinner meeting last week were Steven M. Jung and Dewey Lipe of the American Institutes for Research, (AIR) who designed the project.

Jung said funding was 99 per cent assured.

The project's aim is to increase the reading and mathematics abilities of low-achieving and disadvantaged youngsters through the use of incentives. Although the incentives are not definitely decided, examples are field trips or special activities for the whole class.

Performance objectives and goals for the children to reach will be designed by the teachers. They also shall decide what the incentives to be used will be.

Parents will also be involved in the project.

The project is designed to include the whole class and not single out the children upon whom the reward is dependent.

Different objectives will be worked out for each child, but the total class reward will be dependent upon the success of the children identified as low-achievers.

Teachers will set the objectives for the low-achievers on the basis of what they think the child is capable of doing.

The project is a pilot to remove the "operational bugs" of the idea. It is then hoped it will be instituted on a large scale basis in several urban areas next year.

Teachers will meet with Dr. Robert Mager this week to learn to define good behavioral objectives.

Also speaking at the meeting last week was Russ Meyerson, principal of Slater school in Mountain View.

Meyerson explained that an incentive, such as a field trip, "sharply focuses a child's behavior on what's to be accomplished."

He noted no person "does anything unless there's a payoff."

Dewey Lipe noted teachers will not only set the objectives and goals, but will also help in developing testing forms, and create parent involvement. In addition, he said, observers will visit the classrooms from time to time to see how the project is working, and AIR will administer pre-and post-tests of the children to see if they attained the objectives and will interview some students about the project.

It is as yet undecided which schools will use the incentives and which will be the "control" school.

...ffecting schools too

$5,351, ($5,057); Berryessa, 5,461, $7,042, ($6,638); Franklin-McKinley, 6,145, $11,412, ($11,207); Oak Grove, [illegible],209, $11,668, ($11,751); East Side hig[h] 12,293, $30,332, ($2[illegible],690).

Current costs of educating one child are up too. The 1969-70 costs for these dis[-]tricts were: Orchard, $800; Evergreen $604; Mt. Plea[-] [illegible]

School tax rates on all levels—elementary, high school and junior college—rose this year also. Total tax rates, including all three levels of education, were: $8.148 for Alum Rock; $7.708, Berry[essa]; $7.021, Evergreen; $7.462, Franklin-McKinley; $7.485, Mt. Pleasant; $7.2[illegible] Oak Grove; and $4.618 in Orchard.

school district and the San Jose Community college rates both rose. The vast difference between Orchard's rate and the others is due primarily to the different characteristics of that district. It has a very small number of students in comparison to the others.

And, it has more industry, Orchard to offer an educational program at less cost to the taxpayers. Because there are so few children, there's much more behind each child.

For example, if Alum Rock had only 300 youngsters in the entire district—with an assessed valuation of $91 million, there would be

4/13/71

Dear Parent:

During the last six weeks of school, the first, second, and third graders in Santee will be given the opportunity to earn prizes if they do well in their reading and mathematics classes. This is how it will work. Each class will select the reward that it wants to work for. Students might select a trip to a cheese factory or to the airport or someplace else that they all want to go. Or, the students might select something for their classroom, like books or games. The students in each class, as a group, will be working to earn something that is exciting to them, something they chose for themselves.

Each student will be assigned by his or her teacher certain educational objectives appropriate to his needs. These objectives must be achieved in order for the class to earn the reward they have selected. If 85% of the students reach their objectives, then the class as a whole will be able to earn its reward.

The objectives will relate to specific skills in reading and mathematics. All of the students have just completed reading and mathematics tests to find out which skills each student has already learned. Now, each student will be assigned only those objectives that he has not yet learned but which he can and should learn this school year. No student will be assigned any objectives that are too difficult or too advanced for him.

Here are a few examples of objectives:

(1) Count by steps to 100.

(2) Identify a penny, a nickel, and a dime, and tell the value of each.

(3) Add two 2-digit numerals.

(4) Record the temperature shown on a Fahrenheit thermometer.

(5) Add like fractions with denominators of 2, 3, 4, 5, 6, or 8 where both the addends and the sum are proper fractions.

(6) Identify the correct order of the letters of the alphabet.

(7) Recognize synonyms.

(8) Use descriptive words to create word pictures.

There are over 100 objectives, but only those few particular objectives that are most appropriate for any individual child will be selected from the list and given to the child as a learning goal.

The rewards will be given about every two weeks. Near the end of the school year there will be a larger reward for those classes that earn it. The large reward will be a trip to San Francisco or something similar. Of course, your permission will be secured before all field trips.

You may wonder why all of this is being done. Santee is participating in a government-sponsored research study of the use of incentives or rewards in education. We believe that these incentives or rewards will help make school a more exciting place for students and that the money spent on providing the rewards will be more than justified by a resulting increase in achievement.

Sincerely,

South San Jose SUN
June 9, 1971, p. 13

Incentive programs

Hamburger and coke may help Johnny learn

By JAN HILLE
Staff Writer

Twelve classes of first through third grade youngsters at Santee school are "working harder" these days, according to their teachers.

"Incentives have made them more enthusiastic," explains Miss Margaret Kulzer, third grade teacher.

The incentives of which she speaks are varied—for many of the youngsters last week this included a field trip to the San Jose Zoo or the beach.

The youngsters, their teachers and parents are part of an American Institutes for Research (AIR) project designed to discover whether incentives instill a greater desire to study and learn.

Two other schools, Kennedy and Seven Trees, are also involved as controls in the project. Similar goals are developed, but the children are not offered similar incentives.

The project is federally funded and appears to be going smoothly.

Before the project officially began (about the third week in March) teachers at all three schools pre-tested their students with the Stanford achievement test and a criterion reference test. From these two tests, behavioral objectives were developed.

These objectives contain specific goals for each child—the particular concepts he needs to understand to perform well when post tests are administered.

Only two academic areas are actually being stressed in this project, reading and math, but Santee teachers report they've begun using incentives such as praise and in-class opportunities to encourage success in other subjects too.

Miss Kulzer, for example, held conferences with each child to reach mutual determination on the area in which each student needed improvement, whether it be in behavior or in class work.

She's found the students have developed better study habits in the short time the project has been underway and have also shown more interest in their work. "They even come in at noon to do extra work," she noted.

Miss Shelley Canter, an AIR employe who directs the project at Santee, noted the children "are being rewarded for good performances, not punished for bad."

The first incentive period has just ended, he said, and in order to give the children a smooth beginning, less difficult objectives were chosen to be mastered. "We wanted all of them to experience success."

Receipt of an incentive, whether it be the major field trips, or other minor gifts, will be dependent on at least 85 per cent of the youngsters mastering objectives. It is also hoped that youngsters who learn more quickly will help those having trouble.

From the beginning of the project, the remainder of the school year was divided into four incentive periods, two each for reading and math. At the end of each incentive period, a test, developed by thie teacher, will be administered to make sure the youngsters understand what they've been taught. Then, incentives will be awarded.

Last Monday, the youngsters in Jeanne Meadows second grade class had just been awarded softballs and yo-yo's for passing their tests in reading comprehension.

In order to help parents understand the project, incentives are also offered to them for participation through praise and special treats for their youngsters.

AMERICAN INSTITUTES FOR RESEARCH

Center for Research and Evaluation
in the Applications of Technology in Education

PROCEDURES FOR STATING

EDUCATIONAL OBJECTIVES

Incentives Pilot Study
General Document #2
3/21/71

◇ CREATE ☐ P.O. BOX 1113. PALO ALTO, CALIFORNIA 94302 (LOCATION: 1791 ARASTRADERO ROAD) ☐ TEL. (415) 328-3550
CABLE ADDRESS: AIRESEARCH/PALO ALTO

PROCEDURES FOR STATING EDUCATIONAL OBJECTIVES

eneral Guidelines

I. Administrative Procedures

A. A set of objectives in reading and mathematics should be constructed in each of the three participating schools.

B. The objectives at each level should be constructed by a team, consisting of all teachers at that level in each school.

C. This task should be completed by Monday, March 22, according to the specific guidelines outlined later in this document. A member of the R project staff will be available at all times to offer assistance, as requested by the teams and principals.

D. One representative from each grade level for each school should be selected by their team to meet with the other two representatives of that grade level to compile an overall list of objectives for each grade.

E. Each teacher should plan to identify those objectives (from among the set constructed by her team) which seem appropriate for 85% of the students in her reading and mathematics groups to have mastered by the end of this school year.

F. Teachers will be reimbursed for these efforts through funds provided by the project grant.

II. Basic Assumptions

A. In constructing objectives appropriate to students in a given grade level, teams should assume that students will enter having mastered what they feel to be the basic content of the grade level immediately below. Where necessary in stating their objectives, team members should state these minimum entry levels explicitly.

B. Approximately 30 to 40 objectives should be constructed per grade level per subject area.

C. Where possible, objectives should be selected from among those provided in General Document #1, Comprehensive Objectives List, for which evaluation items already exist. The objectives in this list may be modified or added to as desired. Each team will receive four sets of this document.

Specific Guidelines

The Specificity of Objectives. Specificity refers to the predicted amount of time required for students to achieve an objective. Some students naturally complete a given objective faster than others. Nevertheless, we can expect the majority of students to have achieved any particular objective within a range of time. The range might be from 30 minutes to 30 school days depending upon the specificity of the objective.

This project is not concerned with what might be called micro-objectives, i.e., objectives that could be achieved in a few seconds or a few minutes. Being able to spell the word "elephant" correctly or to add "six plus four" is too specific to qualify for an outcome of interest in this project. Since the project will run for about eight weeks, the outside limits of specificity are predetermined for us. Yet eight weeks is a long time for a student to work for a given award. That reward would probably have to be very strong in order to motivate the student to work at a difficult learning task for that long.

The level of specificity that seems most appropriate for the objectives of this project ranges from about one day's to one week's work. In other words, select objectives which would require from one day to one week for the "typical" student in your class to master. Objectives in the Comprehensive Objectives List are, in fact, designed with about that range in mind.

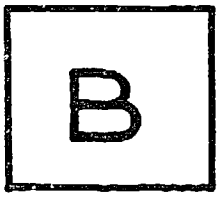
Some Examples of Appropriate Objectives. Appropriate objectives are the ones that state observable learning outcomes that you want your students to attain. They state what the learner will be able to do, including the standard by which acceptable performance will be determined, rather than the classroom activity by which he will be taught. They whould also describe the conditions under which the student will be required to demonstrate what is expected of him.

A reading objective at the readiness level might state:

> Given the alphabet, name both upper and lower case forms of any five given letters.

When the student achieves this objective he will be able to answer the following item correctly.

SAY: "Look at the letter in the box." (You may point to the capital letter.) "Now put your finger on the lower case letter that has the same name as the capital letter in the box."



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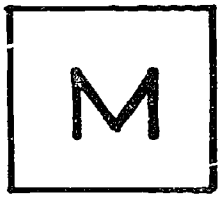

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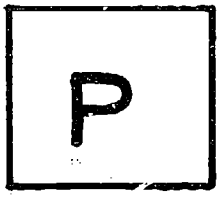

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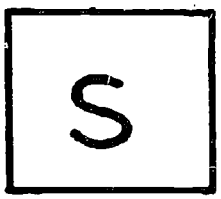


t s z

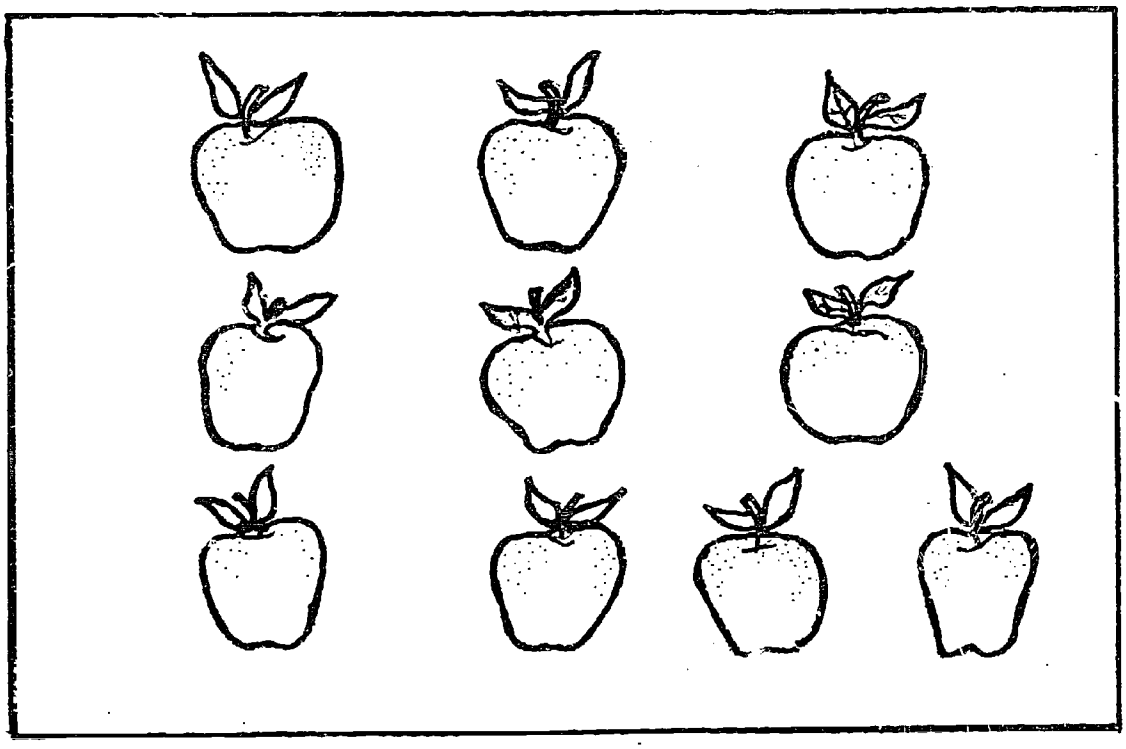
w m u

A mathematics objective might state:

> Given a number of objects (no more than 10) tell how many there are.

When the student has achieved this objective he will be able to answer the following item.

SAY: "Look at the apples in the square. How many apples are there?" (Do not ask him to count them.)



Thus, an objective defines the learning tools for your students, the behaviors they will need to perform in order to demonstrate achievement of one of your "educational intents." When you have stated an objective properly, defined your own instructional task. The better the objectives, the more efficient and probably the more effective will be your teaching. You may already have read Robert F. Mager's book, Preparing Instructional Objectives. If you have not, you will find it extremely helpful, even indispensable. You'll be surprised how quickly it can be read.

AMERICAN INSTITUTES FOR RESEARCH

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COMPREHENSIVE OBJECTIVES LIST

READING AND MATHEMATICS

PRIMARY LEVELS

Incentives Pilot Study
General Document #1
3/10/71

LANGUAGE ARTS

Primary

READINESS

0031 RECOGNIZE DIFFERENCES BETWEEN SOUNDS. (II)

- 0032 Identify loud and soft sounds. (I)
- 0037 Identify human and non-human sounds. (I)
- 0275 Recognize and respond to a variety of rhythms by clapping your hands, clicking your tongue, skipping, hopping, etc., on the beat of the rhythm. (II)
- 0343 After you hear a dictated word, pronounce another word which rhymes with it. (I)

0038 RECOGNIZE DIFFERENCES BETWEEN VISUAL STIMULI. (II)

- 0340 Recognize the colors red, blue, green, brown, yellow, orange, purple, and black and call them by name. (II)
- 0287 Given the pattern of your name or a single shape, make a complete recognizable copy. (III)
- *0285 Given an incomplete outline of a picture or letter, complete the outline, using a finger, crayon, or pencil. (II)
- 0286 Given a repeating pattern of items, complete the last pattern by supplying the missing item or items. (II)

0039 FOLLOW DIRECTIONS. (I)

- 0289 Follow a one step oral direction. (I)
- 0041 Follow written directions indicated by the words: color, [illegible]e, draw, circle, and underline. (I)

0042 FOLLOW A LEFT-TO-RIGHT SEQUENCE. (I)

- 0277 Given a continuous dotted line moving from left to right and top to bottom, follow it with your pencil or finger. (I)
- 0284 Given a series of pictures, follow the left-to-right sequence with your eyes and/or finger, telling about each picture. (I)
- 0295 Given a series of pictures in two or more lines, follow the progression from the end of the top line to the left side of the next line, telling about each picture in sequence. (I)

0043 CLASSIFY OBJECTS ACCORDING TO SIZE, SHAPE, AND NUMBER. (II)

- 0278 Given an illustration, name at least five objects in the picture. (I)

LANGUAGE ARTS

Primary

*0288 Given concrete objects, pictures of objects, or letters, match the like objects or pictures (alike by color, size, shape, position, texture, details) by manipulating or by marking them. (I)

0342 Given sets of objects, classify those objects which belong together. (II)

0290 Given a set of concrete objects, pictures of objects, or letters, identify the one object or picture which is different (in size, shape, etc.) by isolating it or marking it. (I)

0044 RECALL INFORMATION. (I)

*0291 Given the alphabet, name both upper and lower case forms of any five given letters. (I)

0398 Given an illustration, name and describe any action in the picture. (I)

0341 Given an experience in which the child has participated, he can retell this experience. (I)

*0378 Answer questions about details in a given oral passage. (I)

*0348 After listening to a story, tell what happened in the beginning, middle, and end of the story. (I)

0050 PRESENT IDEAS ORALLY. (III)

0082 Express basic needs. (II)

0083 Describe in your own words how two objects or pictures differ. (II)

0084 Describe in your own words the probable reactions of persons in pictures and stories. (II)

0085 Perform a chosen role in a given dramatic play. (III)

LANGUAGE ARTS

Primary

READING SKILLS

0099 RECOGNIZE DIFFERENCES BETWEEN SOUNDS. (II)

- 0301 Given a group of four or five pictures, recognize pictures of the objects whose names rhyme. (II)
- 1173 Recognize words that rhyme. (II)
- 1174 Recognize homonyms. (II)

0100 RECOGNIZE DIFFERENCES BETWEEN VISUAL SYMBOLS. (II)

- *0288 Given concrete objects, pictures of objects, or letters, match the like objects or pictures (alike by color, size, shape, position, texture, details) by manipulating or by marking them. (letter only) (I)
- 0274 Match like letters or words on the basis of shape. (I)
- 0101 Classify pictures, objects or letters on the basis of size, shape, and position. (II)
- 0816 Use descriptive words to create word pictures. (II)

0102 RELATE SOUNDS TO WRITTEN SYMBOLS. (II)

- 0429 Match a given sound with its written symbol. (I)
- 0103 Construct new words by combining sounds. (II)
- 0434 Recognize the written form of a given word. (II)

LANGUAGE ARTS

Primary

0360 Spell given words correctly. (I)

1170 Recognize the consonants and their different pronunciations. (II)

1171 Recognize the vowels and their different pronunciations. (II)

0104 Recognize how sound relates to syllable division in compound words or other two syllable words. (II)

*0822 Read new words by applying spelling pattern analysis. (II)

0105 RECOGNIZE AND USE LETTERS OF THE ALPHABET. (II)

*0285 Given an incomplete outline of a picture or letter, finish the outline using a finger, crayon, or pencil. (I)

0106 Identify upper and lower case letters by name. (I)

*0291 Given the alphabet, name both upper and lower case forms of any five given letters. (I)

0303 Copy upper and lower case letters from a model. (I)

0323 Match the upper and lower case forms of the letters of the alphabet. (I)

0081 Copy your own first name without using a model. (I)

0771 Reproduce from memory all 26 letters of the alphabet in order. (I)

1172 Identify the correct order of the letters of the alphabet. (I)

0772 Given a list of words, order the words alphabetically according to the first letter of the word. (II)

1642 Given a list of words in which the first two letters are the same, order the words alphabetically. (II)

0811 Locate telephone numbers in a directory. (I)

0107 APPLY TECHNIQUES FOR READING NEW WORDS INDEPENDENTLY. (III)

*0822 Read new words by applying spelling pattern analysis. (III)

0823 Apply the analysis of word structure in reading new words (suffixes, compound words, contractions, and plural and possessive forms). (III)

LANGUAGE ARTS

Primary

0832 Apply contextual analysis to reading new words. (III)

0108 CONSTRUCT A BASIC SIGHT VOCABULARY. (II)

0834 Identify the meaning or meanings of a given word. (I)

0466 Recognize synonyms. (II)

0467 Recognize antonyms. (II)

0380 Recognize the correct homonym from a given pair to complete a sentence. (Homonyms must be within the reading vocabulary of the child.) (II)

0815 Recognize words that describe action, size, color, shape. (II)

0828 Recognize given structures of grammatical significance, i.e., endings, prefixes, etc. (II)

1646 Recognize descriptive words or phrases in a reading selection. (II)

0109 READ ORALLY. (II)

0436 Recognize given word forms and sentence structure patterns. (II)

0464 Read a given passage orally, using correct voice intonation, inflection, and phrasing. (II)

0110 READ AND FOLLOW DIRECTIONS. (II)

0469 Follow written directions. (I)

0111 SUMMARIZE STORIES AND INFORMATIVE MATERIAL. (II)

*0457 After reading a given passage, describe the sequence of events. (II)

*0361 After listening to a short story, identify the proper sequence of a series of four to five pictures related to the story. (I)

*0348 After listening to a story, tell what happened in the beginning, middle and end of the story. (I)

0112 READ WITH 75% TO 90% COMPREHENSION. (II)

0455 After reading a given passage, recognize the main idea. (II)

LANGUAGE ARTS

Primary

0430 After reading a given passage, recognize details. (II)

0417 Recognize the repetitive portions of a given story. (II)

0113 Select the best title for a story from a given list. (I)

*0457 After reading a given passage, describe the sequence of events. (II)

*0803 Recognize the adjective which best describes a given character. (II)

*0802 Present an oral report about a story character, identifying the story, the character, and describing him briefly. (III)

*0801 Tell a story about something you have seen, heard, or read. (I)

*0807 Write descriptive words in phrases and sentences. (II)

0809 Recognize word pictures in a given poem. (II)

*1168 Recognize facts in an informational reading passage. (II)

0114 Locate a passage which answers a question or contains a specified thought. (I)

*1644 After reading a story, present a short oral report based on the main idea, the characterization, and/or events in the story. (III)

0115 INTERPRET IDEAS PRESENTED BY PICTURE AND CONTEXTUAL CLUES. (II)

*0404 Given a story containing real-life and make-believe elements, suggest which elements are real and which are make-believe. (II)

1179 Draw conclusions from information given in a reading passage. (II)

0824 Recognize cause-effect relationships in a given reading passage. (II)

0474 Read a given passage and make inferences based on details. (IV)

*1168 Recognize facts in an informational reading passage. (II)

1175 Classify information contained in a reading passage. (II)

1176 Suggest the ending to a reading passage. (II)

0116 APPLY READING TO PERSONAL EXPERIENCE. (III)

1169 After reading a given passage, describe how it relates to personal experience. (II)

LANGUAGE ARTS

Primary

*1180 After reading a book, prepare and present a report including the title, the author, and the part or parts enjoyed. (II)

0117 RECOGNIZE FACT AND FANTASY IN LITERATURE. (II)

0328 Recognize an animal who behaves in a way peculiar to animal life. (II)

*0404 Given a story containing real-life and make-believe elements, suggest which elements are real and which are make-believe. (II)

0335 Identify the components of a fairy tale. (I)

0800 After listening to or reading a story, explain whether it is true or make-believe. (II)

1740 CLASSIFY STORIES YOU HAVE READ AS FOLK TALES, BIOGRAPHIES, FICTIONAL STORIES, ADVENTURE STORIES, MYTHS, FABLES OR FACTUAL STORIES. (II)

1736 Tell what makes a story a folk tale. (I)

1737 Identify the words or phrases in a folk tale that tell if a character is good or if he is evil. (I)

1738 Describe in what ways the main character in a folk tale changes. (II)

1704 Tell the difference between a biography and a fictional story. (I)

1705 Identify the personal characteristics of a given biographical character that made him/her a person to be remembered. (I)

1706 Identify the important contributions of a person about whom a given biography is written. (I)

1664 Identify the words or phrases that create the excitement in a given adventure story. (I)

1665 Identify the climax of a given adventure story. (I)

1727 Identify the superhuman qualities of the hero in a myth you have read. (I)

1728 Tell the difference between a myth and a fable. (I)

1729 Tell what lesson was taught in a fable you have read. (I)

1768 Tell whether a given reading selection is factual or fictional. (I)

LANGUAGE ARTS

Primary

1741 RECOGNIZE QUALITIES OF HUMANS AND ANIMALS IN STORIES WHICH YOU HAVE OBSERVED IN REAL LIFE. (II)

1707 Identify those qualities that the animal in a story exhibits which are like humans and those which are unlike humans. (I)

1762 Identify the similarities between the characters in a book you have read and their counterparts in American life. (I)

1763 After reading a story, identify the differences between people in the story and their counterparts in American life. (I)

1666 Identify the heroic qualities of the main character in an adventure story you have read. (I)

MATHEMATICS

Primary

Objectives in primary mathematics require achievement in the following areas: 1) addition of 4-digit numbers, 2) subtraction of 4-digit numbers, 3) multiplication of 3-digit numbers by 1-digit numbers and division with 1-digit divisors, 4) use of set notation, 5) writing number sentences, 6) recognition of geometric figures and circles, 7) use of time concepts to the minute, 8) application of knowledge of the value of coins, 9) use of linear measure to 1/4 inch, and 10) recognition of temperature readings.

MATHEMATICS

Primary

0127 RELATE NUMERALS TO OBJECTS AND WORDS. (II)

- 0054 Given a group of no more than 10 objects, count the objects. (II)
- 0055 Given groups of objects that contain no more than 10 objects, organize the groups from the largest to the smallest and from the smallest to the largest. (II)
- 0056 Recognize the numeral that represents a given set of 0 to 10 objects. (II)
- 0059 Given a point on a number line, write the corresponding number from 0 to 10 for the point. (II)
- 0067 Recognize the relationship between counting numbers and counting objects by counting steps on the number line. (II)
- 0065 Count objects from 0 to 100 orally. (II)
- 0068 Count orally by steps to 100. (II)
- 0057 Write the numeral for a given set of 0 to 10 objects. (II)
- 0058 Match the word forms of the numbers 0 to 10 with the correct numerals. (I)
- 0066 List the numbers from 0 to 100 in sequence. (I)
- 1047 List the even numbers from 2 through 100. (I)
- 1048 List the odd numbers from 1 through 99. (I)

0125 RECOGNIZE PLACE VALUE TO 9999. (II)

- 0064 Recognize the number of tens and the number of ones in a given 2-digit number. (II)
- 1041 Recognize the ones, tens, and hundreds places in a 3-digit numeral. (II)
- 1531 Tell the value of each digit in a 4-digit number. (I)
- 1532 Rewrite a number with no more than 4 digits using expanded notation. (II)
- 1533 Rewrite 3-digit numbers rounding off to the nearest ten or hundred. (II)

0126 REWRITE ARABIC NUMERALS, 1 THROUGH 39, AS ROMAN NUMERALS AND ROMAN NUMERALS, I THROUGH XXXIX, AS ARABIC NUMERALS. (I)

- 0199 Explain how to write Roman numerals by combining several symbols. (II)

MATHEMATICS

Primary

0200 Recognize Roman numerals I–XXXIX. (II)

1651 Match Arabic numerals 1, 5, 10, to Roman numerals I, V, X. (II)

0128 ADD 4-DIGIT NUMBERS. (II)

0077 Using a picture of two sets of objects or a number line, add two numbers where the sum is 10 or less. (II)

0060 Add two 1-digit numbers vertically and/or horizontally where the sum is 10 or less. (II)

1034 Add numerals horizontally and/or vertically where the sum is not greater than 18. (II)

*0129 Solve word problems in which two 1-digit numbers are added and the sum is ten or less. (III)

0070 Add two 1-digit numbers. (II)

0157 Solve word problems in which two 1-digit numbers are added. (III)

1045 Add two 2-digit numerals with regrouping. (II)

1039 Add two 2-digit numerals without regrouping. (II)

1583 Add two 2-digit numerals by using expanded notation. (II)

1584 Add two 3-digit numerals with regrouping. (II)

1061 Add three 2-digit numerals without regrouping. (II)

*1582 Write and solve equations for story problems requiring addition or subtraction of 1- or 2-digit numbers. (III)

1585 Find the sum of not more than 3 addends with not more than 3 digits in each addend. (II)

1043 Add two 4-digit numerals without regrouping. (II)

1580 Given the sum and one addend in an addition problem, find the missing addend, using inverse operation. (II)

0130 SUBTRACT FROM 4-DIGIT NUMBERS. (II)

0061 Using a picture of two sets of objects or a number line, subtract a 1-digit number from a larger 1-digit number. (II)

MATHEMATICS

Primary

0062 Subtract a 1-digit numeral from a larger 1-digit numeral vertically and/or horizontally. (II)

0131 Solve word problems in which a 1-digit numeral is subtracted from a larger 1-digit numeral. (III)

1035 Subtract numerals where the minuend is not greater than 18. (II)

1040 Subtract 2-digit numerals without regrouping. (II)

1046 Subtract 2-digit numerals with regrouping. (II)

1515 Subtract a 2- or 3-digit numeral from a 3-digit numeral without regrouping. (II)

1516 Subtract a 2- or 3-digit numeral from a 3-digit numeral with regrouping. (II)

1044 Subtract 4-digit numerals without regrouping. (II)

1036 Find the missing number in an addition or subtraction problem where the numerals are less than 18. (II)

0132 Solve word problems for addition and subtraction of 2 numerals with no more than 4 digits. (III)

0133 USE MULTIPLICATION FACTS. (II)

*1050 Add equivalent sets. (II)

1049 Recognize a multiplication fact that represents a given repeated addition fact. (II)

1051 Multiply 2 numerals where the product is not greater than 25. (II)

0134 Solve word problems using multiplication where the product is not greater than 25. (III)

1588 Tell the multiplication facts of 1-digit factors where at least one of the factors is less than 6. (I)

1501 Tell the multiplication facts of 1-digit numbers. (I)

1587 Find the product of two 1-digit numerals using repeated addition. (II)

1534 Multiply a 2-digit or 3-digit numeral by a 1-digit numeral where regrouping is not required. (II)

1649 Multiply a 2-digit or 3-digit numeral by a 1-digit numeral where regrouping is required. (II)

MATHEMATICS

Primary

0135 SOLVE DIVISION PROBLEMS WITH 1-DIGIT DIVISORS. (II)

1605 Divide a given set of no more than 20 elements into groups of equivalent sets. (II)

1606 Find the quotient of a division problem with a 2-digit dividend and a 1-digit divisor using repeated subtraction. (II)

1613 Divide a 3-digit numeral by a 1-digit numeral (no remainder). (II)

1614 Find the quotient and remainder for a division problem with a 2- or 3-digit dividend and a 1-digit divisor. (II)

*1608 Write a number sentence for a story problem that requires the division of a 1- or 2-digit number by a 1-digit number. (III)

0136 ADD LIKE FRACTIONS. (II)

1054 Relate the fractional numbers 1/2, 1/3, and 1/4 to sets of objects or whole objects divided into halves, thirds, or fourths. (II)

1589 Relate the proper fraction (halves, thirds, fourths, fifths, sixths, or eighths) to the shaded region of a given set or figure. (II)

1617 Add like fractions with denominators of 2, 3, 4, 5, 6, or 8 where both of the addends and the sum are proper fractions. (II)

0137 REPRODUCE A GIVEN PATTERN. (I)

0078 Copy a given pattern of objects or shapes. (I)

0079 After seeing a given pattern of objects that has no more than three parts, reproduce from memory the same pattern of objects. (I)

0080 Given a series of objects or shapes in a pattern, describe the next step of the pattern. (II)

0138 EXPLAIN THE FUNCTION OF A GRAPH. (II)

1647 Explain specific data presented in a bar or picture graph. (II)

1648 Construct a picture graph from given data. (II)

MATHEMATICS

Primary

0139 DEFINE GEOMETRIC FIGURES AND CIRCLES. (II)

- 1611 Recognize objects or drawings that are triangles, quadrilaterals, and circles. (II)
- 1612 Describe a given geometric figure as being open or closed. (II)
- 1622 Describe a given point as being inside, on, or outside a figure. (II)

0140 APPLY KNOWLEDGE OF VALUE OF COINS. (III)

- 0071 Identify a penny, a nickel, and a dime, and tell the value of each. (I)
- 0072 Find the value of a given group of pennies, nickels, and dimes that total less than $1.00. (II)
- 0141 Select from a group of coins a combination of coins that total $.75. (I)

0142 DEMONSTRATE AN UNDERSTANDING OF TIME TO THE MINUTE. (III)

- 0073 Identify the hour and/or half hour as given on a clock face. (II)
- 0143 Demonstrate an understanding of telling time by setting the hands of a clock to a given hour, half hour, and quarter hour. (III)
- 1056 Recognize the written time (hour, half hour, quarter hour and five minutes) represented on a given clockface. (II)
- 1573 Express time to the nearest minute using the colon. Use a.m. for morning and p.m. for afternoon in telling time. (II)

0144 USE LINEAR MEASURE TO 1/4 INCH. (II)

- 1055 Measure to the closest inch a given object or line segment. (II)
- 1609 Using a ruler, measure objects to the nearest quarter inch. (II)
- 1514 Given a scale, measure distances on a map. (II)

0145 EXPRESS TEMPERATURE READINGS AS A NUMERICAL FIGURE. (II)

- 1512 Record the temperature shown on a Fahrenheit thermometer. (II)
- 1513 Find the difference between two given temperatures. (II)

0146 DEFINE ELEMENTS OF A SET. (II)

- 0069 Using arrays, find the crossing points through 10. (II)
- 0051 Recognize the smallest or largest object in a group of objects. (II)
- 0074 Given a group of objects, recognize those that are the same size, those that are the same shape, or those that are the same color. (II)
- 0052 Given groups of objects, recognize those groups that have the same number of objects. (II)
- 0053 Recognize which of two groups of objects has more elements and which has fewer elements. (II)
- 0075 Recognize the similarities of given objects. (II)
- 0076 Given a group of objects with one object different from the rest, recognize the object that is different. (II)
- 1504 Define the subsets of a given set. (II)
- 1690 Describe the union of two sets. (II)
- 0147 Recognize a group of objects that have something in common. (II)
- *1050 Add equivalent sets. (II)
- 0148 Add disjoint sets. (II)

0149 USE SET NOTATION TO SOLVE PROBLEMS. (II)

- 1505 Recognize a number as being greater than, equal to, or less than a second number. (II)
- 1689 Express a set of elements in set notation and conclude if the two sets are equivalent. (II)
- 0150 Express the empty set. (II)
- 0151 Express subsets. (II)
- 0152 Express the union of sets. (II)
- 0153 Express the intersection of sets. (II)

MATHEMATICS

Primary

0154 WRITE NUMBER SENTENCES (EQUATIONS). (III)

- 0063 Write a number sentence for a given pictured addition or subtraction problem. (III)
- 1031 Write an equation for a pictured addition problem where the sum of the numerals is not greater than 18. (III)
- 1032 Write an equation for a pictured subtraction problem where the minuend is not greater than 18. (III)
- 1033 Given an addition sentence with two addends and the sum, write an equation for a subtraction problem using the same numerals. (The numerals are not to be greater than 10.) (III)
- 1042 Use the correct symbol (<, =, or >) that belongs between two given numerals, when neither numeral has more than 3 digits. (II)
- 0155 Write number sentences using 3-digit numerals and the symbols <, =, and >. (III)
- *1608 Write a number sentence for a story problem that requires the division of a 1- or 2-digit number by a 1-digit number. (III)
- *1582 Write and solve equations for story problems requiring addition or subtraction of 1- or 2-digit numbers. (III)
- 1517 Given addition and subtraction story problems, write them as number sentences. (Number should be limited to 3 digits.) (III)

0156 SOLVE WORD PROBLEMS. (III)

- 1037 Solve word problems for addition problems where the sum is not greater than 18. (III)
- 1038 Solve word problems for subtraction where the minuend is not greater than 18. (III)
- 0158 Solve word problems involving addition and subtraction of two 2-digit numerals. (III)
- 1574 Solve to the nearest minute 1-step addition and subtraction story problems involving time. (III)
- *0129 Solve word problems in which two 1-digit numbers are added and the sum is ten or less. (III)

FRANKLIN-McKINLEY SCHOOL DISTRICT
400 TULLY ROAD
SAN JOSE, CALIFORNIA 95112
PHONE: (408) 286-0840

DAVID A. WILLEY
SUPERINTENDENT

A-7

April 30, 1971

Dear

Santee School is trying something new to help children learn mathematics and reading. We are asking a few parents to help. It will not take much of your time and it will be very easy to do.

Will you please come to Santee School this Thursday, May 6, at about 3:15 p.m. to see me and I will explain it to you at that time? We believe it is very important for you to come to this meeting and we want to do everything we can in order to make it possible for you to come. A gift certificate will be given to parents who come to this meeting and a larger one to those parents who help their child.

We hope very much to see you Thursday.

Sincerely,

PARENT'S RECORD

DAY	WHAT I DID:
Example:	Today I told Jonnie I was happy that he did well in math and I let him play an extra 15 minutes at his friend's home.
Monday May 10	
Tuesday May 11	
Wednesday May 12	
Thursday May 13	
Friday May 14	
Monday May 17	
Tuesday May 18	
Wednesday May 19	
Thursday May 20	
Friday May 21	

Name _____

Incentives Pilot Study
3/17/71
Evaluation Item #1

INSTRUCTIONAL PRACTICES QUESTIONNAIRE

READING

A. Resources for Reading Instruction

1. List the printed materials that are used in your reading group. (Title & Publisher)

Textbooks and workbooks _____

_____

_____

_____

Programmed materials _____

_____

_____

_____

Other (specify) _____

_____

2. List the audio-visual materials that are used in your reading group.

Audio (e.g., tapes, records, etc.) _____

_____

Visuals (felt board, slides, etc.) _____

_____

A-V (movies, T.V., etc.) _____

_____

3. List any other materials and equipment that are used in classroom reading instruction.

Games/Puzzles _____

Simulations _____

Activity packages _____

Other (specify) _____

4. Who, besides yourself, assists in the classroom reading instruction of your class? (Check all that apply.)

_____ No one else

_____ Parent aide (unpaid)

_____ Parent aide (paid)

_____ One other teacher (team)

_____ Two or more teachers (team)

_____ Peer tutors

_____ Older student tutors from higher grade

_____ Adult paraprofessional aide (not a parent)

_____ Other (specify) _____

5. Do you regularly utilize the services of any of the following special service personnel in reading instruction?
(Check all that apply and indicate the frequency.)

_____ school psychologist (no. of times _____)

_____ reading specialist (no. of times _____)

_____ curriculum specialist (no. of times _____)

_____ other (specify) _____

6. Thinking back over your teaching experience, what has been your most valuable teaching resource (material, equipment, personnel) in reading? Recount, if you can, some specific instances where you used a resource with particular success. What were the circumstances? What results convinced you that each was a successful effort

B. Teaching Techniques

1. About what <u>percent</u> of student time devoted to learning reading is spent in each of the following activities:

_____ students work alone

_____ students work in small groups (not more than 5)

_____ students work in large groups (less than the entire class)

_____ entire class participates

_____ other (specify) _____

100% total

2. What grading system do you use in reading? (Check one.)

_____ none (no reporting)

_____ letter grades (A, B, C, etc.)

_____ pass/fail

_____ parent conferences

_____ other (specify) _____

If letter grades <u>are</u> assigned, upon what basis is the distribution determined?

_____ normal curve

_____ other basis (specify) _____

_____

3. What method(s) do you regularly use to assess your student's progress in reading? (Check all that apply.)

_____ classroom quizzes

_____ observation of classroom performance

_____ standardized tests

_____ other (specify) _____

4. About how much time, on the average, do you spend each day teaching and preparing to teach reading?

_____ less than one hour

_____ one to two hours

_____ two to three hours

_____ three to four hours

_____ more than four hours

5. About what percent of your time devoted to teaching reading is spent in each of the following activities:

_____ tutoring individual students

_____ teaching small groups (less than 5)

_____ teaching large groups (less than entire class)

_____ teaching the entire class

_____ other (specify) _____

100% total

6. What contact do you normally have with the parents of students in your reading group? (Check all that apply.)

_____ none

_____ parent night at school

_____ at least one parent conference per year for students having difficulty

_____ at least one parent conference per year for all students

_____ home visits for students having difficulty

_____ home visits for all students

_____ other (specify) _____

7. Do you involve parents in the reading instruction of their children?

_____ yes

_____ no

If yes, what kind(s) of instructional involvement? (Check all that apply.)

_____ help with occasional homework assignments

_____ daily help with drills (flashcards, etc.)

_____ daily help with remedial materials (workbooks, programmed instruction, etc.)

_____ other (specify) _____

8. What techniques have you used to increase the amount of student motivation to achieve success in reading? (Check all that apply.)

_____ classroom competition among individual students (posting progress indicators)

_____ classroom competition among small groups (posting progress indicators)

_____ tokens (stars, etc.) for individual students

_____ tokens (stars, etc.) for small groups

_____ withdraw privileges of students who don't do their work

_____ urge students to try harder

_____ other (specify) _____

_____

9. Thinking back over your teaching experience, what has been the most valuable teaching technique you have used to improve student reading performance? Recount, if you can, some specific instances where you used a technique with particular success. What were the circumstances? What results convinced you that each was a successful effort?

Name _____

Incentives Pilot Study
3/17/71
Evaluation Item #2

INSTRUCTIONAL PRACTICES QUESTIONNAIRE

MATHEMATICS

A. Resources for Mathematics Instruction

1. List the printed materials that are used in your mathematics group.(Title & Publisher)

Textbooks and workbooks _____

_____

_____

_____

Programmed materials _____

_____

_____

_____

Other (specify) _____

_____

2. List the audio-visual materials that are used in your mathematics group.

Audio (e.g., tapes, records, etc.) _____

_____

Visuals (felt board, slides, etc.) _____

_____

A-V (movies, T.V., etc.) _____

_____

3. List any other materials and equipment that are used in classroom mathematics instruction.

Games/Puzzles _____

Simulations _____

Activity packages _____

Other (specify) _____

4. Who besides yourself, assists in the classroom mathematics instruction of your class? (Check all that apply.)

_____ No one else

_____ Parent aide (unpaid)

_____ Parent aide (paid)

_____ One other teacher (team)

_____ Two or more teachers (team)

_____ Peer tutors

_____ Older student tutors from higher grade

_____ Adult paraprofessional aide (not a parent)

_____ Other (specify) _____

5. Do you regularly utilize the services of any of the following special service personnel in mathematics instruction? (Check all that apply and indicate the frequency.)

_____ school psychologist (no. of times _____)

_____ mathematics specialist (no. of times _____)

_____ curriculum specialist (no. of times _____)

_____ other (specify) _____

6. Thinking back over your teaching experience, what has been your most valuable teaching resource (material, equipment, personnel) in mathematics? Recount, if you can, some specific instances where you used a resource with particular success. What were the circumstances? What results convinced you that each was a successful effort?

B. Teaching Techniques

1. About what percent of student time devoted to learning mathematics is spent in each of the following activities:

_____ students work alone

_____ students work in small groups (not more than 5)

_____ students work in large groups (less than the entire class)

_____ entire class participates

_____ other (specify) _____

100% total

2. What grading system do you use in mathematics? (Check one.)

_____ none (no reporting)

_____ letter grades (A, B., C, etc.)

_____ pass/fail

_____ parent conferences

_____ other (specify) _____

If letter grades are assigned, upon what basis is the distribution determined?

_____ normal curve

_____ other basis (specify) _____

_____

3. What method(s) do you regularly use to assess your student's progress in mathematics? (Check all that apply.)

_____ classroom quizzes

_____ observation of classroom performance

_____ standardized tests

_____ other (specify) _____

4. About how much time, on the average, do you spend each day teaching and preparing to teach mathematics?

_____ less than one hour

_____ one to two hours

_____ two to three hours

_____ three to four hours

_____ more than four hours

5. About what <u>percent</u> of your time devoted to teaching mathematics is spent in each of the following activities:

_____ tutoring individual students

_____ teaching small groups (less than 5)

_____ teaching large groups (less than entire class)

_____ teaching the entire class

_____ other (specific) _____

100% total

6. What contact do you normally have with the parents of students in your mathematics group? (Check all that apply.)

_____ none

_____ parent night at school

_____ at least one parent conference per year for students having difficulty

_____ at least one parent conference per year for all students

_____ home visits for students having difficulty

_____ home visits for all students

_____ other (specify) _____

7. Do you involve parents in the mathematics instruction of their children?

_____ yes

_____ no

If yes, what kind(s) of instructional involvement? (Check all that apply.)

_____ help with occasional homework assignments

_____ daily help with drills (flashcards, etc.)

_____ daily help with remedial materials (workbooks, programmed instruction, etc.)

_____ other (specify) _____

8. What techniques have you used to increase the amount of student motivation to achieve success in mathematics? (Check all that apply.)

_____ classroom competition among individual students (posting progress indicators)

_____ classroom competition among small groups (posting progress indicators)

_____ tokens (stars, etc.) for individual students

_____ tokens (stars, etc.) for small groups

_____ withdraw privileges of students who don't do their work

_____ urge students to try harder

_____ other (specify) _____

_____

9. Thinking back over your teaching experience, what has been the most valuable teaching technique you have used to improve student mathematics performance? Recount, if you can, some specific instances where you used a technique with particular success. What were the circumstances? What results convinced you that each was a successful effort?

A	B
C	D

+M:

-R:

O:

Teacher:

Observer:

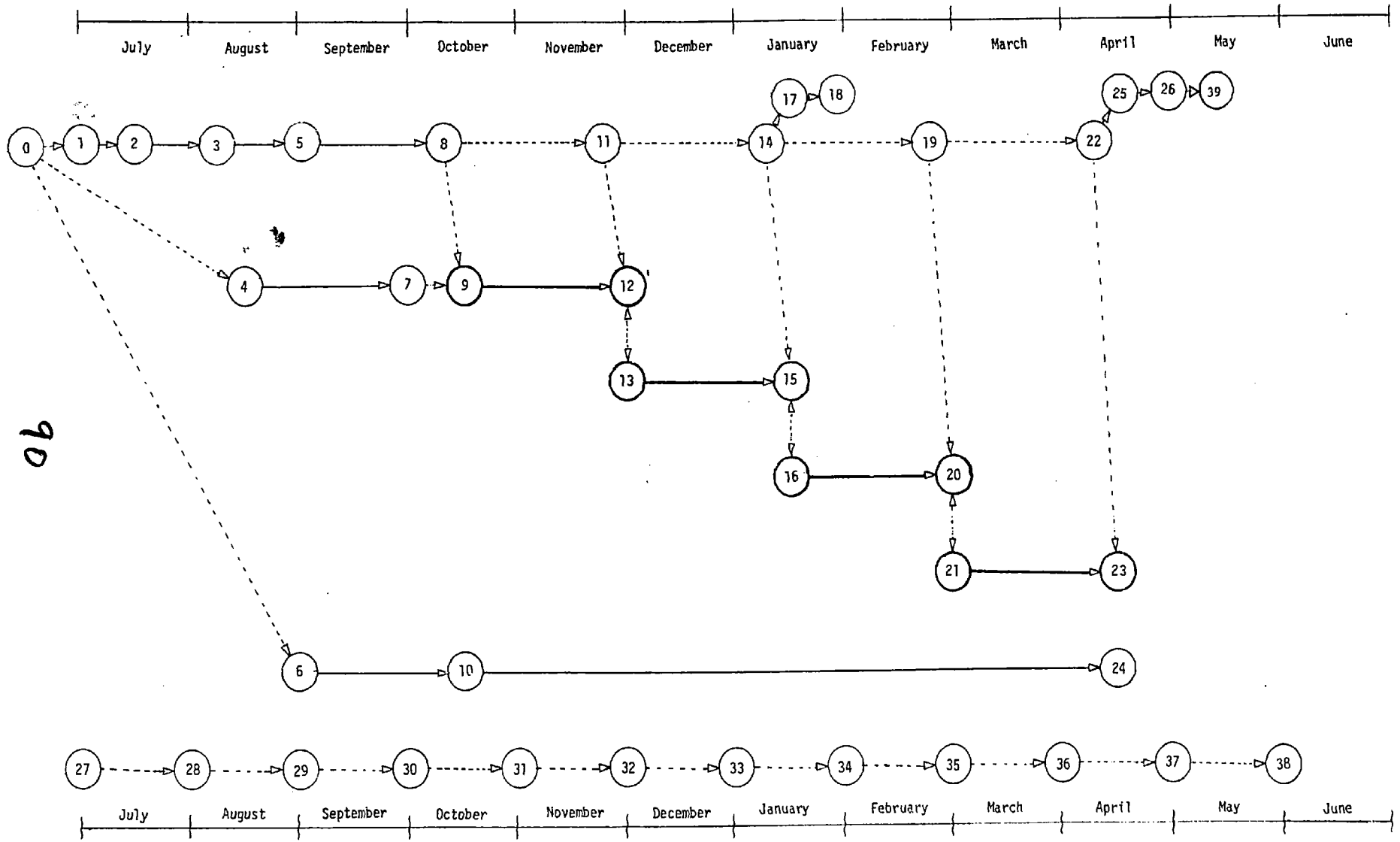
School:

M Tu W Th F

	Time:	Time:	TOTALS
(1) Alone			
(2) Peer			
(3) T-I			
(4) T-SG			
(5) T-LG			
(6) NP/T U			
(7) NP/T O			
	Time:	**Time:**	
(1) NI			
(2) ATT			
(3) PR			
(4) CR			
(5) RE			
(6) PU			
(7) SMI			
(8) F & E			
(9) S/DG			
(10) O			

APPENDIX B

PROJECT FLOW CHART



APPENDIX B
REVISED FLOW CHART

The knocks and bruises acquired in a pilot study of any sort should yield significant payoff in smooth and efficient organization of the major study to follow. Several general principles have emerged from this pilot study to guide the revision of the flow chart for a major study.

The basic unit of the project is the incentive earning period. All other administration and evaluation activities are preparatory to or stem from the incentive earning period. In the case of student incentives, the first incentive period might be made relatively short, the level of student achievement required in order to earn the incentive should be well within the teacher's expectation for the students to attain, and the incentive payoff should be quite high. Thus, students will learn that the system is real, and that they can, in fact, earn the rewards that are promised. Subsequent incentive earning periods could be extended for longer and longer durations of time and they should require progressively higher levels of student performance to earn a given incentive.

Lead time to the beginning of the first incentive earning period must be stretched as far as it possibly can. Consider, for example, that teachers must be oriented to the project; they must be instructed in both reinforcement principles and the writing of instructional objectives; and they must compile the year's objectives. Then, following the designation of objectives but prior to the beginning of the first incentive earning period, the criterion-referenced pretests must be constructed, tried out, revised, and printed. Simultaneously, parents must be oriented to the project and instructed in their reinforcement and tutoring roles.

Formation of a community council early in the project can provide an invaluable community laison mechansim that would serve to identify incentive sources in the community. In this pilot study, the local business managers were especially pleased to contribute services and merchandise that were "earned" by students as opposed to an outright handout.

The following is a suggested basic flow chart for a student and parent incentive system based solely on reading achievement. This flow chart may be modified and expanded to meet peculiar local circumstances or to accommodate a more complex organization, such as a variable length incentive earning periods discussed earlier. The flow chart is organized for a year-long operation with summer workshops for teachers.

0. begin project

1. conduct teacher orientation and workshop
   a. instruct teachers in writing instructional objectives
   b. instruct teachers in parent involvement part of the program
   c. teachers begin writing their reading objectives for the academic year (teachers paid for extra service in attending the workshop and writing objectives)
   d. teacher incentives identified; begin arrangements for incentive delivery

2. obtain pre-experimental baseline measures
   a. Instructional Practices Questionnaire
   b. teacher training and experience
   c. student achievement measures

3. begin developing five alternate forms of the reading criterion-referenced test to assess attainment of the teacher designated objectives; try out and revise the tests; order standardized reading tests

4. parent orientation
   a. notify all parents by letter, phone, and/or home visit
   b. prepare packets to be used by parents in home tutoring and home reinforcement of reading skills

5. administration of standardized and criterion-referenced reading pre-tests to students

6. begin selection and training of classroom observers

7. complete parent orientation
   a. parent incentives identified; begin arrangements for incentive delivery
   b. parents instructed in their tutoring and reinforcing roles

8. criterion-referenced reading test results returned to participating teachers

9. begin the first reading incentive earning period
   a. specify the objectives to be mastered by each child
   b. select and begin arrangements for delivery of class incentive

10. begin classroom observations in experimental and control classrooms

11. administer the first interim reading criterion-referenced test

12. end first reading incentive period
   a. teachers complete scoring the first interim reading tests
   b. provide the classes with incentives where earned

13. begin second reading incentive earning period
   a. specify the objectives to be mastered by each child
   b. select and begin arrangements for delivery of class incentives

14. administer second interim reading criterion-referenced test

15. end second reading incentive period
    a. teachers complete scoring the second interim reading tests
    b. provide the classes with incentives where earned

16. begin third reading incentive earning period
    a. specify the objectives to be mastered by each child
    b. select and begin arrangements for delivery of class incentive

17. summary printout of first semester reading gains reported back to project administrator

18. provide teachers and parents with incentives where earned

19. administer third interim reading criterion-referenced test

20. end third reading incentive period
    a. teachers complete the scoring of tests
    b. provide the classes with earned incentives

21. begin fourth reading incentive earning period
    a. specify the objectives to be mastered by each child
    b. select and begin arrangements for delivery of class incentive

22. administer the reading criterion-referenced post-test and the standardized post-test

23. end fourth reading incentive period
    a. teachers complete the scoring of tests
    b. provide the classes with earned incentives

24. complete classroom observation

25. summary printout of second semester and year reading gains reported back to project administrator

26. provide teachers and parents with earned incentives

27. hold first monthly "community council" meeting

28. hold second monthly "community council" meeting

29. hold third monthly "community council" meeting

30. hold fourth monthly "community council" meeting

31. hold fifth monthly "community council" meeting

32. hold sixth monthly "community council" meeting

33. hold seventh monthly "community council" meeting

34. hold eighth monthly "community council" meeting

35. hold ninth monthly "community council" meeting

36. hold tenth monthly "community council" meeting

37. hold eleventh monthly "community council" meeting

38. hold twelfth monthly "community council" meeting

39. complete final report on first year experimental results

APPENDIX C

TEACHER RECOMMENDATIONS

Teacher comments and teacher interviews produced a number of important/ interesting recommendations for future incentives studies:

I. Student incentives
   A. Use individualized incentives based on individual rather than class performance because:
      1) this system got all students working
      2) this system motivated students who failed to earn an individualized incentive.

   B. Increase the frequency of incentive delivery. Students at this age need more immediate reinforcement, particularly the slow learners/low achievers. Many teachers instituted progress charts to provide immediate reinforcement as a supplement to the project incentives.

II. Teacher incentives
   Increase frequency of incentive delivery (i.e., make part of incentives total available during the project).
      1) teachers need (more) frequent reinforcement
      2) in this way, students participating in the project, can benefit from the classroom purchases made possible by their academic performance.

III. Parent incentives
   Selecting incentives that the whole family can share in and enjoy:
      1) is consistent with the selection of teacher incentives.
      2) Parent incentives are in part based on the child's performance; therefore, it seems appropriate for the child to share in the incentive.

IV. Criterion-referenced tests
   A. Have separate criterion-referenced tests for each grade level.
      1) The tests were too long; their length frightened and discouraged the students.
      2) Younger children were discouraged by how many items they could not answer.

   B. Revisions should be made in accordance with the speech patterns of the Chicano students who comprised approximately 1/3 of the student sample. Items with sound discriminations between "sh" and "ch" were virtually impossible for these students, for example.

   C. Test format should be varied more to make the tests less monotonous, an important consideration when dealing with younger students whose attention span is limited.

   D. Humorous touches should be added to the tests, as they hold the children's attention and also reduce their test fears, which may inhibit their performance.

FRANKLIN-McKINLEY SCHOOL DISTRICT
400 TULLY ROAD
SAN JOSE, CALIFORNIA 95112
PHONE: (408) 286-0640

APPENDIX D

PRINCIPAL RECOMMENDATIONS

July 8, 1971

Dr. Steven M. Jung
American Institutes for Research
Post Office Box 1113
Palo Alto, California 94302

Dear Dr. Jung:

I wish to relate to you my impressions of the Title III project, Using Incentives to Improve Reading and Mathematics Achievement, conducted here at Santee School this spring. I was impressed with the over-all plan and with the effectiveness of its day to day implementation. I commend Dr. Lipe, Miss Cantor and your office for a job well done.

Orienting the teachers in the skill of writing objectives was a difficult, but successful task. Teachers were able to write reading and mathematics objectives used by AIR to construct the criterion-referenced tests used with the Stanford Achievement Test to pre test and post test the experiment and control groups.

The criterion-referenced tests were universally recognized as very useful instruments of high quality. Results from their use as a pre test provided each teacher with specific knowledge of the objectives each student had mastered.

Next, the selection of microincentives and macroincentives for the experiment group was accomplished. The visit to Slater School's token economy helped my teachers establish their own individual and group incentives based on student behavior and effort, and on achievement of instructional objectives.

Of course, final results are not available yet, but our feeling, following the post test, is that our students' performance was enhanced by the incentives. Generally, teachers found the project strenuous for students and themselves. This was due largely to the short term of the project which forced the pre test, interim tests and post test to be scheduled very close together.

My recommendations for future projects are two in number. First, schedule the project so that tests are farther apart and thus allow ample time for instruction and practice to assure mastery of objectives. Second, work out a system of delivery of incentives for teachers and students that is prompt and trouble-free.

I am confident that what was learned by out staff will serve us well next year in improving out program at Santee. Though our program will look rather informal compared to a project with outside funding which must have its stringent requirements, our concerns and techniques will reflect the learning that took place this spring.

I am grateful that the project was carried on in our school district and that we at Santee were able to have a significant role.

Sincerely,

Joe Gist

Joe Gist
Principal

JG/ed

6-3-74
Santee School

Dear Miss Shelly and Mr Dewey,
Thank you for the field trip.
I know you worked hard for us.
Getting the tickets and correcting
the papers. We had FUN at the BEA-
CH and MARINE WORLD.
I have learned study skills and most
of all I have learned PROOFREAD-
ING. It was worth all the home work
Well by for now Thanks for the toys.

Your Pal
Maurine.