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ABSTRACT

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and was funded by the National Institute of Education (NIE). Its major purpose is the development of curriculum materials for kindergarten through grade 6. This document is an extension of "Evaluation Report 7-B-4," which looked at revised Mathematics Applied to Novel Situations (MANS) tests. This material discusses MANS tests that underwent further revisions, viewed as minor and within the original purpose of making the tests easier for local districts to use. It is felt this primary objective was met, while a secondary goal of improving technical qualities of individual scales was only partially realized. These revised tests were used with 20 CSMP and 20 non-CSMP classes. Results of testing were found to not be quite so strongly in favor of the program as in previous evaluations, but on the total scales CSMP classes averaged 10 percent higher, a difference significant at the .05 level. While a difference favoring CSMP was found on each of seven categories, only on the scale for number patterns and relationships was there a statistically significant advantage for CSMP pupils. (MP)

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Extended Pilot Trial of the  
Comprehensive School Mathematics Program

Evaluation Report 8-B-2

Evaluation of Revised Second Grade, MANS Blue Level

Knowles Dougherty  
Math Research and Evaluation Studies  
October, 1981

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## Description of Evaluation Report Series

The Comprehensive School Mathematics Program (CSMP) is a program of CEMREL, Inc., one of the national educational laboratories, and is funded by the National Institute of Education. Its major purpose is the development of curriculum materials for grades K-6.

Beginning in September, 1973, CSMP materials began being used in classrooms on a regular basis, beginning in kindergarten and first grade. The evaluation activities have paralleled the development and dissemination of materials so that the primary evaluation emphasis is now at the upper elementary grades. All activities have been conducted by a group within CEMREL which is independent of CSMP.

The evaluation of the program in this extended pilot trial is intended to be reasonably comprehensive and to supply information desired by a wide variety of audiences. For that reason the reports in this series are reasonably non-technical and do not attempt to widely explore some of the related issues. On the next page is given a list of reports through 1980. Below is given a list of reports completed in 1981:

- Evaluation Report:
- 8-B-1 Sixth Grade Evaluation, Preliminary Study
  - 8-B-2 Evaluation of Revised Second Grade, MANS Blue Level
  - 8-B-3 Evaluation of Revised Third Grade, MANS Green Level
  - 8-B-4 Three Evaluations of Gifted Student Use
  - 8-C-1 Preliminary Study of CSMP "Graduates"

Extended Pilot Trials of the  
Comprehensive School Mathematics Program

Evaluation Report Series

Evaluation Report (1974)	1-A-1	Overview, Design and Instrumentation
	1-A-2	External Review of CSMP Materials
	1-A-3	Final Summary Report Year 1
	1-B-1	Mid-Year Test Data: CSMP First Grade Content
	1-B-2	End-of-Year Test Data: CSMP First Grade Content
	1-B-3	End-of-Year Test Data: Standard First Grade Content
	1-B-4	End-of-Year Test Data: CSMP Kindergarten Content
	1-B-5	Test Data on Some General Cognitive Skills
	1-B-6	Summary Test Data: Detroit Schools
	1-C-1	Teacher Training Report
	1-C-2	Observations of CSMP First Grade Classes
	1-C-3	Mid-Year Data from Teacher Questionnaires
	1-C-4	End-of-Year Data from Teacher Questionnaires
1-C-5	Interviews with CSMP Kindergarten Teachers	
1-C-6	Analysis of Teacher Logs	
Evaluation Report (1975)	2-A-1	Final Summary Report Year 2
	2-B-1	Second Grade Test Data
	2-B-2	Readministration of First Grade Test Items
	2-B-3	Student Interviews
	2-C-1	Teacher Questionnaire Data
	2-C-2	Teacher Interviews, Second Grade
2-C-3	Teacher Interviews, First Grade	
Evaluation Report (1976)	3-B-1	Second and Third Grade Test Data Year 3
	3-C-1	Teacher Questionnaire Data Year 3
Evaluation Report (1977)	4-A-1	Final Summary Report Year 4
	4-B-1	Standardized Test Data, Third Grade
	4-B-2	Mathematics Applied to Novel Situations (MANS) Test Data
	4-B-3	Individually Administered Problems, Third Grade
4-C-1	Teacher Questionnaire Data, Third Grade	
Evaluation Report (1978)	5-B-1	Fourth Grade MANS Test Data
	5-B-2	Individually Administered Problems, Fourth Grade
	5-C-1	Teacher Questionnaire and Interview Data, Fourth Grade
Evaluation Report (1979)	6-B-1	Comparative Test Data: Fourth Grade
	6-B-2	Preliminary Test Data: Fifth Grade
	6-C-1	Teacher Questionnaire Data: Grades 3-5
Evaluation Report (1980)	7-B-1	Fifth Grade Evaluation: Volume I, Summary
	7-B-2	Fifth Grade Evaluation: Volume II, Test Data
	7-B-3	Fifth Grade Evaluation: Volume III, Non-Test Data
	7-B-4	Re-evaluation of Second Grade, Revised MANS Tests
	7-B-5	Achievement of Former CSMP students at Fourth Grade
	7-B-6	Student Achievement, Rapid Implementation Model

Key to Indexing

Evaluation Reports are labelled m-X-n,

where m is the year of the pilot study, with 1973-74 as Year 1.

X is the type of data being reported where A is for overviews and summaries, B is for student outcomes and C is for other data.

n is the number within a given year and type of data.

Table of Contents  
Evaluation Report 8-B-2  
Evaluation of Revised Second Grade, MANS Blue Level

Summary . . . . .	1
Introduction . . . . .	3
Revision of the MANS Blue Level . . . . .	5
Setting of the Test Administrations . . . . .	7
Feedback on the Revisions . . . . .	9
Results of the Testing . . . . .	13
Appendix A: List of Class Means . . . . .	23

## Summary

This report is an extension of Evaluation Report 7-B-4, Re-evaluation of Second Grade, Revised MANS Tests. The revised second grade MANS tests (called the Blue Level) were further revised after their initial use in 1980. The revisions were minor and still within the original purpose: to make the tests easier for local districts to use. In the Spring of 1981 the revised Blue Level MANS tests were administered to 20 CSMP and 20 non-CSMP classes. The classes came from five rather distinctly different school districts, but the majority were composed of lower ability students.

The primary objective of the further revision of the MANS Blue Level was judged to have been met: school districts are able to use the tests with essentially no problems. A secondary objective was to improve the technical quality of the individual scales. For some scales this objective was met, for others it was not.

The CSMP/non-CSMP results of the testing were not quite so strongly in favor of CSMP as they had been in 1980. Nevertheless, on the total of the MANS scales, CSMP classes averaged over 10% higher scores than non-CSMP, a difference that was significant at the .05 level. In each of the scale categories, the CSMP classes outscored the non-CSMP classes, the difference being statistically significant in one of them: Number Patterns and Relationships.

## Introduction

The Comprehensive School Mathematics Program (CSMP) is a K-6 mathematics curriculum being developed and field tested by CEMREL, Inc. During the past few years, a special series of MANS Tests (Mathematics Applied to Novel Situations) has been developed for use in the evaluation of CSMP.

A series of 10 MANS scales was originally developed in 1976 for use in second grade in the CSMP Extended Pilot Test. Like all MANS scales they were intended to assess important mathematical thinking skills thought to underlie the CSMP curriculum, but in a novel context where possible and without using any of the special terminology and techniques of the CSMP curriculum. They required extensive directions and explanations, given in a standardized manner by specially trained testers. They were administered to 70 second grade classes, some CSMP and some non-CSMP classes, and the results of this experimental comparison are given in Evaluation Report 3-B-1.

Because of the expense and effort required to train testers, these scales have had limited utility outside the realm of CSMP Evaluation activities. In order to make them more widely available, these scales were revised in 1979-80. The primary objective was to simplify the directions enough that a local coordinator could fairly easily train a tester to carry out the testing. (Other revisions were also made based on statistical data from the original study and on new scales developed later in higher grades, but appropriate in concept for use with second graders.) These revised scales were denoted as the "Blue" Level, intended for second graders, but appropriate for certain first and third grade classes as well. The Blue Level MANS consists of 13 scales, 10 of which are of the usual MANS

variety described above. Three of the scales (standard computation, place value and word problems) are not particularly novel and resemble sections of traditional tests of school achievement.

In the Spring of 1980 the MANS Blue Level was administered to 21 second grade classes in three school districts and the results are given in Evaluation Report 7-B-4. One shortcoming of that study was the under-representation of classes which were lower than average in ability, as measured by reading comprehension scores.

In 1980-81 there was an opportunity to make further (minor) revisions in the MANS Blue Level and to administer it to a set of classes, the majority of which were of below average ability. This report presents the results of these efforts.

The present report serves an additional purpose. After the completion of the Extended Pilot Test for the second grade curriculum, final revisions were made in the curriculum, as in the case with other grade levels. Thus it is possible to view this report and Evaluation Report 7-B-4 as a fairly complete assessment of student achievement at the end of second grade with the revised CSMP curriculum.

## Revision of the MANS Blue Level

The revision of the MANS Blue Level consisted primarily of completing the package of testing materials to be sent to a local testing coordinator. A coordinator's manual was constructed to enable a local school administrator to select and train testers, schedule testing sessions, etc. Within the test booklets themselves, the Gates-McGinitie Vocabulary Test, Level B Form 1, was added in order to provide a uniform measure of general ability. It was divided into two equivalent halves, each taken by half the students in a class, thereby providing a reliable estimate of the class mean score on the total Vocabulary test.

A secondary aspect of the MANS Blue Level revision involved minor changes in the student pages and tester instructions of the MANS scales themselves. From the analysis of the results from the administration of the initial version of the MANS Blue Level, several different things were taken into account: item difficulties, item biserials (with respect to its scale and the covariate), numbers attempting the items, frequency distributions on total score on scales, KR20 correlations, correlations between scales and the covariate, equality between two forms of a scale, etc.

Of the 160 items, 136 were retained in 1981 exactly as they were in 1980, 14 were revised slightly and 10 were dropped while 11 more were added. The item revisions and changes were made to correct errors in test construction, to increase a scale's range of difficulty level, or to increase or decrease the general difficulty level of a scale. On balance these item revisions and changes may have made the total test slightly harder. Some 30 of the retained items were switched from one form to the other in order to balance the difficulty level of the two forms. No

new scales were added and none of the 13 old ones was eliminated. Tester instructions were revised slightly in order to reduce instruction time or to decrease the probability of misunderstanding.

The thirteen scales in the MANS Blue Level have been grouped into seven categories, described in the table below.

Table 1  
Description of Scale Categories<sup>1</sup>

Scale Category	Description	No. of Scales
Computation	Includes two types of scales: standard computation taken or adapted from computation subtests of standard achievement test batteries, and mental arithmetic requiring the exact answers to calculations amenable to non-algorithmic solution.	2
Estimation	Requires the rapid deriving of approximate answers to problems.	3
Fluency	Requires producing many correct answers to a given problem.	1
Other Number Systems	Requires computation with, or applications of, negative numbers, fractions and decimals depending on grade level.	1
Number Patterns and Relationships	Requires finding or applying a given pattern in sets of numbers.	4
Place Value	Requires an understanding of the base ten numbering system.	1
Word Problems	Requires the solution of types of word problems not usually encountered at the grade level.	1
TOTAL		13

<sup>1</sup>For descriptions of the scales themselves, see the section of this report titled Results of the Testing.

## Setting of the Test Administrations

The revised Blue Level of the MANS test was administered to forty second grade classes in five school districts. Specific information about each of these sites is given in Table 2.

Table 2  
Description of Testing Sites

	Site Three	Site Four	Site Five	Site Six	Site Eight
Section of the Country	South	South	Midwest	Midwest	Midwest
Type of Community	Large City	Small Town and Rural	Suburb	Small City	Large City
Socio Economic Background	Low	Low to Middle	Middle	Middle	Low
Number of Classes: CSMP	5	1	2	2	10
Non-CSMP	4	1	3		10
Average No. of Students: CSMP Classes	27	40 <sup>1</sup>	23	17	24
Non-CSMP Classes	26	38 <sup>1</sup>	25	19	25
Mean Vocabulary Score <sup>2</sup> : CSMP	21.3	29.1	33.6	38.7 <sup>3</sup>	22.8
Non-CSMP	21.1	26.0	28.4	41.3 <sup>3</sup>	23.7

<sup>1</sup>In this site, a "class" corresponds to a random sample of students from several different classes in the district.

<sup>2</sup>For individual students, scores of 21, 29, and 37 correspond to the 25th, 50th and 75th percentiles respectively

<sup>3</sup>In this site, classes were composed of upper track students.

Overall, there were an equal number of CSMP and non-CSMP classes (20), involving slightly more than 500 students in each group. The mean across classes on the vocabulary test was 25.4 for CSMP and 25.8 for non-CSMP. The majority of the teachers were teaching CSMP for the first time, most of the remainder for the second. The majority of the students had been in CSMP since at least first grade; a few had just started in second.

## Feedback on the Revisions

### Local Administration

The primary objective in the revisions was to enable local school administrators to use the MANS tests without direct outside assistance. This objective appears to have been met and, at two of the sites a member of the CSMP staff observed the local coordinators using the various materials to train testers. Both times this process went smoothly. It seems safe to assume that the majority of school systems would be able to use the MANS Blue Level in its present form.

### Quality of the Scales

The secondary objective in the revisions was to upgrade the quality of the scales. Each of the scales was analyzed from several points of view, only three of which will be reported in this section: internal consistency, ceiling effect and floor effort. Internal consistency was measured using the KR20 reliability coefficient corrected with the Spearman-Brown Formula, for increasing the number of items to a common number, 12, for each scale. In Table 3, below, the corrected KR20 is given for each of the scales for 1980 and 1981.

Table 3  
Corrected KR20 Reliability on MANS Scales  
1980 vs. 1981

MANS Scales <sup>1</sup>	1980 Corrected KR20		1981 Corrected KR20	
	Form 1	Form 2	Form 1	Form 2
Which Is Larger	.65	.56	.44	.51
Negative Numbers	.75	.50	.78	.69
Labelling Number Lines	.76	.80	.89	.80
Writing Number	.87	.85	.88	.86
Computation	.77	.77	.78	.82
Sequences	.92	.91	.91	.90
Solving Number Machines	.80	.88	.88	.84
Mental Arithmetic	.80	.85	.81	.81
One-Step Word Problems		.79 <sup>2</sup>		.76 <sup>2</sup>
Estimating Intervals +		.74		.61
Estimating Intervals -		.64		.54
Estimating Intervals x		.63		.58

Table 3 shows that the majority of the scales were in the acceptable .70 to .90 range. It is noteworthy that the five scales with the lowest KR20's are the five which have the multiple choice response format, giving rise to much guessing with low ability students. Table 3 also shows a striking similarity between the 1980 and 1981 results. Some of the differences may be explained by changes made in the scales. Form 1 of the Solving Number Machines Scale was changed by correcting an item inadvertently made practically impossible in 1980. Form 2 of the Negative

<sup>1</sup>The Number Fluency scale is not composed of a set number of items and therefore did not yield a reliability coefficient.

<sup>2</sup>For the last four scales there was only one form.

Numbers scale was changed by reducing the number of items that could be answered correctly using a popular (but incorrect) line of reasoning. Form 1 of the Labelling Number Lines scale was changed in a number of respects but none that would explain the increase in the KR20. For four of the scales (Which Is Larger and the three Estimating Intervals scales), not only did the KR20 stay below the acceptable range, but in each case it actually dropped from 1980 to 1981. Perhaps this was due to the fact that they all involve items of the multiple choice variety and the general ability level of the 1981 student population was much lower than that of 1980.

In order to determine the possibility of a ceiling effect or a floor effect, a frequency distribution of student total scores was made for each scale. Table 4 gives the relevant results from those distributions.

Table 4

Percentage Scoring 0% or 100% for each MANS Scale

MANS Scales <sup>1</sup>	No. of Items	Percentage Scoring 0%		Percentage Scoring 100%	
		Form 1	Form 2	Form 1	Form 2
Which Is Larger	9	7	4	0	0
Negative Numbers	4	48	15	5	8
Labelling Number Lines	5	33	31	8	0
Writing Numbers	11	13	7	8	8
Computation	9	3	5	9	7
Sequences	5	25	38	17	17
Solving Number Machines	4	46	55	9	6
Mental Arithmetic	12	6	12	1	0
One-Step Word Problems	9	6 <sup>2</sup>		3 <sup>2</sup>	
Estimating Intervals +	7	11		0	
Estimating Intervals -	6	16		1	
Estimating Intervals x	5	23		1	

Taking into consideration the number of items per scale and the fact that 4 of the 40 classes were of very high ability, Table 4 shows little evidence of ceiling effect. However in the case of five scales (Negative Numbers, Labelling Number lines, Sequences, Solving Number Machines, and Estimating Intervals x) Table 4 does show evidence for a floor effect. Nevertheless it is interesting to note that these five scales are also the five with the fewest number of items. In addition the reader is reminded that 34% of the students scored in the lowest quartile on the vocabulary test.

<sup>1</sup>The Number Fluency scale is not composed of a set number of items and therefore did not yield a reliability coefficient.

<sup>2</sup>For the last four scales there was only one form.

## Results of the Testing

### The MANS Scales and Summary Statistics Across Classes

In the next few pages, the scales are listed by category. Preceding the name of each scale is a letter and number in parentheses: the letter referring to the category and the number distinguishing between scales in that category. For each scale there is a brief description and a sample item. Also given are the number of items per form and some of the time limits. For a few scales, all students took the same form. But for most scales (those indicated by "x items, two forms"), each student took one of the two forms. For most scales, a flexible and sufficient amount of time was allowed. For a few scales, dealing with problems meant to be done without exact calculation, strict time limits were adhered to; for these particular scales, the allowed time has been shown.

The following procedure of analysis was used for each MANS scale. Individual students who did not have both a score on the scale and a vocabulary score were eliminated from the study (usually less than one per class). For the remaining students in each of the classes, two mean scores were calculated: on the MANS scale and on the vocabulary test. (Where a MANS scale had two forms, the mean for that scale was the sum of the means of the two forms.) An analysis of covariance procedure was then used with class means as the unit of analysis and vocabulary as the covariate.

Therefore, beside each scale description are three statistics. The first two are the adjusted mean for the 20 CSMP classes and the adjusted mean for the 20 non-CSMP classes, adjusted to take into account differences in ability, based on scores from the Gates-McGinitie Vocabulary Test, Level B, Form 1. The mean scores on this

vocabulary test were almost identical: 25.4 for CSMP classes and 25.8 for non-CSMP classes. Hence the adjustment in the MANS scores was very small - less than 1% (adjusted upward for CSMP and downward for non-CSMP). The third statistic is the p-value of the resulting t-test: that is, the probability of such a difference in means occurring by chance if one assumes "no difference" between the two groups of classes. If the probability is small (less than .05) then the difference is traditionally called "statistically significant", the implication being that there is a difference between the two groups of classes.

(C) COMPUTATION

(C1) Computation

Adjusted Means p-val  
CSMP non-CSMP

Abstract: Items patterned after those in arithmetic computation sections of standard achievement tests for 2nd Grade.  
(9 items (using +, -, x), 2 forms)

10.3 10.7 .53

Examples:

$$\begin{array}{r} 19 \\ +6 \\ \hline \end{array}$$

$$\begin{array}{r} 49 \\ -7 \\ \hline \end{array}$$

$$5 \times 8 =$$

(C2) Mental Arithmetic

Abstract: Put the number in the box which makes the number sentence true, where the box may be in any of the "3 positions" and where the numbers are large and easy to work with.  
(12 items (using +, -, x), 2 forms)

9.8 8.1 .02

Examples:

$$\square + 70 = 90$$

$$600 - 100 = \square$$

$$3 \times \square = 300$$

(E) ESTIMATION

(E2-E4) Estimating Intervals

Abstract: Given a computation problem, and 5 fixed intervals (0-10, 10-50, 50-100, 100-500, 500-1000), determine which interval contains the answer to the problem and put an x in the interval. By instruction, format and time limits, students are discouraged from computing exact answers.

Examples:

(E2) Estimating Intervals - Addition

51 + 53    0    10    50    100    500    1000

2.8 2.7 .39

(7 items, on form, time limit: 1½ minutes)

(E3) Estimating Intervals - Subtraction

900 - 601    0    10    50    100    500    1000

1.9 1.8 .58

(6 items, one form, time limit: 1½ minutes)

(E4) Estimating Intervals - Multiplication

5 x 11    0    10    50    100    500    1000

1.5 1.3 .04

(5 items, one form, time limit: 1½ minutes)

(F) FLUENCY

Adjusted Means p-val  
CSMP non-CSMP

(F1) Number Fluency

6.5 5.8 .17

Abstract: Given sample number sentences about 9 ( $9 = 10 - 1$ ,  $9 = 1 + 5 + 3$ ,  $9 = 3 \times 3$ ,  $9 = 18 \div 2$ ) make up as many number sentences as you can about 8.  
(Open ended, but a maximum of 16 were counted, 1 form, time limit = 4 minutes)

Example:

My number sentences about 8.

8 = \_\_\_\_\_ 8 = \_\_\_\_\_  
8 = \_\_\_\_\_ 8 = \_\_\_\_\_  
8 = \_\_\_\_\_ 8 = \_\_\_\_\_

(N) OTHER NUMBER SYSTEMS

(N1) Negative Numbers

2.8 2.4 .10

Abstract: Given the starting score (which could be above or below zero), and how much the score went up or down, determine the final score.  
(4 items, two forms)

Example:

Dave: Score at the start: 5 below zero  
Then: Won 2  
Score at the end? 7 below zero 3 below zero 3 above zero 7 above zero

(R) NUMBER RELATIONS

(R1) Solving Number Machines

Adjusted Means p-val  
CSMP non-CSMP

Abstract: From 3 pairs of numbers (clues), determine what the person's game is (i.e. how the second number is derived from the first). Then use this knowledge to find the missing number from the 4th pair.

2.5 1.9 .01

(4 items, two forms)

Example: David's Game

	Class said:	David's answer:
First clue:	5	10
Second clue	1	2
Third clue:	3	6
Question:	4	<input type="text" value="*"/>

(R3) Sequences

4.3 3.8 .07

Abstract: Determine the missing number in a given sequence of numbers.  
(5 items, two forms)

Example:

28, 25, \_\_\_\_\_, 19, 16, 13

(R4) Which is Larger?

6.7 6.7 .78

Abstract: Given two similar computation problems choose the one which gives the larger answer. By instruction, format and time limits, students are discouraged from computing exact answers. The larger answer could always be determined more easily by inspection than by doing the computation.  
(9 items (using +, -, x), 2 forms, time limit = 3 minutes)

Example:  $585 + 250$    
 $580 + 290$

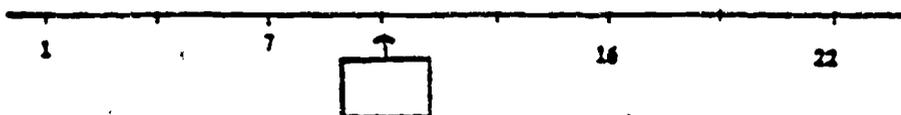
(Check the larger one).

(R5) Labelling Number Lines

3.8 2.7 .01

Abstract: Given a number line with some of the marks labelled, use the pattern shown to fill in the indicated blank with a label. A sample was worked collectively.  
(5 items, 2 forms)

Example:



(V) PLACE VALUE

Adjusted Means p-value  
CSMP non-CSMP

(V3) Writing Numbers

11.3 10.1 .07

- Abstract: a) Write a number that is read aloud.  
(6 items, one form)  
b) Given a number, determine what number is  
1, 10 or 100 larger or smaller than the  
given number. A sample item was worked  
collectively.  
(5 items, 2 forms)

Example:

What number is 10 more than 402? \_\_\_\_\_

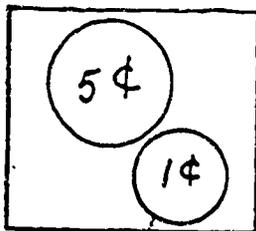
(W) WORD PROBLEMS

(W1) One-step Word Problems

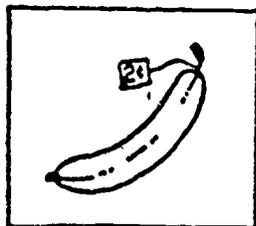
3.9 3.7 .28

Abstract: As the student looks at a series of cartoons and  
and/or follows the story in the captions below,  
the story is read by the tester.  
(9 items, 1 form)

Example:



Jill spent 6¢ to  
buy some bananas.



Bananas cost 2¢ each.

How many bananas did  
she buy?

\_\_\_\_\_

Summary of CSMP/non-CSMP Comparisons by MANS Category

The 13 individual MANS scales were grouped into 7 categories according to the content of the scale. Table 5 shows the adjusted means and p-value for each of these categories.

Table 5  
MANS Results by Scale Category

Scale Category <sup>1</sup> (specific scales)	Number of Items	Adjusted Mean Scores		p-Value
		CSMP Classes ( n=20 )	Non-CSMP Classes ( n=20 )	
Computation (C1, C2)	42	20.2	18.8	.22
Estimation (E2, E3, E4)	18	6.3	5.9	.22
Fluency (F1)	16	6.5	5.8	.16
Other Number Systems (N1) (Negative Numbers)	8	2.8	2.4	.09
Number Patterns and Relationships (R1, R3, R4, R5)	46	17.5	15.1	.01
Place Value (V3)	22	11.3	10.1	.07
Word Problems (W1)	9	3.9	3.7	.28
TOTAL SCORE:	161	68.5	61.7	.03

<sup>1</sup>Appendix A gives the means on each subtest for each class in the study.

Table 5 shows that the difference between the CSMP and non-CSMP classes on the total MANS test was statistically significant in favor of CSMP. Further it shows that there was a difference in favor of CSMP in each of the seven categories but that only for Number Patterns and Relationships was it statistically significant (at the .01 level).

### Comparison with Previous Studies

The most closely related study (Evaluation Report 7-B-4) tested 21 second grade classes, 12 CSMP and 9 non-CSMP. Table 6 gives a comparison of the CSMP/non-CSMP results in the two studies.

Table 6

Comparison of Present Results with those of 1980<sup>1</sup>

1981 Scales		Similar 1980 Scales
Name	p-Value	p-Value
Labelling Number Lines	.001	.01
Solving Number Machines	.01	.01
Mental Arithmetic	.02	.05
Estimating Intervals: x	.04	.01
Writing Numbers	.07	.01
Sequences	.07	.05
Negative Numbers	.10	.10
Number Fluency	.17	.01
One Step Word Problems	.28	.20
Estimating Intervals: +	.39	.40
Estimating Intervals: -	.58	.10
Which Is Larger	.78	.10
Computation	.53 <sup>2</sup>	.85 <sup>2</sup>

<sup>1</sup> See Evaluation Report 7-B-4.

<sup>2</sup> The circle denotes that the difference was in favor of non-CSMP.

Table 6 shows that the differences in favor of CSMP were generally somewhat stronger in the 1980 study, but that the pattern of strengths and weakness is very similar. Scales showing a statistically significant difference in favor of CSMP in 1981 generally showed similar results in 1980. Where the difference in favor of CSMP was smallest in 1981, it was also relatively small in 1980. The one scale (Computation) in which the difference was slightly in favor of non-CSMP in 1981 showed a similar result in 1980.

## Graph of Class Means

In Figure 1 a graph is presented in which each class is represented by its mean on the vocabulary test and its mean on the total MANS score. Also shown is the regression line based on the present data. It shows the best estimate of a class mean on the Total MANS test given the mean on the vocabulary test.

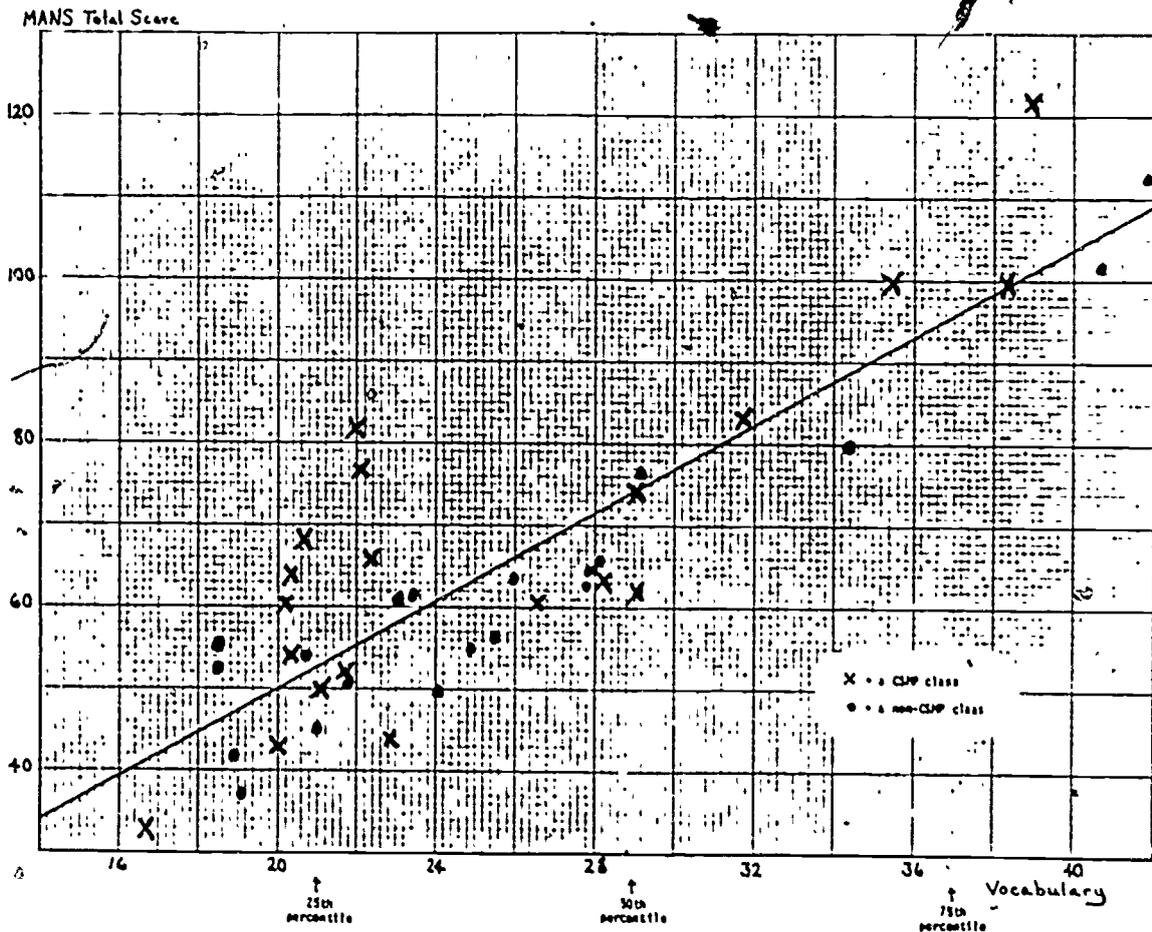


Figure 1, Class Means, Total MANS Score vs. Vocabulary

Figure 1 shows the preponderance of classes with rather low vocabulary scores. In fact 30 of the 40 classes scored below 29 which is the 50th percentile on the national norms for individuals taking that section of the Gates McGinitie Test. The graph also shows that the classes which had the highest MANS scores relative to reading ability were all CSMP classes, but that several CSMP classes were also among the lowest scoring classes. By contrast, the non-CSMP scores were much more regular in the sense of being within a fairly narrow band relative to the regression line. Appendix A gives the mean on each MANS scale for each class in the study.

## Graph of District Means

Figure 2, below, has been constructed in a fashion similar to Figure 1 except that district means are plotted instead of class means.

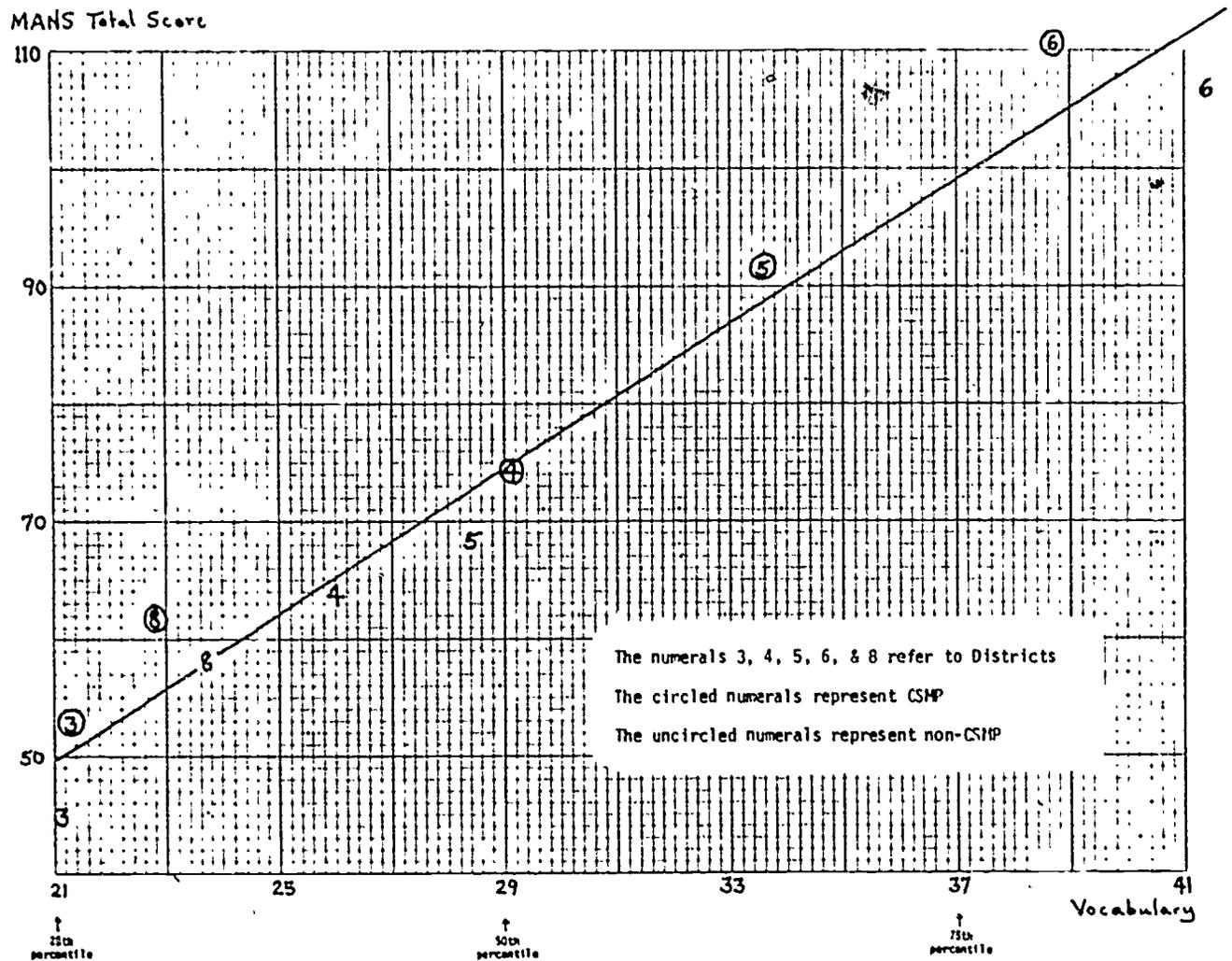


Figure 2, District Means, Total MANS Scores vs. Vocabulary

Figure 2 shows that each district occupies a rather distinct position in the range of vocabulary scores. In addition it shows that CSMP classes out-performed their non-CSMP counterparts in each district.

APPENDIX A

LIST OF CLASS MEANS

Table 7, below, gives the mean on each MANS scale for each of the 40 classes in this study. The classes with numbers 1 - 10 are CSMP classes, those larger than 10 are non-CSMP. The scale designations (a letter and a number) are keyed to those that appear with the scale names and descriptions throughout this report.

Table 7  
List of Class Means, Second Grade MANS Tests, 1981

DIST	CLASS	COMPUTATION		ESTIMATION			NUMBER FLUENCY	NEGATIVE NUMBERS	NUMBER PATTERNS AND RELATIONSHIPS					PLACE VALUE	WORD PRODS	TOTAL	READING VOCABL
		C1	C2	E1	E3	E4			F1	N1	R1	R3	R4				
3	1	4.3	9.4	2.4	1.4	1.5	4.5	2.5	1.7	3.4	4.9	2.7	8.7	2.6	52.1	21.7	
3	2	0.6	5.7	2.9	1.9	1.6	3.5	2.5	1.7	2.5	5.6	1.7	8.0	3.6	49.9	21.1	
3	3	10.4	6.4	2.8	1.8	1.4	4.0	2.1	1.4	2.9	6.4	2.5	10.0	2.7	53.9	20.4	
3	4	15.4	10.5	1.5	1.1	1.4	4.9	1.8	2.2	3.4	4.6	2.6	12.2	4.2	64.3	20.4	
3	5	6.4	5.9	3.1	1.7	1.2	3.6	2.7	1.4	2.3	5.3	1.8	6.0	2.4	43.8	22.9	
4	31	9.4	4.4	2.8	1.4	1.8	3.8	1.1	4.6	2.2	6.8	1.1	8.6	2.5	44.9	21.0	
5	51	13.1	7.2	1.6	1.3	1.4	3.4	1.4	2.9	3.3	5.4	2.5	9.9	3.3	56.0	23.5	
3	52	9.9	4.7	2.4	1.5	1.0	1.9	2.6	4.9	1.3	4.0	0.5	4.5	2.3	37.0	19.1	
3	53	9.7	4.3	2.0	1.4	0.9	4.6	2.4	1.5	1.1	5.6	1.1	7.7	2.5	41.6	18.9	
4	1	10.1	10.9	3.3	1.7	1.4	4.3	2.8	3.1	4.9	6.8	4.8	13.8	4.1	74.2	29.1	
4	51	11.5	7.9	2.6	1.3	1.4	4.7	2.0	1.4	3.9	6.9	3.3	12.5	4.2	63.8	26.0	
5	1	11.5	14.3	4.3	2.5	2.3	6.7	6.2	5.3	8.8	9.0	6.3	15.4	5.7	99.7	35.5	
5	2	12.4	17.2	3.8	2.2	1.8	3.4	3.8	3.5	5.4	6.7	4.6	14.2	4.5	83.2	31.7	
6	51	9.4	7.3	3.4	2.4	1.9	7.4	2.7	3.8	4.7	6.4	3.1	10.8	3.8	64.8	28.1	
5	52	11.1	9.3	3.5	2.2	1.8	7.0	3.3	3.4	6.3	7.8	4.1	12.1	4.5	76.3	29.2	
5	53	7.5	7.1	3.5	1.9	2.6	7.6	2.3	2.3	4.9	6.4	3.6	10.1	4.1	62.8	27.8	
6	1	13.4	14.0	4.6	3.3	2.3	10.6	3.5	4.4	6.8	8.3	6.1	16.5	5.1	97.5	38.4	
6	2	14.9	18.3	4.8	4.1	3.2	10.4	3.8	6.3	8.8	9.8	7.4	20.2	6.8	121.7	39.8	
6	51	15.3	16.3	3.5	3.2	2.1	12.5	4.2	5.2	7.8	9.8	6.7	18.7	6.9	112.2	41.9	
6	52	13.0	15.2	4.3	2.9	2.3	10.8	4.8	4.4	7.4	9.3	5.6	16.2	6.7	101.4	40.7	
8	1	11.1	13.3	2.4	2.0	1.8	7.0	2.7	2.3	5.6	8.1	5.2	13.6	4.3	81.9	22.0	
8	2	8.7	5.8	1.9	1.6	1.8	3.6	1.7	1.1	2.6	7.8	3.2	8.4	3.8	42.8	20.0	
8	3	10.3	8.2	2.3	1.5	1.4	9.3	2.1	2.3	3.7	6.2	2.7	10.1	3.3	63.4	26.6	
8	4	11.6	6.7	1.8	1.7	1.4	9.2	1.9	1.1	4.8	6.3	4.1	10.5	3.0	63.3	28.2	
8	5	18.1	7.6	1.7	1.7	1.4	4.7	2.5	2.1	4.1	7.4	3.6	11.5	3.7	62.8	29.1	
8	6	13.0	12.7	3.0	1.7	1.3	7.0	1.8	3.0	4.2	6.3	4.8	13.7	4.3	76.9	22.1	
8	7	9.8	8.1	2.4	1.6	1.3	6.5	2.2	2.2	2.9	6.8	2.8	11.8	3.5	68.6	20.2	
8	8	16.4	9.3	3.4	1.7	1.4	7.8	2.1	1.7	4.4	6.3	4.1	9.7	3.9	69.9	22.4	
8	9	11.0	9.7	3.0	2.1	1.6	6.2	2.2	1.9	4.0	7.4	3.6	10.9	4.7	68.3	20.7	
8	10	4.4	4.3	1.5	0.9	0.3	3.2	2.8	1.8	1.3	5.1	2.5	3.2	2.5	32.0	16.7	
8	51	11.2	6.4	2.7	1.8	1.8	3.6	1.7	1.8	3.8	6.4	3.3	7.8	3.2	52.6	18.8	
8	52	11.1	7.9	2.3	1.9	1.1	4.2	2.0	1.4	4.5	6.3	3.6	12.0	3.1	65.3	28.0	
8	53	9.3	7.9	2.4	1.9	1.3	4.1	2.2	1.3	2.7	6.4	1.9	8.4	2.8	55.8	18.5	
8	54	14.8	10.4	3.6	3.1	1.7	4.8	2.9	2.1	4.6	7.6	3.9	13.5	4.8	79.6	34.4	
8	55	10.7	8.7	1.9	1.8	0.7	4.5	2.5	1.6	2.6	7.1	7.2	6.5	4.1	54.8	24.9	
8	56	9.7	8.7	2.8	1.4	1.4	5.3	2.4	2.5	4.3	6.8	2.4	9.5	4.0	61.2	23.4	
8	57	10.4	7.2	2.8	1.7	1.4	4.2	2.8	1.4	2.8	6.2	1.6	9.9	3.1	53.9	20.7	
8	58	11.4	7.9	2.8	2.8	1.4	6.4	1.6	1.5	4.5	6.4	2.5	9.5	3.3	68.5	23.1	
8	59	8.5	6.5	2.4	1.5	1.2	4.7	1.9	1.9	3.1	6.0	1.2	7.6	2.6	49.5	14.1	
8	60	7.3	6.8	2.1	2.4	0.8	4.4	2.4	1.4	2.5	6.2	1.6	8.8	3.2	58.7	21.8	