DOCUMENT RESUME

ED 132 179 95 TM 005 894

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TITLE Innovative School Environments and Student Outcomes. Project LONGSTEP Final Report: Volume II.
INSTITUTION American Institutes for Research in the Behavioral Sciences, Palo Alto, Calif.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
REPORT NO AIR-21400-9/76-FR-II
PUB DATE Sep 76
CONTRACT OEC-0-70-4789
NOTE 93p.; For related documents, see TM 005 891-896 and TM 005 920-922

EDRS PRICE MF-$0.83 HC-$4.67 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Gains; Achievement Tests; *Educational Innovation; Elementary School Students; Elementary Secondary Education; Language Arts; *Longitudinal Studies; Mathematics; *School Attitudes; *School Environment; Sciences; Social Studies; Statistical Analysis; Student Attitudes
IDENTIFIERS Longitudinal Study of Educational Practices; *Project LONGSTEP

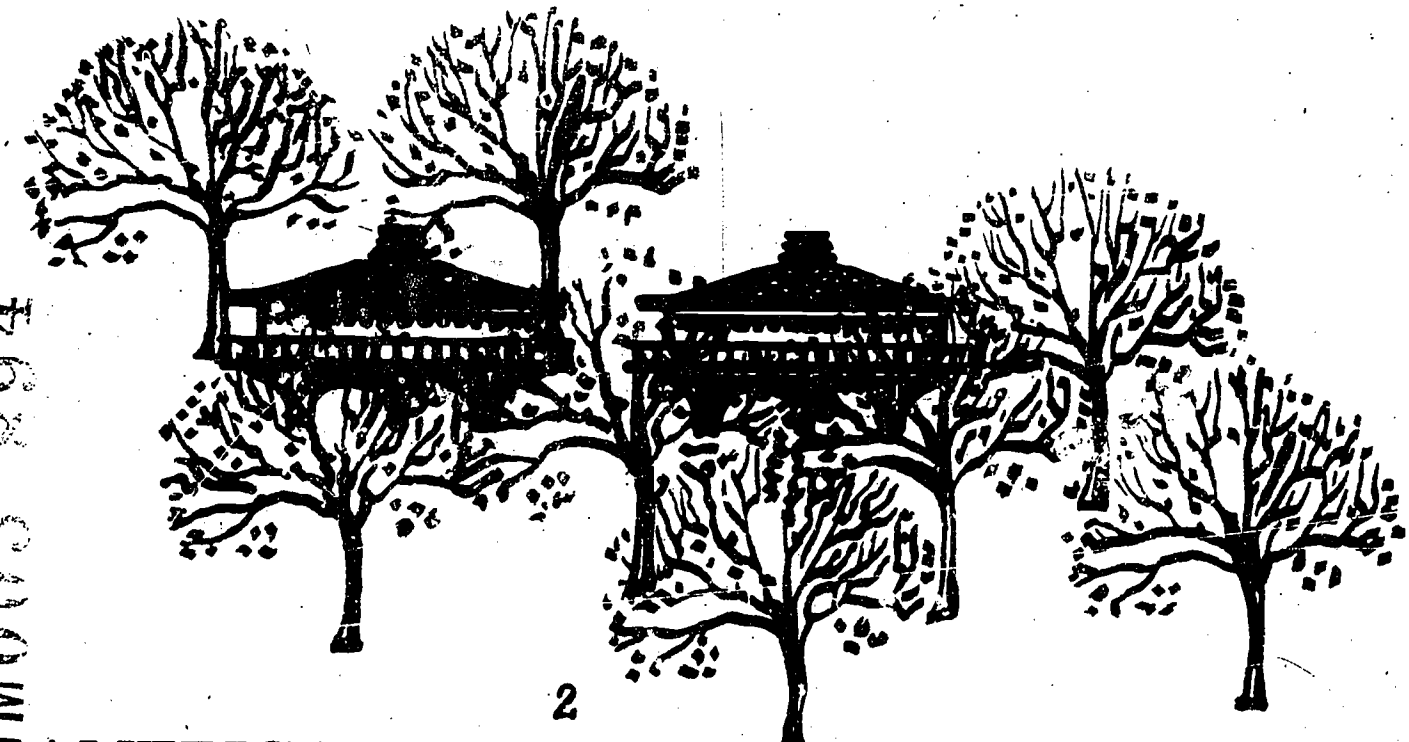
ABSTRACT

The general emphasis of Project LONGSTEP was on the identification of changes in student achievement that occur as a result of exposure to intensive educational innovation. This volume explores the possibility that growth in student achievement test performance and positive changes in school-related attitudes were highly associated with highly innovative school environments. Both student outcome scores and treatment data in language arts, mathematics, social studies, and science were aggregated to the school level so that the more general question of the relation between school environments and outcomes could be explored. Important differences among schools with respect to the achievement test performance and attitudes of their students existed in a number of samples analyzed. Greater average growth in achievement test performance and positive changes in attitude were not associated with school-level emphasis on innovation and individualization. Measures of growth in achievement were typically not related to quantity of schooling indices. There was, however, a tendency for these indices to be positively related to student attitudes toward schooling. In general, changes in average student attitudes toward school were not significantly related to average growth in achievement. However, the majority of correlations were positive. In respect to the primary hypothesis, the results of this study indicate that innovative school environments did not demonstrate a substantially positive impact on either achievement or student attitudes. "Data Collection Instruments and Guidelines" developed for Project LONGSTEP referenced in Vol. I, Chapter II, Section C, will be accessioned TM 005 987 in RIEMAY77. (RC)

INNOVATIVE SCHOOL ENVIRONMENTS AND STUDENT OUTCOMES

Project LONGSTEP Final Report

Volume II



AMERICAN INSTITUTES FOR RESEARCH

Palo Alto, California

AIR-21400-9/76-FR-II

INNOVATIVE SCHOOL ENVIRONMENTS AND STUDENT OUTCOMES

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PROJECT LONGSTEP FINAL REPORT

VOLUME II

Prepared for

Office of Planning, Budgeting and Evaluation
Office of Education
Washington, D. C. 20202

American Institutes for Research
Palo Alto, California 94302

September 1976

The research reported herein was performed pursuant to Contract No. OEC-0-70-4789 with the U. S. Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

ABSTRACT

This report is one of a series developed as part of the Longitudinal Study of Educational Practices (Project LONGSTEP). The general emphasis of Project LONGSTEP was on the identification of changes in student achievement that occur as a result of exposure to intensive educational innovation. The specific purpose of this volume was to explore the possibility that growth in student achievement test performance and positive changes in attitudes toward school were highly associated with school environments in which there was, on the average, a great deal of emphasis on innovation.

Previous Project LONGSTEP reports examined the relationship between achievement test performance in mathematics and reading/language and intensive educational innovation in those subject-matter areas. The analyses conducted for this report, however, were not designed to assess the impact of specific educational treatments on individual students. Rather, both student outcome scores and treatment data in all subject matter areas (language arts, mathematics, social studies and science) were aggregated to the school level and interrelated so that the more general question of the relation between school environments and outcomes could be explored.

The findings of this study suggest that

- Important differences among schools with respect to the achievement test performance and attitudes of their students existed in a number of LONGSTEP samples analyzed.
- Greater average growth in achievement test performance and positive changes in attitude were not associated with school-level emphasis on innovation and individualization.
- Measures of growth in achievement were typically not related to our key quantity of schooling indices. There was, however, a tendency for these indices to be positively related to student attitudes toward schooling.

- In general, changes in average student attitudes toward school were not significantly related to average growth in achievement. However, the majority of correlations were positive.

In respect to our primary hypothesis, the results of this study indicate that innovative school environments did not demonstrate a substantially positive impact on either achievement or student attitudes. These findings essentially support the student-level findings reported in Volume I and the Volume I Supplement. The pattern of results leads us to conclude that important differences among schools in the LONGSTEP sample did occur but that such differences were not highly associated with innovative school environments.

ACKNOWLEDGMENTS

The conduct of a project as large and complex as LONGSTEP requires the assistance of a large number of agencies and individuals. The preface to Volume I of the final report attempted to acknowledge these many project contributions. The present report obviously owes its existence to all of the project contributors, and to them we again express our gratitude. In this section we would like to offer our sincere appreciation to the following individuals who made special contribution to Volume II:

Bruce E. Everett and David E. Gross for their processing of the student-level data analyzed;

Marion F. Shaycoft, for her critical review of the manuscript; and

Carolyn L. Davis, for her preparation of the manuscript.

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I. INTRODUCTION TO PROJECT LONGSTEP

Educators and noneducators alike have shown a growing awareness of the lack of--and need for--evidence as to whether or not innovative educational practices are indeed better than the more traditional approaches. In response to this need, the U. S. Office of Education in 1969 awarded a contract to the American Institutes for Research to develop a design for a study of the effectiveness of highly intensive, innovative educational practices on students in grades 1 through 12. The general emphasis of the resulting Project LONGSTEP (the Longitudinal Study of Educational Practices) was on the identification of changes in student achievement that occur as a result of exposure to intensive educational innovation, "intensive innovation" meaning the implementation of a new program encompassing a significant proportion of students, entailing a major alteration of school procedures, and involving a high investment of resources.

Specific objectives of Project LONGSTEP were to design a system to study the characteristics underlying innovative educational approaches; to establish a large-scale data base of program characteristics and student outcomes for a select sample of educational programs involving intensive and highly innovative education practices; to determine longitudinally the impact of such innovation upon student performance and attitudes; and to attempt to identify the dimensions of the components that exhibited the greatest impact on student outcomes.

A complete discussion of the project design and data collection, the scaling of the analysis variables, and the methods and findings for an analysis of innovative emphasis in language arts and arithmetic is contained in Volume I and the Volume I Supplement of the final report (Coles, Chalupsky, Everett, Shaycoft, Rodabaugh and Danoff, 1976; Coles and Chalupsky, 1976). This Volume II report has been prepared with the expectation that the reader is familiar with the general study design and the scaling of the study's variables as reported in Volume I and the Volume I Supplement. However, to familiarize the reader with these previous reports, this section will end with a brief description of the objectives of Volume I and the Volume I Supplement as well as a summary of the methods used and

the major findings. (Readers who are familiar with the analytic methods and findings presented in Volume I and its supplement may want to skip the following discussion and turn to Section II.)

The basic objective of the previous analyses of the Project LONGSTEP data base was to determine if substantial gains in reading or arithmetic achievement were associated, to any meaningful degree, with exposure to intensive educational innovation in the language arts or arithmetic subject matter areas. Overall differences in achievement growth among analysis samples were compared to national norms and also associated with sample differences with respect to (1) pretest, (2) socioeconomic status, (3) innovative emphasis (measured by an index called Level of Innovation), (4) Number of Minutes per Day (in a typical classroom on either language arts or math activities), and (5) Teaching Qualifications (a measure of the experience and qualifications of each student's language arts or math teacher(s)).

An educational growth model was analyzed that related achievement growth to variation with respect to these same variables among treatment groups within each analysis sample. Results across analysis samples (i.e., across grades, cohorts[1] and school years) were compared. So as to utilize a somewhat different methodology to examine the associations between educational treatment attributes and outcomes within analysis samples, a residualized achievement gain score was correlated with Level of Innovation, Number of Minutes per Day, and Teaching Qualifications. The gain score was equal to that part of a student's CTBS[2] Reading Total or CTBS Arithmetic

[1]"Cohort" is a term that is used to identify a given group of students who followed the same grade progression during the three years that the study was implemented. Cohorts are labeled by the grade level of that group of students during Year 1 of the study, the 1970-71 school year. Thus, Cohort 1 refers to all those students who were first-graders during the 1970-71 school year or who were not present in the sample during Year 1 but who would have been first-graders at that time because they were second-graders in Year 2 or third-graders in Year 3. Similarly, Cohort 4 would identify the students who were in the fourth grade in 1970-71. The term "cohort" was utilized throughout the Project LONGSTEP report to identify student groups because the study's longitudinal design meant that a given group of students would be members of three different grades, the particular grade depending on the particular school year.

[2]Comprehensive Tests of Basic Skills, 1968 edition, Monterey, California: CTB/McGraw-Hill.

Total posttest score that could not be predicted from the appropriate pretest score and the student's socioeconomic status (SES) level.

Lastly, because procedures based on all students in an analysis sample permitted the examination of only overall or average trends, it was believed possible that innovative emphasis could have been highly related to achievement, but only for a small number of students. Therefore, those students were identified who, for two consecutive school years, achieved much more or much less than was expected on the basis of their pretest and SES levels. High achievers were then compared with low achievers with respect to the Level of Innovation, Number of Minutes per Day and Teaching Qualifications to which they had been exposed.

This rather diverse set of analytic procedures was used in Volume I and the Volume I Supplement to examine the relationship between reading and arithmetic achievement and program-level innovative emphasis in those subject matter areas. The following major findings were reported.

- The mean reading and arithmetic posttest scores for Project LONGSTEP's sample of fairly innovative schools were <u>not</u> conspicuously farther from national norms than their average pretest scores were from their norms.
- Variation among analysis samples with respect to average reading and arithmetic achievement gains did not tend to be associated in any highly consistent manner with sample differences on mean Level of Innovation, Number of Minutes per Day and Teaching Qualifications.
- Variation in Level of Innovation was not highly associated with reading or arithmetic achievement within Project LONGSTEP's analysis samples.
- Variation in Level of Innovation was not positively or consistently related to reading achievement within analysis samples.
- Variation in Level of Innovation appeared to be negatively associated with arithmetic achievement in many samples.

- Variation in Teaching Qualifications was not highly or consistently related to reading achievement but was positively associated with small gains in arithmetic achievement.

Additional findings included (1) a trend for reading and arithmetic achievement to decrease between the sixth and seventh grades, (2) a trend for reading and arithmetic gains on the Comprehensive Tests of Basic Skills (CTBS) to be larger in the earlier grades, (3) a trend for the average gains in arithmetic shown by all cohorts except those in senior high school to be larger than mean gains in reading (relative to their respective standard deviations), (4) a trend for the elementary grades (1-6) to be exposed to notably more instruction per day than junior high and high school students with respect to language arts, and (5) notable mean achievement gains in reading and arithmetic for students who were third-graders during the 1972-73 school year.

II. OBJECTIVES AND ANALYTIC STRATEGY FOR THIS VOLUME

Volume I and the Volume I Supplement examined trends in reading and arithmetic achievement both between and within reading and arithmetic analysis samples and cohorts/grades. Overall findings were that Project LONGSTEP's primary research hypothesis--that substantial gains in reading and arithmetic achievement are positively associated with innovative emphasis in these subject matter areas--was not supported in any general way.

The analyses conducted for these previous reports, however, did not assess the impact of program-level innovative emphasis on student attitudes nor did they examine the impact of the innovativeness of the total school environment on student performance. Procedures implemented for the current report were designed to explore these more general questions concerning the impact of intensive, innovative school environments. Specifically, the objective of this brief report is to explore the possibility that growth in student cognitive achievement and positive changes in attitudes toward school were highly associated with school environments in which there was, on the average, a great deal of emphasis on innovation. The remainder of

this chapter contains a summary of the analytic strategy used to achieve this objective. Methods are summarized with respect to each of the questions that were posed concerning the data.

1. What grades were analyzed?

Although Project LONGSTEP collected data from 11 cohorts of students during three consecutive school years (1970-71, 1971-72 and 1972-73), time and cost constraints did not permit analysis of all these data. Furthermore, project staff felt that a judicious sampling of the available grades would be adequate for the exploratory analyses to be conducted. It was decided that achievement growth and changes in attitude during the 1972-73 school year for students who were then in grades 3, 6, 7, 10 and 12[3] would allow the proposed analyses of the impact of students' total educational environment to focus on the

- early elementary school years (grade 3)
- late elementary school years (grade 6)
- middle school years or the first year of junior high school (grade 7)
- intermediate high school years (grade 10)
- late high school years (grade 12).

2. How were innovative emphasis and other attributes of the school environment measured?

As noted previously, the objective of the analyses conducted here was to examine the impact of students' total educational environment rather than the impact of the treatment environment in a specific subject matter area. In other words, the analyses to be conducted for this volume were designed to focus on school environments rather than on the specific treatment environments to which individual students were exposed. The essential difference in these two approaches in terms of measures of treatment attributes is that the school environment may be considered an aggregate characteristic of all the Educational Experience Analysis Guide

[3]Students in these grades in 1972-73 were members of Cohorts 1, 4, 5, 8 and 10, respectively.

(EdExAG) groups[4] present in the school. Furthermore, since it was the overall school environment that was of interest, these school-level attributes for a given grade for all subject matter areas (language arts, arithmetic/mathematics, social studies and science) could be assumed to influence all students in a particular grade within a particular school, regardless of whether or not they are taking a specific subject (language arts, arithmetic/mathematics, social studies and science) and regardless of the specific EdExAG group to which they belonged.

Measures of the school environment for students in grades 3, 6, 7, 10 and 12 were created in two steps. First, all variables of interest were aggregated (separately by grade within school) to the subject matter area level. For example, three EdExAG groups in science for students in grade 10 may have been identified in school A. An aggregate score for science for school A for grade 10, then, would have been computed by averaging each variable of interest across these three groups. Second, a school-level aggregate score on each relevant variable was computed by averaging the four subject matter area aggregate scores pertaining to a given grade within a given school. In terms of the example noted previously, the Level of Innovation aggregate scores for language arts, arithmetic/mathematics, social studies and science for grade 10 in school A would have been averaged.

3. What educational outcomes were analyzed?

Since these analyses were targeted at the impact of the overall school environment, the most appropriate available measure of general cognitive achievement was judged to be the CTBS Battery Total Score. Thus, the Battery Total Expanded Scale Score provided by the test publisher, CTB/McGraw-Hill, was utilized in all analyses. (Volume I contains a more detailed discussion of the attributes of this "equal interval" test score scale.) In addition, because they had not been included in the analyses

[4] As described thoroughly in Volume I, an instrument called the Educational Experience Analysis Guide (EdExAG) was used by AIR staff to document the underlying attributes of school practices and procedures. All the students in a given school who were exposed to the same basic programmatic approach, as defined by the items on the EdExAG, were said to belong to the same EdExAG group.

conducted for Volume I or for the Volume I Supplement, school differences with respect to growth in a number of subtest areas of the CTBS were also computed. An even more compelling reason for considering these additional cognitive outcomes was the possibility that they might have been influenced differently by the intensive innovations sampled by Project LONGSTEP.[5] Thus, the Expanded Scale Scores for Reading Vocabulary, Reading Comprehension, Arithmetic Computation, Arithmetic Concepts, and Arithmetic Applications were included in a number of the analyses and summary tables presented in this report.

Lastly, a general measure of school- or education-related attitudes was computed by averaging the following student questionnaire scales: Attitude toward School, Attitude toward Language Arts, Reading Interest, and Attitude toward Math. The resulting score was called the Attitude Composite. As shown in Attachment A, Table A-1, the internal consistency reliability of this four-scale composite index (as measured by Cronbach's coefficient alpha) ranged between .53 and .68. These were judged sufficient, given the nature and probable stability of the attributes being assessed.

It should be noted that the four-scale Attitude Composite could not be computed for students in grade 3 because the version of the student questionnaire pertaining to these students was completed by their teachers and did not contain the items used to construct the four basic attitude scales averaged for the Attitude Composite. Therefore, the Attitude Composite index analyzed for grade 3 students was the three-item scale called Social Facility in Volume I. This scale assessed the extent to which the student made friends easily, was socially aggressive and was confident with adults.

[5]During the early years of Project LONGSTEP it was hypothesized that a general measure of cognitive achievement, like that provided by the Comprehensive Tests of Basic Skills (CTBS), might not be sensitive to the impact that such a diverse set of educational programs had on their students. More specifically, it was argued that some of the items found in the CTBS may have assessed skills that were not relevant given the instructional objectives of a particular program. To explore this issue empirically, information concerning mathematics objectives was collected with respect to a subset of the grades participating in the study. The Project LONGSTEP Final Report: Volume II Appendix Report (separately bound) presents the methods and findings obtained.

4. How were students selected for the analysis samples and how many students were included in each?

Samples of students analyzed for this report were those students who (1) had followed a normal grade progression during their years of participation in Project LONGSTEP, (2) had an SES score, and (3) had a CTBS Battery Total Score from Spring 1972 (the pretest) and from Spring 1973 (the posttest). Students included in the Attitude Composite analyses were also required to have an Attitude Composite score for Spring 1972 (pre-attitude) and for Spring 1973 (post-attitude). Table 1 shows the number of students in the achievement and attitude analyses for grades 3, 6, 7, 8 and 10. The number of different schools is also shown in Table 1.

TABLE 1

Numbers of Students (and Schools) per Analysis Sample

Grade	Achievement Analysis	Attitude Analyses*
3	721 (13)	704 (13)
6	2046 (34)	1766 (30)
7	1852 (19)	1622 (18)
10	1471 (6)	1308 (6)
12	901 (3)	754 (3)

*Fewer schools were involved in the attitude analyses for grades 6 and 7 because the student questionnaire from which the attitude measure was derived could not be given to students at one participating site.

Due to time and cost restraints, the attributes of students not meeting the selection criteria for these analyses could not be examined. Thus, all inferences presented in this report technically only apply to the particular populations of students of which the analysis samples may be considered representative.

5. What attributes of students' total educational environments were of primary concern?

Table 2 shows the school environment measures that were included in the tables prepared for this Volume II of the Project LONGSTEP final report. Outcome measures have also been included in Table 2 so that one table contains a listing of all the measures compiled for these analyses. It should be noted, however, that the primary focus of the analyses presented here was on a subset of the variables shown in Table 2. Therefore, the variables of primary concern have been marked with an asterisk.

6. What method was used to adjust outcome differences among schools for differences in student input?

Each posttest (or post-attitude) score was regressed[6] on pretest (or pre-attitude), student SES, and a series of dummy variables encoding school membership. The square of the multiple correlation obtained was then compared with that resulting from the regression of posttest on pretest (or pre-attitude) and SES alone. The difference between the two squared multiple correlations indicated the percent of variance in the posttest (or post-attitude) that could be associated with school membership, after the influence of school membership was statistically adjusted for differences with respect to pretest (or pre-attitude) and SES. In commonality analysis terms (Mayeske, et al., 1972) this difference between squared multiple correlations is called the uniqueness for school membership (relative to the particular prediction model also containing pretest and SES). It should be noted that this procedure is the regression analysis formulation of analysis of covariance and that testing the statistical significance of such a uniqueness is equivalent to testing for differences in adjusted posttest means. Table A-2 in Attachment A shows the square of the multiple correlation of posttest (or post-attitude) with

- the school membership dummy codes alone [$R^2(D)$]

[6]The unit of analysis in these regressions was the individual student.

TABLE 2

Analysis Variables Compiled
for the Volume II Report

Outcome Measures - Cognitive Achievement[1]

*CTBS Battery Total Expanded Scale Score
CTBS Reading Vocabulary Expanded Scale Score
CTBS Reading Comprehension Expanded Scale Score
CTBS Arithmetic Computation Expanded Scale Score
CTBS Arithmetic Concepts Expanded Scale Score
CTBS Arithmetic Applications Expanded Scale Score

Outcome Measures - Attitudinal[1]

*Social Facility (Grade 3 only)
*Attitude Composite (Grades 6,7,10 and 12)

Student Background

Student Socioeconomic Status (SES)

Mean Quantity of Schooling Measures by School

Percent of School Year prior to the Pretest
Percent of School Year prior to the Posttest
Number of Days per School Year (Posttest Year)
Number of Days Prior to Posttest (Posttest Year)
*Number of Minutes per Day[2] (Posttest Year)
*Total Time Before Posttest in Hours[2] (Posttest Year Only)

Average Treatment Attributes by School[3]

*Level of Innovation
*Degree of Individualization
Individualization of Instructional Pace
Use of Performance Agreements
Utilization of Student Evaluation
Scheduling Characteristics
Classroom - Group Organization
Affective Evaluation
Treatment Years for the Grade

Average Resource Variables by School[3]

School-Classroom Design
Use of Materials (based on classroom observation)
Classroom Environment (based on classroom observation)
Study Arrangements (based on classroom observation)
Access to Resources (based on classroom observation)
*Teacher/Student Contact Hour Ratio[4]
Aide/Student Contact Hour Ratio
Volunteer/Student Contact Hour Ratio
Teacher Inservice Training

*Key analysis variables for this report.
[1]Collected during Spring 1972 (pretest or pre-attitude) and Spring 1973 (posttest or post-attitude).
[2]Equal to the average number of hours per day in a typical classroom spent on a given subject (language arts, arithmetic/mathematics, social studies or science) summed across subject matter areas.
[3]For the posttest school year. The composition of these scales is discussed fully in Volume I.
[4]Equal to the number of teachers times the number of hours per week spent in a "typical" classroom, times 100 and divided by number of student contact hours per week.

- pretest (or pre-attitude) and SES alone [$R^2(P,S)$]
- pretest (or pre-attitude), SES, and the school membership dummy codes [$R^2(P,S,D)$].

Table A-3 in Attachment A shows the raw score regression coefficients for pretest and for SES in the regression equation containing pretest, SES, and the school membership codes as predictors of posttest. These coefficients are the familiar within-group (i.e., within-schools here) regression coefficients (pooled) used in analysis of covariance to adjust the outcome or dependent variable means. The appropriate formula for adjusting posttest school means is,

$$\bar{Y}'_i = \bar{Y}_i - b_{w_X}(\bar{X}_i - \bar{\bar{X}}) - b_{w_Z}(\bar{Z}_i - \bar{\bar{Z}})$$

where,

$\bar{Y}'_i$ = adjusted posttest mean for school i ;

$\bar{Y}_i$ = unadjusted posttest mean for school i ;

b_{w_X}, b_{w_Z} = pooled within-schools raw score regression coefficents for variable X (pretest) and for variable Z (SES) obtained by regressing posttest (Y) on pretest (X), SES (Z), and the dummy variables encoding school membership;

$\bar{X}_i$ = school i's mean on variable X (pretest);

$\bar{\bar{X}}$ = the overall grand mean of variable X (pretest);

$\bar{Z}_i$ = school i's mean on variable Z (SES); and

$\bar{\bar{Z}}$ = the overall grand mean of variable Z (SES).

In summary, mean posttest (or post-attitude) differences among schools were statistically adjusted for pretest (or pre-attitude) and SES differences by means of analysis of covariance. Adjusted posttest (or post-attitude) means were computed for each school. The proportion of outcome variance uniquely associated with school membership was computed for each outcome measure and used as an index of the differential impact of schools and of the educational environments they were providing for students.

7. What analytic strategy was employed to examine the school-level associations between achievement growth (or changes in attitudes) and school environment attributes?

Adjusted posttest (or post-attitude) school means for each outcome measure shown in Table 2 were computed and separately ranked. (The highest adjusted school mean received the highest rank.) Descriptive statistics were then prepared for each school (separately by grade) with respect to the outcome measures themselves, the average quantity of school measures, the mean treatment attributes, and the average resource variables shown in Table 2. Next, this information was placed in summary tables according to each school's rank order on the CTBS Battery Total Score. The tables were scanned to see if any notable linear relationship existed between attributes of school environments and adjusted outcomes. An index of the association between the adjusted posttest school means and Number of Minutes per Day, Total Time Before Posttest (during the posttest school year), Level of Innovation, Degree of Individualization, and Teacher/Student Contact Hour Ratio was computed by correlating the measures, using the means shown in these summary tables as the basic data. School-level associations with the Attitude Composite were summarized similarly.

III. RESULTS AND DISCUSSION

Findings have been organized into short subsections summarizing the results regarding the school-level associations among the various outcomes and the various school environment attributes of interest in this report. A final section reviews these findings in the context of the results and conclusions discussed in Volume I and the Volume I Supplement of the Project LONGSTEP final report.

Magnitude of School Differences

Table 3 contains the proportion of student-level variance in each outcome measure that could be uniquely associated with students' school membership. Three trends seemed to be apparent in this table:

- notable differences among schools existed for all outcomes for students in grade 3 and, to a lesser extent, for students in grade 6
- school differences with respect to Arithmetic Computation were very large in grade 3 and worthy of note in grades 6 and 7
- school differences with respect to the Attitude Composite were largest for grade 6 and noteworthy for grade 3.

Associations Among Outcomes

Adjusted school means with respect to the CTBS Battery Total, the various CTBS subtests and the Attitude Composite are shown for each analysis grade in Attachment A, Tables A-4 through A-8. (Tables A-9 through A-13 in Attachment A contain the school pre-, post- and SES means and standard deviations for three outcomes--the CTBS Battery Total, the CTBS Arithmetic Computation score and the Attitude Composite.) Examination of the tables of adjusted school means showed that

- a school's average adjusted posttest performance on one measure of cognitive achievement was, as expected, highly related to its average adjusted posttest performance on the other cognitive measures

TABLE 3

Proportions of Outcome Variance Uniquely Associated with School Membership During the 1972-73 School Year[1]

Outcome/Dependent Variable	Grade 3	6	7	10	12
CTBS Battery Total	.077	.018	.021	.006	.006
Attitude Composite	.038	.052	.022	.011	.000
CTBS Reading Vocabulary	.081	.013	.007	.005	.014
CTBS Reading Comprehension	.075	.024	.018	.008	.009
CTBS Arithmetic Computation	.145	.080	.059	.008	.000
CTBS Arithmetic Concepts	.057	.025	.028	.004	.005
CTBS Arithmetic Applications	.068	.053	.023	.020	.007

[1]The squared multiple correlations from which these uniquenesses were computed are shown in Attachment A, Table A-2.

- the rank orders of the schools on the various adjusted CTBS subtest means were not identical (except in grades 10 and 12 where the numbers of different schools were very small)
- except in two cases, the adjusted mean Attitude Composite was not significantly correlated with any of the CTBS measures (see Table 4).

School Outcomes and Quantity of Schooling

School-level aggregate scores were computed for the quantity of schooling indices listed previously in Table 2. Each aggregate score was equal to the average score (or for some indices, the sum) computed across language arts, arithmetic/mathematics, social studies, and science subject-matter areas for a given grade. The results are shown in Attachment A, Tables A-14 through A-18. Adjusted posttest (or post-attitude) means were then correlated with these indices to provide a school-level measure of the association between achievement growth or attitude change and quantity of schooling. Table 5 shows the correlations of Number of Minutes per Day and Total Time Before the Posttest with the three outcomes for which there were notable differences among schools--CTBS Battery Total, CTBS Arithmetic Computation, and Attitude Composite. Because of the small numbers of schools, especially for grades 10 and 12, only two of the intercorrelations were statistically significant--the correlations of both key quantity of schooling indices with the Attitude Composite adjusted school means for grade 7. Since these correlations were positive, positive growth in attitudes toward school and schooling occurred in those schools having more instructional time per day (relative to the other Project LONGSTEP schools with seventh-graders). Table 5 also shows that most of the correlations with the Attitude Composite adjusted school means were positive, even where they were not statistically significant.

School Outcomes and Innovative Treatment Environments

School-level means for the educational treatment attributes listed previously in Table 2 have been placed in Attachment A, Tables A-19 through A-21. Only the means for schools with students in grades 3, 6 and 7 have

TABLE 4

School-Level Correlations Between
the Adjusted Mean Attitude Composite Score and
the CTBS Adjusted Posttest Means

Variable	Grade 3	6	7	10	12
CTBS Battery Total	.45	.33	-.08	.79	.10
CTBS Reading Vocabulary	.22	.19	-.21	.30	.13
CTBS Reading Comprehension	.21	.33	.07	.75	.09
CTBS Arithmetic Computation	.43	.00	-.13	.63	.28
CTBS Arithmetic Concepts	.58*	.31	-.19	.73	.56
CTBS Arithmetic Applications	.17	.36*	-.33	.60	-.08
Number of Schools	13	30	18	6	3

*$p \leq .05$ (two-tailed)

TABLE 3

School-Level Correlations of
Key Quantity of Schooling Indices
with Selected Outcomes

Variable	Grade 3	6	7	10	12
Number of Minutes per Day					
CTBS Battery Total	-.23	.19	-.29	.17	-.52
CTBS Arithmetic Computation	-.11	.01	-.39	.37	-.50
Attitude Composite	-.08	.04	.56*	.31	.52
Total Time Before the Posttest					
CTBS Battery Total	-.27	.00	-.05	.31	-.18
CTBS Arithmetic Computation	-.17	-.17	-.18	.48	-.15
Attitude Composite	-.01	-.01	.52*	.33	.63
Number of Schools					
Cognitive Outcome	13	34	19	6	3
Attitude Outcome	13	30	18	6	3

*$p \leq .05$ (two-tailed)

been included in these particular analyses since they were the only grades for which nontrivial mean differences among schools existed (see Table 3). Furthermore, attention was focused on the three outcomes where differences seemed to be occurring--the CTBS Battery Total and Arithmetic Computation scores and the Attitude Composite index. Adjusted outcome means (shown in Attachment A, Tables A-4, A-5 and A-6) were associated with the treatment attributes. Table 6 shows the school-level correlations (unweighted by numbers of students) between the three outcomes of primary interest and the two key treatment indices, Level of Innovation and Degree of Individualization. Examination of these correlations shows that (1) all but two of the 18 coefficients were negative, and (2) only one coefficient was statistically significant. Thus, greater mean growth in achievement and greater positive changes in attitude either were not associated with emphasis on innovation and individualization or were associated with the more moderate and less innovative schools present in these samples of schools.

School Outcomes and Resource Variables

The CTBS Battery Total and Arithmetic Computation posttest and the Attitude Composite means (adjusted) were also correlated with the resource variables listed in Table 2. School-level resource data for grades 3, 6 and 7 are shown by school in Attachment A, Tables A-22, A-23 and A-24. Correlations of the three outcomes with the resource index of primary interest, Teacher/Student Contact Hour Ratio are presented in Table 7. These coefficients do not suggest that achievement or attitudes are highly related to our measure of teacher/student contact. It should be pointed out, however, that only two of the coefficients were negative and that they also were very small.

Discussion

These results suggest that average achievement growth and attitude change are not highly or consistently associated (across grades) with innovative school environments. In fact, the only correlations between average outcomes and school attributes that were statistically significant were (1) the positive correlations between the Attitude Composite and the quantity of schooling indices for the seventh grade (see Table 5) and (2) the

TABLE 6

School-Level Correlations Between
Selected Adjusted Outcomes and Level of Innovation
and Degree of Individualization

Variable	Grade 3	Grade 6	Grade 7
Level of Innovation			
CTBS Battery Total	-.57*	.06	-.09
CTBS Arithmetic Computation	-.51	-.13	-.29
Attitude Composite	-.29	-.23	-.43
Degree of Individualization			
CTBS Battery Total	-.44	.11	-.15
CTBS Arithmetic Computation	-.31	-.06	-.35
Attitude Composite	-.25	-.23	-.27
Number of Schools			
Cognitive Outcome	13	34	19
Attitude Outcome	13	30	18

* $p \leq .05$ (two-tailed)

TABLE 7

School-Level Correlations Between Selected Adjusted Outcomes and Teacher/Student Contact Hour Ratio

Variable	Grade 3	Grade 6	Grade 7
Teacher/Student Contact Hour Ratio			
CTBS Battery Total	-.05	.07	.28
CTBS Arithmetic Computation	.02	-.01	.41
Attitude Composite	.47	.27	.21
Number of Schools			
Cognitive Outcome	13	34	19
Attitude Outcome	13	30	18

negative correlation between the CTBS Battery Total Score and Level of Innovation for the third grade (see Table 6). However, examination of the distribution of adjusted posttest school means for the third grade analysis sample (see Table A-4, Attachment A) indicated that the performance of students in two schools (schools 90 and 74) may have had a substantial impact on the observed negative correlation between posttest and Level of Innovation. It was decided, therefore, that the school-level correlations between the three primary outcomes of interest and the key school educational environment indices would be recomputed with two schools removed from the grade 3 correlations.

Coefficients obtained with and without the deleted schools are shown in Table 8. This table indicates that deletion of schools 90 and 74 from the grade 3 analysis has the general effect of reversing the sign of the relationship between these three school outcome measures and the school environment indices from negative to positive. This is most notable in the case of the statistically significant negative correlation of Level of Innovation with the CTBS Battery Total adjusted posttest school means. This result leads us to question the generality of a trend for lowered average cognitive achievement to be associated with less innovative emphasis in the grade 3 Project LONGSTEP schools. It could be argued, of course, that deleting observations so that one's findings more closely match one's suspicions is neither objective nor analytically defensible. However, the fact that correlations between all outcomes and all school environment indices were changed similarly by this procedure (deleting schools does suggest that these "outlying" schools were having a general impact on all results for grade 3, not just on the correlations with Level of Innovation.

In any case, the results of the analyses briefly described in this section do not show that innovative school environments had a substantially positive impact on achievement at the school level. Concluding that there is a negative relationship between achievement/attitudes and innovative emphasis is probably not warranted because the negative effects that were present were not dramatic. Furthermore, the negative effects observed in grade 3 were not general but due to high adjusted mean achievement in two schools that also happened to have little emphasis on innovation.

TABLE 8

School-Level Correlations of Selected Adjusted Outcomes for Grade 3 with the Key School Environment Indices - With/Without High Achieving Schools

Variable	CTBS Battery Total		CTBS Arithmetic Computation		Attitude Composite	
	N = 13	N = 11	N = 13	N = 11	N = 13	N = 11
Number of Minutes per Day	-.23	.05	-.11	.14	-.08	.20
Total Time Before the Posttest	-.27	.04	-.17	.17	-.01	.26
Level of Innovation	-.57	.02	-.51	.22	-.29	.05
Degree of Individualization	-.44	.06	-.31	.33	-.25	.05
Teacher/Student Contact Hour Ratio	-.05	-.01	.02	.17	.47	.55

IV. SUMMARY OF FINDINGS

The findings of this study suggest that

- Important differences among schools with respect to the achievement test performance and attitudes of their students existed in a number of LONGSTEP samples analyzed.
- Greater average growth in achievement test performance and positive changes in attitude were not associated with school-level emphasis on innovation and individualization.
- Measures of growth in achievement were typically not related to our key quantity of schooling indices. There was, however, a tendency for these indices to be positively related to student attitudes toward schooling.
- In general, changes in average student attitudes toward school were not significantly related to average growth in achievement. However, the majority of correlations were positive.

In respect to our primary hypothesis, the results of this study indicate that innovative school environments did not demonstrate a substantially positive impact on either achievement or student attitudes. These findings essentially support the student-level findings reported in Volume I and the Volume I Supplement. The pattern of results leads us to conclude that important differences among schools in the LONGSTEP sample did occur but that such differences were not highly associated with innovative school environments.

REFERENCES

Coles, G. J., Chalupsky, A. B., Everett, B. E., Shaycoft, M. F., Rodabaugh, B. J., & Danoff, M. N. Impact of educational innovation on student performance: Project methods and findings for three cohorts. Project LONGSTEP final report: Volume I. Palo Alto, California: American Institutes for Research, 1976.

Coles, G. J., Chalupsky, A. B. Impact of educational innovation on student performance: Overall findings for reading and arithmetic. Project LONGSTEP final report: Volume I Supplement. Palo Alto, California: American Institutes for Research, 1976.

Mayeske, G. W., Wisler, C. E., Beaton, A. E., Jr., Weinfeld, F. D., Cohen, W. M., Okada, T., Proshek, J. M., & Tabler, K. A. A study of our nation's schools. Washington, D. C.: U. S. Government Printing Office, 1972.

ATTACHMENT A

TABLE A-1

Coefficient Alpha (α) for the Attitude Composite Variable

Grade	Coefficient Alpha	
	Pre-Attitude	Post-Attitude
3*	.53	.57
6**	.62	.64
7**	.66	.68
10**	.64	.65
12**	.60	.61

* This is the internal consistency of the items in this scale based on all students for whom a Form A student questionnaire (during the pre-attitude year, 1971-72) or a Form B student questionnaire (during the post-attitude year, 1972-73) was available. See Volume I, Chapter III.

** $\alpha = \left[\frac{k}{k-1}\right]\left[1 - \frac{\sum V_i}{k^2 V_t}\right]$, where k = number of scales (4),

V_i = variance of the i^{th} scale,

V_t = variance of the composite mean index.

TABLE A-2

Multiple Correlations (Squared) Between Outcomes and Pretest (or Pre-Attitude), Student Socioeconomic Status and School Membership

Outcome/Dependent Variable	Grade (in 1972-73)														
	Grade 3			Grade 6			Grade 7			Grade 10			Grade 12		
	$R^2(D)$	$R^2(P,S)$	$R^2(P,S,D)$	$R^2(D)$	$R^2(P,S)$	$R^2(P,S,D)$	$R^2(D)$	$R^2(P,S)$	$R^2(P,S,D)$	$R^2(D)$	$R^2(P,S)$	$R^2(P,S,D)$	$R^2(D)$	$R^2(P,S)$	$R^2(P,S,D)$
CTBS Battery Total	.1242	.6610	.7383	.1480	.8290	.8472	.0939	.8166	.8380	.0774	.8353	.8409	.0548	.8362	.8422
Attitude Composite	.0255	.1131	.1511	.0694	.2840	.3361	.0431	.3768	.3992	.0320	.4862	.4974	.0447	.6013	.6016
CTBS Reading Vocabulary	.1495	.5275	.6089	.1456	.7246	.7372	.0899	.6598	.6664	.0824	.7113	.7163	.0814	.6926	.7070
CTBS Reading Comprehension	.1334	.5156	.5903	.1263	.5766	.6001	.0773	.5690	.5873	.0929	.6057	.6135	.0489	.6101	.6194
CTBS Arithmetic Computation	.1074	.3488	.4936	.1818	.4840	.5640	.1179	.5646	.6233	.0364	.7036	.7119	.0169	.7246	.7249
CTBS Arithmetic Concepts	.1066	.5447	.6018	.1064	.5280	.5526	.0748	.5105	.5385	.0529	.6463	.6507	.0309	.6609	.6657
CTBS Arithmetic Applications	.0909	.3496	.4173	.1075	.5473	.6002	.0615	.5197	.5423	.0407	.5427	.5629	.0274	.5896	.5967

Note: $R^2(D)$, $R^2(P,S)$, $R^2(P,S,D)$ are defined in the body of the report.

TABLE A-3

Analysis of Covariance Within Group Regression Coefficients For Pretest (or Pre-Attitude) and SES

Grade	Dependent Variable	$Bw_{Pretest}$*	Bw_{SES}**
3	CTBS Battery Total	.88585	.32341
	Social Facility	.33760	.12292
	CTBS Reading Vocabulary	.71677	.56510
	CTBS Reading Comprehension	.71930	.83614
	CTBS Arithmetic Computation	.74337	.48854
	CTBS Arithmetic Concepts	.74770	.71036
	CTBS Arithmetic Applications	.65458	.69893
6	CTBS Battery Total	1.02021	.39542
	Attitude Composite	.54641	.03014
	CTBS Reading Vocabulary	.89737	.54778
	CTBS Reading Comprehension	.74504	1.00578
	CTBS Arithmetic Computation	.73850	.51376
	CTBS Arithmetic Concepts	.74706	.64207
	CTBS Arithmetic Applications	.73100	.75056
7	CTBS Battery Total	1.09308	.40666
	Attitude Composite	.60022	.07969
	CTBS Reading Vocabulary	.89791	.76442
	CTBS Reading Comprehension	.81402	1.08207
	CTBS Arithmetic Computation	.89730	.64957
	CTBS Arithmetic Concepts	.85086	.99437
	CTBS Arithmetic Applications	.76000	.78708

*$Bw_{Pretest}$ = pooled within-groups raw score regression coefficient for pretest. (continued)

**Bw_{SES} = pooled within-groups raw score regression coefficient for SES

TABLE A-3 (continued)

Grade	Dependent Variable	$Bw_{Pretest}$*	Bw_{SES}**
10	CTBS Battery Total	.97263	.31464
	Attitude Composite	.70727	.00517
	CTBS Reading Vocabulary	.83282	.66134
	CTBS Reading Comprehension	.75972	.81644
	CTBS Arithmetic Computation	.86801	.29568
	CTBS Arithmetic Concepts	.84119	.52566
	CTBS Arithmetic Applications	.74848	.70187
12	CTBS Battery Total	.96291	-.11598
	Attitude Composite	.77669	.03729
	CTBS Reading Vocabulary	.80499	.20333
	CTBS Reading Comprehension	.84246	.13221
	CTBS Arithmetic Computation	.87701	-.14707
	CTBS Arithmetic Concepts	.85645	-.10549
	CTBS Arithmetic Applications	.75414	.21117

*$Bw_{Pretest}$ = pooled within-groups raw score regression coefficient for pretest

**Bw_{SES} = pooled within-groups raw score regression coefficient for SES

TABLE A-4

Adjusted Outcome Means by School - Grade 3

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj.$\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj.$\bar{X}$ (Rank)	CTBS Reading Comprehension Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj.$\bar{X}$ (Rank)	Attitude Composite Adj.$\bar{X}$ (Rank)
90	13	31	412.9 (13)	436.0 (12)	465.3 (12)	399.7 (12)	435.8 (11)	417.6 (11)	106.7 (13)
74	2	40	408.0 (12)	441.7 (13)	484.4 (13)	419.7 (11)	431.0 (12)	421.8 (12)	101.4 (7)
26	12	96	387.3 (11)	412.0 (11)	428.0 (8)	384.1 (11)	412.2 (9)	422.6 (13)	99.9 (4)
72	2	29	386.1 (10)	407.5 (9)	417.3 (5)	371.8 (8)	420.6 (11)	414.5 (10)	100.4 (5)
91	13	76	380.5 (9)	408.0 (10)	445.2 (11)	371.8 (7)	418.6 (10)	413.1 (9)	101.5 (9)
90	13	22	379.0 (8)	393.4 (4)	427.3 (7)	375.2 (9)	408.5 (8)	379.8 (3)	103.2 (11)
92	13	45	378.5 (7)	397.5 (6)	431.8 (10)	366.7 (6)	400.1 (6)	392.4 (8)	100.4 (6)
81	9	40	370.3 (6)	396.5 (7)	411.6 (4)	377.0 (10)	398.7 (5)	388.1 (5)	102.3 (10)
79	9	39	362.9 (5)	404.8 (8)	428.5 (9)	355.5 (1)	398.1 (4)	389.8 (7)	98.7 (2)
71	2	59	360.9 (4)	381.4 (2)	398.6 (1)	368.6 (4)	393.8 (3)	368.0 (1)	101.5 (8)
25	12	111	360.0 (3)	384.9 (3)	402.9 (2)	365.0 (2)	402.5 (7)	388.8 (6)	103.6 (12)
59	11	77	358.7 (2)	394.2 (5)	421.4 (6)	366.0 (3)	379.3 (1)	379.4 (2)	97.3 (1)
73	2	56	356.4 (1)	380.6 (1)	405.4 (3)	367.6 (5)	390.5 (2)	382.1 (4)	99.5 (3)

*Highest adjusted school mean received the highest rank.

TABLE A-5

Adjusted Outcome Means by School - Grade 6

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj.$\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj.$\bar{X}$ (Rank)	CTBS Reading Comprehension Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj.$\bar{X}$ (Rank)	Attitude Composite Adj.$\bar{X}$ (Rank)**
9	1	18	528.1 (34)	533.1 (34)	538.5 (30)	496.5 (27)	540.7 (34)	553.9 (34)	104.0 (29)
30	4	28	506.8 (33)	497.4 (10)	537.8 (29)	495.2 (25)	512.2 (28)	530.8 (33)	103.0 (24)
32	7	39	506.6 (32)	516.9 (33)	555.0 (34)	505.0 (30)	502.7 (20)	516.2 (26)	102.3 (16)
33	7	55	504.6 (31)	503.6 (16)	541.7 (32)	499.1 (28)	515.0 (31)	511.2 (23)	102.6 (19)
2	5	22	497.9 (30)	508.6 (26)	506.6 (7)	512.6 (32)	504.7 (21)	491.8 (6)	101.9 (15)
92	13	41	497.5 (29)	510.9 (28)	518.9 (17)	492.5 (23)	510.8 (26)	517.5 (29)	--- (--)
74	2	62	496.4 (28)	515.2 (30)	522.7 (18)	516.6 (33)	514.8 (29)	523.2 (32)	102.8 (22)
63	10	50	495.3 (27)	506.2 (22)	532.5 (26)	472.8 (10)	501.6 (17)	498.0 (11)	101.6 (11)
7	1	49	495.2 (26)	504.1 (18)	535.7 (28)	505.5 (31)	506.5 (23)	520.8 (30)	100.2 (4)
34	7	53	495.0 (25)	507.0 (23)	512.0 (11)	482.7 (18)	501.9 (19)	498.1 (12)	102.3 (17)
91	13	79	494.2 (24)	507.2 (24)	508.6 (9)	496.3 (26)	511.6 (27)	516.2 (25)	--- (--)
17	1	45	493.0 (23)	499.8 (11)	525.8 (21)	478.3 (15)	506.8 (24)	510.2 (22)	101.6 (10)
96	6	7	490.1 (22)	496.4 (7)	552.7 (33)	476.4 (13)	514.9 (30)	512.3 (24)	107.1 (30)
1	5	19	489.9 (21)	510.1 (27)	539.6 (31)	482.4 (16)	506.9 (25)	498.2 (13)	101.7 (12)
8	1	66	489.3 (20)	493.9 (4)	524.3 (20)	517.7 (34)	520.3 (33)	517.2 (27)	98.2 (2)
19	1	32	488.3 (19)	507.3 (25)	524.0 (19)	493.8 (24)	505.7 (22)	521.9 (31)	103.7 (28)
73	2	69	486.6 (18)	501.5 (14)	518.4 (16)	485.4 (20)	500.6 (16)	503.1 (19)	103.3 (26)
15	1	57	486.5 (17)	516.4 (32)	526.6 (22)	471.2 (8)	488.9 (6)	499.2 (15)	101.2 (7)
97	6	23	486.4 (16)	493.7 (3)	533.8 (27)	462.3 (5)	516.8 (32)	500.2 (16)	103.5 (27)
64	10	112	485.7 (15)	502.2 (15)	514.7 (14)	471.6 (9)	493.1 (12)	496.3 (9)	101.8 (14)

(continued)

* Highest adjusted school mean received the highest rank.

** As noted in the text, attitude data could not be collected at all schools. Therefore, the highest rank here is 30.

TABLE A-5 (continued)

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj.$\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj.$\bar{X}$ (Rank)	CTBS Reading Comprehension Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj.$\bar{X}$ (Rank)	Attitude Composite Adj.$\bar{X}$ (Rank)**
99	6	59	484.7 (14)	490.6 (1)	529.1 (24)	501.0 (29)	499.3 (15)	517.3 (28)	102.7 (21)
10	1	13	484.0 (13)	505.6 (21)	512.4 (12)	489.6 (22)	489.1 (8)	504.6 (20)	103.2 (25)
27	12	239	482.4 (12)	515.0 (29)	527.0 (23)	456.1 (1)	490.8 (9)	486.1 (1)	100.5 (5)
3	8	32	481.8 (11)	500.9 (13)	514.4 (13)	487.1 (21)	495.1 (13)	506.6 (21)	101.8 (13)
72	2	21	481.6 (10)	516.3 (31)	500.0 (3)	470.2 (7)	488.5 (3)	497.4 (10)	102.9 (23)
90	13	49	480.5 (9)	491.4 (2)	507.1 (8)	482.6 (17)	487.1 (2)	489.6 (5)	--- - (--)
59	11	102	479.6 (8)	505.1 (20)	502.7 (4)	462.2 (4)	488.9 (5)	488.9 (4)	102.6 (18)
98	6	29	478.8 (7)	504.6 (19)	529.2 (25)	459.7 (3)	497.5 (14)	501.5 (17)	101.2 (8)
93	13	26	478.5 (6)	500.5 (12)	482.1 (1)	476.8 (14)	501.7 (18)	498.3 (14)	--- - (--)
71	2	74	477.9 (5)	495.9 (15)	504.2 (5)	467.9 (6)	488.6 (4)	488.8 (3)	99.5 (3)
81	9	54	476.1 (4)	496.6 (8)	506.3 (6)	484.1 (19)	492.4 (10)	493.1 (7)	96.4 (1)
55	3	265	475.1 (3)	496.3 (6)	514.9 (15)	457.6 (2)	497.7 (11)	494.6 (8)	100.7 (6)
61	11	54	473.9 (2)	504.1 (17)	509.0 (10)	475.4 (11)	485.2 (1)	487.6 (2)	101.2 (9)
79	9	63	471.8 (1)	496.8 (9)	492.9 (2)	476.1 (12)	489.0 (7)	502.1 (18)	102.7 (20)

* Highest adjusted school mean received the highest rank.

** As noted in the text, attitude data could not be collected at all schools. Therefore, the highest rank here is 30.

TABLE A-6

Adjusted Outcome Means by School - Grade 7

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj.$\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj.$\bar{X}$ (Rank)	CTBS Reading Comprehension Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj.$\bar{X}$ (Rank)	Attitude Composite Adj.$\bar{X}$ (Rank)**
31	4	24	535.1 (19)	542.2 (19)	556.1 (19)	550.5 (19)	546.1 (18)	559.7 (19)	98.5 (5)
89	5	18	526.0 (18)	519.2 (12)	542.2 (17)	534.0 (17)	547.1 (19)	530.9 (16)	98.3 (4)
60	11	91	523.6 (17)	521.7 (13)	554.7 (18)	514.8 (14)	528.9 (14)	532.5 (17)	100.1 (11)
85	9	39	519.4 (16)	530.5 (18)	542.0 (16)	521.2 (16)	536.9 (16)	538.5 (18)	97.1 (1)
4	8	47	515.7 (15)	512.7 (6)	536.2 (14)	535.9 (18)	535.4 (15)	498.2 (5)	100.5 (14)
86	9	43	511.0 (14)	513.6 (7)	533.6 (11)	513.4 (13)	512.4 (11)	505.7 (10)	102.4 (18)
61	11	82	504.2 (13)	521.9 (14)	521.9 (6)	503.6 (12)	508.7 (7)	495.9 (9)	99.1 (8)
55	3	273	502.1 (12)	514.1 (8)	530.5 (10)	487.8 (8)	512.2 (9)	518.7 (15)	100.6 (15)
97	6	18	500.4 (11)	518.4 (11)	539.7 (15)	519.9 (15)	521.3 (13)	514.8 (12)	100.9 (16)
94	13	156	499.5 (10)	516.7 (10)	533.9 (13)	490.5 (9)	502.9 (6)	509.9 (11)	----- (--)
27	12	291	496.1 (9)	523.9 (15)	525.5 (7)	478.8 (4)	500.4 (5)	503.1 (7)	99.1 (7)
20	1	80	495.5 (8)	524.8 (17)	533.6 (12)	485.0 (7)	512.3 (10)	505.1 (8)	99.8 (11)
67	10	64	494.9 (7)	524.2 (16)	520.2 (4)	466.3 (2)	497.3 (3)	505.3 (9)	101.6 (17)
35	7	133	494.5 (6)	514.4 (9)	500.6 (1)	498.4 (10)	511.1 (8)	515.3 (13)	97.9 (2)
24	6	73	493.1 (5)	510.7 (4)	528.3 (9)	483.2 (6)	520.7 (12)	517.6 (14)	98.8 (6)
98	6	27	490.6 (4)	509.9 (2)	526.8 (8)	499.7 (11)	538.1 (17)	478.8 (1)	99.8 (12)
21	1	160	485.2 (3)	508.2 (1)	520.2 (5)	481.8 (5)	489.8 (1)	498.7 (6)	97.9 (3)
76	2	152	478.8 (2)	510.0 (3)	509.7 (2)	466.8 (3)	498.0 (4)	492.8 (2)	99.5 (9)
75	2	81	476.5 (1)	512.4 (5)	513.8 (3)	452.8 (1)	491.6 (2)	495.5 (3)	99.7 (10)

*Highest adjusted school mean received the highest rank.

**As noted in the text, attitude data could not be collected at all schools. Therefore, the highest rank here is 18.

TABLE A-7

Adjusted Outcome Means by School - Grade 10

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj. $\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj. $\bar{X}$ (Rank)	CTBS Reading Comprehension Adj. $\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj. $\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj. $\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj. $\bar{X}$ (Rank)	Attitude Composite Adj. $\bar{X}$ (Rank)
36	7	195	622.5 (6)	633.0 (4)	636.0 (6)	607.9 (5)	630.9 (6)	636.9 (6)	101.3 (6)
28	12	342	616.1 (5)	634.8 (5)	627.3 (5)	607.3 (4)	624.8 (5)	607.8 (4)	100.5 (4)
87	9	225	614.4 (4)	635.2 (6)	627.1 (4)	600.6 (3)	616.8 (3)	597.1 (3)	100.3 (3)
56	3	234	612.9 (3)	631.1 (3)	620.3 (3)	610.6 (6)	623.9 (4)	612.3 (5)	100.1 (2)
68	10	155	602.7 (2)	613.3 (1)	609.2 (2)	590.6 (2)	612.9 (2)	590.6 (1)	100.5 (5)
22	1	320	599.3 (1)	623.0 (2)	607.5 (1)	586.7 (1)	611.4 (1)	596.5 (2)	98.8 (1)

*Highest adjusted school mean received the highest rank.

Table A-8

Adjusted Outcome Means by School - Grade 12

School	Site	No. of Students (Test Variables Analyses)	CTBS Battery Total Adj.$\bar{X}$ (Rank)*	CTBS Reading Vocabulary Adj.$\bar{X}$ (Rank)	CTBS Reading Comprehension Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Computation Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Concepts Adj.$\bar{X}$ (Rank)	CTBS Arithmetic Applications Adj.$\bar{X}$ (Rank)	Attitude Composite Adj.$\bar{X}$ (Rank)
22	1	317	663.8 (3)	684.6 (3)	679.3 (1)	621.1 (3)	651.4 (2)	648.8 (3)	100.2 (1)
28	12	296	662.7 (2)	684.2 (2)	677.3 (2)	621.0 (2)	663.3 (3)	641.8 (2)	100.5 (3)
68	10	288	645.2 (1)	659.8 (1)	655.6 (1)	616.7 (1)	645.8 (1)	629.5 (1)	100.3 (2)

*Highest adjusted school mean received the highest rank.

TABLE A-9

Means (and Standard Deviations) by School for Selected Measures - Grade 3

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
90	13	383.2	(64.0)	275.9	(54.2)	364.1	(34.8)	299.5	(26.3)	94.9	(7.2)	103.1	(7.6)	98.3	(10.7)	94.1	(9.6)
74	2	405.1	(49.0)	306.8	(48.2)	410.6	(28.8)	309.4	(26.0)	93.2	(5.3)	101.3	(11.7)	102.9	(5.8)	93.4	(5.2)
26	12	393.2	(52.6)	312.4	(46.3)	381.7	(39.0)	310.1	(30.9)	105.2	(9.5)	100.9	(10.2)	102.1	(9.3)	105.1	(9.6)
72	2	340.9	(41.4)	260.1	(52.2)	358.9	(42.4)	306.0	(27.6)	90.4	(5.5)	99.8	(10.3)	102.5	(8.6)	90.4	(5.6)
91	13	373.8	(52.8)	301.4	(52.6)	368.8	(37.6)	315.7	(33.5)	95.9	(7.7)	99.5	(8.1)	96.6	(10.2)	95.6	(7.4)
93	13	350.9	(53.9)	277.1	(55.0)	361.5	(36.6)	307.7	(34.7)	96.4	(7.9)	103.3	(7.6)	102.4	(9.6)	96.2	(8.1)
92	13	352.0	(61.9)	279.0	(57.1)	356.6	(33.3)	303.2	(29.0)	96.5	(8.9)	99.9	(9.9)	100.5	(8.2)	96.5	(8.9)
81	9	377.7	(42.5)	317.1	(41.6)	381.2	(27.9)	324.9	(22.4)	96.8	(7.0)	101.6	(10.1)	99.9	(9.2)	96.8	(7.4)
79	9	399.4	(48.9)	345.5	(48.0)	370.1	(31.2)	344.2	(32.5)	109.2	(5.8)	101.3	(10.2)	104.9	(5.0)	109.2	(5.8)
71	2	334.4	(44.4)	280.1	(46.7)	367.3	(32.0)	319.8	(29.6)	93.3	(4.8)	100.9	(8.8)	101.5	(9.4)	93.4	(4.8)
25	12	366.9	(60.0)	314.0	(48.9)	363.5	(40.9)	312.4	(30.0)	103.8	(9.3)	103.4	(7.8)	99.0	(11.1)	103.9	(9.3)
59	11	386.6	(54.7)	334.8	(48.0)	379.3	(39.8)	327.1	(37.3)	111.9	(2.9)	98.8	(10.4)	100.7	(9.4)	111.8	(2.9)
73	2	374.3	(41.7)	327.4	(42.6)	379.2	(33.2)	332.1	(30.6)	101.0	(8.5)	99.6	(10.6)	100.9	(11.0)	100.8	(8.6)

TABLE A-10

Means (and Standard Deviations) by School for Selected Measures - Grade 6

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
9	1	496.9	(72.4)	424.2	(62.4)	479.1	(65.4)	427.3	(47.4)	92.5	(5.4)	101.9	(6.1)	96.1	(7.5)	92.5	(5.6)
30	4	507.5	(76.5)	454.6	(64.1)	486.4	(64.1)	437.5	(50.0)	94.7	(7.8)	100.9	(6.0)	96.0	(4.0)	94.7	(7.8)
32	7	535.0	(66.8)	476.6	(50.4)	531.2	(50.8)	475.6	(45.9)	108.0	(7.4)	102.3	(4.9)	99.1	(5.8)	107.6	(7.4)
33	7	530.5	(70.0)	474.1	(54.3)	532.3	(56.4)	484.9	(60.0)	108.0	(7.0)	103.5	(5.3)	100.6	(6.4)	108.1	(7.0)
2	5	458.0	(60.4)	416.6	(57.9)	486.2	(58.7)	416.7	(38.2)	90.2	(5.5)	103.3	(7.1)	102.7	(6.3)	90.2	(5.5)
92	13	492.4	(60.0)	446.7	(49.7)	471.2	(60.0)	416.5	(52.0)	100.5	(9.1)	--- -	(- -)	--- -	(- -)	--- -	(- -)
74	2	501.6	(71.3)	458.9	(70.2)	535.8	(66.2)	475.2	(67.9)	94.9	(5.7)	103.7	(7.4)	101.5	(6.8)	94.9	(5.7)
63	10	468.9	(79.4)	428.5	(65.0)	447.6	(68.5)	416.1	(61.5)	93.4	(8.1)	103.6	(7.0)	103.5	(6.0)	93.0	(8.0)
7	1	484.8	(57.6)	443.1	(52.2)	496.8	(51.6)	436.4	(50.7)	96.4	(5.2)	97.8	(6.1)	95.4	(7.0)	96.4	(5.2)
34	7	517.2	(64.0)	470.2	(55.0)	492.7	(50.6)	432.9	(48.1)	109.0	(7.2)	102.5	(7.1)	99.5	(6.6)	108.9	(7.2)
91	13	481.4	(72.8)	439.6	(57.4)	488.2	(73.2)	435.3	(56.8)	99.2	(7.7)	--- -	(- -)	-- -	(- -)	--- -	(- -)
17	1	446.2	(58.5)	408.5	(57.7)	455.1	(58.1)	418.9	(53.2)	93.4	(5.2)	98.5	(6.9)	94.3	(7.9)	93.5	(5.3)
96	6	521.9	(58.8)	487.0	(44.2)	517.1	(51.3)	508.0	(39.5)	89.7	(7.0)	104.5	(6.2)	95.3	(3.3)	89.7	(7.0)
1	5	480.4	(57.1)	444.1	(53.8)	456.8	(51.1)	414.0	(44.8)	95.8	(3.8)	104.0	(6.9)	103.9	(4.8)	95.8	(3.8)
8	1	545.0	(60.7)	502.3	(57.4)	536.2	(49.6)	493.2	(42.8	110.7	(5.9)	97.8	(7.0)	98.1	(5.8)	110.6	(5.9)
19	1	510.1	(68.0)	472.2	(52.3)	500.5	(58.1)	472.9	(54.5)	102.6	(8.2)	102.1	(5.6)	96.4	(5.8)	102.7	(8.4)
73	2	500.4	(69.1)	464.4	(59.0)	497.4	(61.6)	460.2	(52.4)	102.5	(8.5)	104.2	(5.6)	100.9	(6.7)	102.7	(8.5)
15	1	486.6	(67.2)	453.4	(57.8)	465.2	(51.0)	440.4	(47.2)	96.0	(7.0)	100.9	(6.3)	99.3	(6.9)	96.1	(7.0)
97	6	499.6	(58.9)	467.4	(44.0)	473.9	(43.8)	446.0	(43.7)	93.3	(3.2)	100.5	(4.6)	94.3	(5.3)	93.3	(3.2)
64	10	444.9	(53.2)	415.8	(46.3)	447.4	(53.5)	419.8	(47.8)	90.1	(6.8)	101.8	(7.5)	100.0	(6.8)	90.8	(6.6)
99	6	514.2	(50.6)	482.3	(40.0)	524.6	(42.8)	488.4	(32.4)	96.0	(6.8)	102.4	(6.4)	99.1	(6.6)	95.9	(6.6)
10	1	483.3	(59.3)	411.8	(40.8)	465.8	(62.4)	421.8	(37.6)	87.9	(5.3)	100.1	(4.5)	94.4	(5.9)	89.0	(4.8)
27	12	494.8	(75.2)	461.8	(65.3)	470.6	(60.6)	440.8	(64.8)	106.0	(8.4)	100.7	(6.8)	99.5	(6.1)	105.9	(8.4)
3	8	475.1	(60.0)	448.5	(55.1)	491.8	(63.3)	457.8	(55.2)	91.8	(9.0)	103.2	(6.6)	102.7	(5.3)	91.8	(9.0)
72	2	459.8	(70.1)	433.3	(68.9)	479.9	(74.9)	444.0	(58.3)	92.6	(7.2)	102.0	(5.6)	98.2	(7.2)	93.1	(7.5)

(continued)

TABLE A-10 (continued)

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
90	13	459.6	(70.0)	431.9	(74.4)	463.6	(64.5)	420.9	(58.5)	98.7	(7.1)	---	(--)	---	(--)	---	(--)
59	11	488.5	(75.8)	456.4	(68.5)	451.5	(67.1)	423.7	(59.0)	110.5	(4.9)	103.2	(5.8)	100.0	(5.9)	110.7	(5.0)
98	6	489.2	(68.1)	464.5	(61.1)	468.9	(58.2)	462.4	(49.1)	93.8	(8.4)	100.6	(5.7)	98.7	(7.5)	93.8	(8.4)
93	13	460.8	(68.5)	435.4	(61.8)	461.9	(72.2)	425.8	(55.6)	98.1	(6.5)	---	(--)	---	(--)	---	(--)
71	2	447.3	(61.0)	423.1	(59.6)	452.3	(56.4)	426.7	(52.1)	96.9	(6.1)	100.6	(6.7)	101.8	(5.7)	96.9	(5.5)
81	9	476.9	(61.2)	452.9	(48.4)	484.9	(61.2)	447.2	(46.3)	99.5	(9.1)	96.9	(6.9)	100.5	(5.9)	99.5	(9.1)
55	3	452.1	(68.3)	432.3	(60.7)	447.1	(55.8)	437.1	(51.2)	91.8	(7.0)	100.5	(7.3)	99.7	(6.7)	91.7	(6.9)
61	11	521.9	(68.4)	494.8	(59.2)	494.1	(59.9)	463.5	(52.1)	110.6	(5.3)	101.5	(6.4)	99.4	(7.1)	110.5	(5.4)
79	9	505.4	(70.0)	481.3	(55.6)	491.3	(65.4)	461.0	(53.7)	109.0	(5.6)	103.1	(5.7)	99.8	(6.6)	109.0	(5.6)

TABLE A-11

Means (and Standard Deviations) by School for Selected Measures - Grade 7

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
31	4	540.1	(60.9)	490.5	(64.1)	550.0	(61.1)	476.0	(62.5)	95.3	(8.5)	99.2	(5.7)	102.7	(5.6)	95.3	(8.5)
89	5	498.3	(98.4)	460.7	(85.4)	508.8	(92.4)	448.9	(69.7)	94.8	(7.3)	96.3	(6.2)	98.2	(6.6)	95.1	(6.3)
60	11	531.4	(77.3)	487.7	(69.2)	501.0	(75.7)	450.8	(71.5)	109.8	(5.0)	100.0	(5.7)	99.4	(6.4)	109.8	(4.9)
85	9	570.3	(67.8)	527.4	(58.6)	552.6	(56.5)	499.4	(52.5)	109.1	(6.2)	96.2	(6.3)	98.0	(7.1)	109.4	(5.9)
4	8	505.1	(79.3)	477.2	(67.5)	532.4	(64.2)	474.6	(62.6)	92.7	(6.3)	101.4	(7.2)	103.2	(6.8)	92.7	(6.3)
86	9	509.1	(83.6)	483.4	(57.1)	511.6	(75.7)	473.0	(61.5)	97.5	(6.3)	101.4	(7.4)	97.9	(6.3)	96.9	(6.0)
61	11	535.1	(84.2)	509.0	(67.4)	517.4	(80.5)	481.9	(69.3)	109.3	(6.0)	99.9	(7.6)	100.9	(6.3)	109.1	(5.9)
55	3	470.5	(82.6)	458.5	(64.2)	463.4	(70.0)	432.2	(55.1)	91.4	(6.8)	100.2	(7.6)	101.3	(7.4)	91.3	(6.6)
97	6	519.8	(62.4)	505.2	(56.7)	517.9	(50.1)	477.4	(44.3)	91.1	(5.8)	99.5	(6.7)	99.6	(7.8)	91.0	(5.8)
94	13	493.6	(80.1)	479.4	(63.2)	489.2	(78.1)	472.9	(65.1)	98.5	(7.2)	-- -	(- -)	-- -	(- -)	-- -	(- -)
27	12	498.3	(78.0)	484.4	(68.4)	474.7	(75.4)	465.2	(60.9)	104.7	(9.0)	100.1	(6.8)	101.8	(6.9)	104.7	(9.0)
20	1	524.3	(77.0)	508.9	(60.2)	500.1	(69.7)	487.0	(59.8)	104.2	(8.1)	100.0	(8.7)	100.5	(7.4)	104.2	(8.1)
67	10	460.5	(75.9)	456.4	(60.8)	435.8	(70.6)	446.1	(62.0)	90.1	(8.2)	100.4	(6.9)	100.1	(7.9)	90.3	(8.3)
35	7	531.0	(75.6)	514.4	(61.2)	533.0	(70.4)	505.1	(60.8)	108.4	(7.5)	98.8	(6.2)	101.2	(5.9)	108.5	(7.4)
24	6	515.0	(74.7)	505.6	(59.3)	510.3	(67.2)	506.2	(53.9)	96.2	(7.3)	97.3	(6.6)	98.8	(6.8)	96.2	(7.3)
98	6	491.9	(94.8)	487.7	(88.3)	512.0	(79.4)	491.6	(67.2)	93.5	(7.6)	98.4	(5.2)	99.3	(8.2)	93.5	(7.7)
21	1	470.3	(72.6)	472.2	(56.9)	467.3	(63.3)	460.2	(51.0)	95.7	(8.0)	96.4	(7.1)	98.8	(6.3)	95.7	(8.1)
76	2	476.8	(91.9)	482.4	(74.1)	471.9	(79.1)	479.2	(63.4)	99.6	(7.9)	100.1	(6.6)	101.8	(7.0)	99.5	(8.0)
75	2	481.0	(84.2)	490.5	(69.9)	491.3	(88.1)	520.1	(69.3)	94.2	(6.9)	101.3	(6.9)	104.2	(6.7)	94.3	(6.5)

TABLE A-12

Means (and Standard Deviations) by School for Selected Measures - Grade 10

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
36	7	629.4	(86.3)	589.7	(75.2)	618.2	(98.7)	596.7	(89.8)	107.5	(7.4)	100.8	(6.4)	100.2	(7.1)	107.3	(7.5)
28	12	641.7	(102.4)	609.5	(88.6)	610.8	(100.8)	589.5	(93.8)	105.7	(8.8)	101.2	(6.6)	102.0	(6.7)	105.9	(8.8)
87	9	630.3	(103.8)	600.9	(89.8)	625.0	(95.7)	614.9	(95.7)	101.7	(11.9)	100.1	(6.7)	100.7	(6.0)	101.6	(12.1)
56	3	598.8	(85.7)	572.5	(80.2)	593.8	(90.8)	570.2	(89.6)	93.7	(7.2)	101.0	(6.5)	102.4	(6.5)	93.7	(7.3)
68	10	558.6	(91.5)	541.3	(85.4)	564.7	(101.2)	550.3	(94.7)	94.8	(8.3)	99.8	(7.2)	100.0	(6.6)	94.8	(8.5)
22	1	588.2	(91.4)	574.6	(90.1)	584.3	(97.3)	585.8	(94.9)	96.8	(7.5)	97.9	(7.1)	99.8	(6.8)	96.8	(7.1)

TABLE A-13

Means (and Standard Deviations) by School for Selected Measures - Grade 12

School	Site	CTBS Battery Total - Posttest $\bar{X}$	SD	CTBS Battery Total - Pretest $\bar{X}$	SD	CTBS Arithmetic Computation Posttest $\bar{X}$	SD	CTBS Arithmetic Computation Pretest $\bar{X}$	SD	Student SES (Test Variable Analyses) $\bar{X}$	SD	Attitude Composite Posttest $\bar{X}$	SD	Attitude Composite Pretest $\bar{X}$	SD	Student SES (Attitude Variable Analysis) $\bar{X}$	SD
22	1	644.7	(99.2)	627.0	(98.3)	611.7	(98.8)	606.0	(108.0)	96.1	(8.2)	98.5	(7.0)	97.8	(7.1)	96.0	(8.4)
28	12	693.1	(96.3)	679.4	(94.1)	639.0	(93.3)	638.6	(89.5)	103.7	(9.6)	101.8	(6.1)	101.2	(6.1)	103.2	(9.6)
68	10	634.9	(119.0)	636.5	(106.5)	608.7	(117.5)	608.1	(101.7)	98.2	(11.0)	101.1	(6.5)	100.9	(5.9)	98.1	(11.2)

TABLE A-14

Mean Quantity of Schooling Measures by School - Grade 3

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
90	13	76.7	78.9	180	142.0	147.5	349
74	2	75.0	73.3	180	131.9	210.0	462
26	12	71.5	84.5	200	169.0	200.0	563
72	2	75.0	73.3	180	131.9	216.0	475
91	13	76.7	78.9	180	142.0	225.0	533
93	13	76.7	78.9	180	142.0	228.3	540
92	13	76.7	78.9	180	142.0	197.5	467
81	9	82.8	81.1	180	146.0	205.0	499
79	9	82.8	81.1	180	146.0	180.0	438
71	2	75.0	73.3	180	131.9	120.0	264
25	12	71.5	84.5	200	169.0	260.0	732
59	11	81.3	84.7	176	149.1	215.0	534
73	2	75.0	73.3	180	131.9	240.0	528

*For the posttest school year, 1972-73.

TABLE A-15

Mean Quantity of Schooling Measures by School - Grade 6

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
9	1	66.7	66.5	182	121.0	195.0	393
30	4	81.7	81.1	180	146.0	240.0	584
32	7	71.0	73.0	173	129.9	270.0	585
33	7	71.0	73.0	173	129.9	235.0	509
2	5	81.7	81.1	180	146.0	240.0	584
92	13	76.7	78.9	180	142.0	197.5	467
74	2	75.0	73.3	180	131.9	210.0	462
63	10	75.0	75.3	173	134.0	300.0	670
7	1	66.7	66.5	182	121.0	225.0	454
34	7	71.0	73.0	173	129.9	215.0	465
91	13	76.7	78.9	180	142.0	225.0	533
17	1	66.7	66.5	182	121.0	225.0	454
96	6	78.3	78.3	180	140.9	245.0	575
1	5	81.7	81.1	180	146.0	245.0	596
8	1	66.7	66.5	182	121.0	240.0	484
19	1	66.7	66.5	182	121.0	245.0	494
73	2	75.0	73.3	180	131.9	240.0	528
15	1	66.7	66.5	182	121.0	225.0	454
97	6	78.3	78.3	180	140.9	220.0	517
64	10	75.0	75.3	178	134.0	280.0	625

* For the posttest school year, 1972-73.

(continued)

TABLE A-15 (continued)

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
99	6	78.3	78.3	180	140.9	149.0	350
10	1	66.7	66.5	182	121.0	215.0	434
27	12	71.5	84.5	200	169.0	223.2	629
3	8	83.3	80.8	182	147.1	225.0	552
72	2	75.0	73.3	180	131.9	228.0	501
90	13	76.7	78.9	180	142.0	140.0	331
59	11	81.3	84.7	176	149.1	226.0	562
98	6	78.3	78.3	180	140.9	220.0	517
93	13	76.7	78.9	180	142.0	227.5	538
71	2	75.0	73.3	180	131.9	120.0	264
81	9	82.8	81.1	180	146.0	247.5	602
55	3	79.4	78.3	180	140.9	240.0	564
61	11	81.3	84.7	176	149.1	197.5	491
79	9	82.8	81.1	180	146.0	210.0	511

*For the posttest school year, 1972-73.

TABLE A-16

Mean Quantity of Schooling Measures by School - Grade 7

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
31	4	81.7	81.1	180	146.0	200.0	487
89	5	81.7	81.1	180	146.0	200.0	487
60	11	81.3	84.7	176	149.1	181.0	444
85	9	82.8	81.1	180	146.0	180.0	438
4	8	83.3	80.8	182	147.1	220.0	539
86	9	82.8	81.1	180	146.0	240.0	584
61	11	81.3	84.7	176	149.1	183.5	456
55	3	79.4	78.3	180	140.9	240.0	564
97	6	78.3	78.3	180	140.9	210.0	493
94	12	76.7	78.9	180	142.0	200.0	473
27	12	71.5	84.5	200	169.0	223.2	629
20	1	66.7	66.5	182	121.0	200.0	403
67	10	75.0	75.3	178	134.0	240.0	536
35	7	71.0	73.0	178	129.9	108.0	234
24	6	78.3	78.3	180	140.9	216.0	507
93	6	78.3	78.3	180	140.9	200.0	470
21	1	66.7	66.5	182	121.0	200.0	403
76	2	75.0	73.3	180	131.9	240.0	528
75	2	75.0	73.3	180	131.9	270.0	594

*For the posttest school year, 1972-73.

TABLE A-17

Mean Quantity of Schooling Measures by School - Grade 10

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
36	7	71.0	73.0	178	129.9	180.0	390
28	12	71.5	84.5	200	169.0	240.0	676
87	9	82.8	81.1	180	146.0	240.0	584
56	3	79.4	78.3	180	140.9	240.0	564
68	10	75.0	75.3	178	134.0	236.7	529
22	1	66.7	66.5	182	121.0	165.0	333

*For the posttest school year, 1972-73.

TABLE A-18

Mean Quantity of Schooling Measures By School - Grade 12

School	Site	% of School Year Prior to Pretest	% of School Year Prior to Posttest	No. of Days per School Year (Posttest)	No. of Days Prior to Posttest*	No. of Minutes per Day*	Total Time before Posttest in Hours*
22	1	66.7	66.5	182	121.0	147.0	296
28	12	71.5	84.5	200	169.0	240.0	676
68	10	75.0	75.3	178	134.0	236.7	529

*For the posttest school year, 1972-73.

TABLE A-19

Average Treatment Attributes by School - Grade 3

School	Site	Level of Innovation	Degree of Individualization	Individualization in Decision-Making	Individualization of Instructional Pace	Use of Performance Agreements	Utilization of Student Evaluation	Scheduling Characteristics	Classroom Group Organization	Affective Evaluation	Treatment Years for the Grade
90	13	13.7	5.2	1.2	2.0	3.0	1.0	1.0	2.0	1.0	1.5
74	2	14.8	6.3	1.0	2.0	3.0	2.3	1.0	2.0	1.0	3.0
26	12	24.7	10.2	2.2	3.0	5	3.0	2.0	2.0	2.0	2.0
72	2	22.0	8.0	1.0	2.0	3.0	2.0	2.0	2.0	1.0	2.0
91	13	19.5	7.7	1.0	2.0	2.0	2.7	1.0	2.0	1.0	1.3
93	13	18.8	7.3	1.7	2.0	1.0	2.7	2.0	2.0	1.0	1.0
92	13	22.1	8.3	2.0	3.0	1.5	1.8	2.5	3.0	1.0	3.0
81	9	17.2	6.3	1.0	1.9	1.0	2.4	1.1	2.9	1.0	1.9
79	9	18.7	6.7	1.3	2.0	1.0	2.3	2.0	3.0	1.0	1.0
71	2	25.2	9.7	2.0	2.0	3.0	2.7	3.0	3.0	1.0	3.0
25	12	22.8	8.4	1.7	1.8	2.0	3.0	2.0	2.0	2.0	1.8
59	11	18.3	6.5	1.0	2.0	1.0	2.5	1.0	1.5	1.0	2.8
73	2	23.5	10.0	2.0	3.0	3.0	3.0	2.0	3.0	1.0	3.0

TABLE A-20

Average Treatment Attributes by School - Grade 6

School	Site	Level of Innovation	Degree of Individualization	Individualization in Decision-Making	Individualization of Instructional Pace	Use of Performance Agreements	Utilization of Student Evaluation	Scheduling Characteristics	Classroom Group Organization	Affective Evaluation	Treatment Years for the Grade
9	1	19.5	7.3	1.7	2.0	2.0	1.7	2.0	2.0	1.0	6.0
30	4	19.2	7.6	1.0	2.0	2.3	2.3	1.0	2.3	1.0	3.0
32	7	20.1	7.6	1.2	2.0	1.8	2.7	1.0	2.0	1.0	3.0
33	7	19.8	8.0	1.2	2.0	2.0	2.8	1.8	2.0	3.0	3.8
2	5	11.2	4.7	1.0	1.0	1.0	1.7	1.0	1.0	1.0	1.0
92	13	22.1	8.3	2.0	3.0	1.5	1.8	2.5	3.0	1.0	4.0
74	2	14.8	6.3	1.0	2.0	1.0	2.3	1.0	2.0	1.0	6.0
63	10	20.7	8.5	1.4	2.5	2.3	2.3	1.5	2.8	1.5	1.8
7	1	19.6	7.3	1.5	2.0	1.0	2.8	1.8	2.3	3.0	3.3
34	7	20.7	7.8	1.2	1.9	2.4	2.4	2.1	2.1	1.3	1.5
91	13	19.5	7.7	1.0	2.0	2.0	2.7	1.0	2.0	1.0	1.3
17	1	19.8	7.7	1.0	2.0	2.0	2.7	2.0	2.0	1.0	1.0
96	6	13.3	5.3	1.0	1.0	1.0	2.3	2.0	2.0	1.0	6.0
1	5	13.4	5.4	1.0	1.3	1.3	1.9	1.0	1.5	1.0	1.8
8	1	16.8	7.7	1.0	2.0	2.0	2.7	1.0	1.0	1.0	2.0
19	1	17.8	6.4	1.3	2.0	1.0	2.2	2.0	2.0	1.0	1.3
73	2	23.5	10.0	2.0	3.0	3.0	2.0	2.0	3.0	1.0	3.0
15	1	19.2	8.0	1.5	2.0	1.8	2.8	1.0	2.3	1.5	3.3
97	6	11.2	4.7	1.0	1.0	1.0	1.7	1.0	1.0	1.0	2.0
64	10	20.9	8.3	1.4	2.5	2.3	2.2	1.8	2.8	1.5	2.0

(continued)

TABLE A-20 (continued)

School	Site	Level of Innovation	Degree of Individualization	Individualization in Decision-Making	Individualization of Instructional Pace	Use of Performance Agreements	Utilization of Student Evaluation	Scheduling Characteristics	Classroom Group Organization	Affective Evaluation	Treatment Years for the Grade
99	6	13.5	5.3	1.0	1.0	1.0	2.3	1.0	1.0	1.0	6.0
10	1	21.8	7.3	1.6	1.8	1.0	3.0	3.0	2.0	1.0	1.5
27	12	22.6	8.9	1.6	2.4	2.3	2.7	2.0	1.9	2.0	1.0
3	8	22.8	10.3	1.3	3.0	3.0	3.0	1.0	3.0	1.0	3.0
72	2	18.8	7.7	1.0	2.0	2.0	2.7	2.0	2.0	1.0	6.0
90	13	16.0	5.2	1.2	2.0	1.0	1.0	1.5	2.5	1.0	2.0
59	11	18.3	6.5	1.0	2.0	1.0	2.5	1.0	1.5	1.0	4.8
98	6	12.2	4.7	1.0	1.0	1.0	1.7	1.0	2.0	1.0	2.0
93	13	18.8	7.3	1.7	2.0	1.0	2.7	2.0	2.0	1.0	1.0
71	2	25.2	9.7	2.0	2.0	3.0	2.7	3.0	3.0	1.0	3.0
81	9	18.8	6.7	1.1	1.6	1.4	2.6	1.0	2.1	1.0	1.6
55	3	21.4	8.4	1.4	3.0	1.0	3.0	1.3	1.3	1.0	1.0
61	11	13.6	4.7	1.1	1.0	1.3	1.3	1.0	1.3	1.0	1.0
79	9	16.7	5.7	1.3	1.0	1.0	2.3	2.0	2.0	1.0	2.0

TABLE A-21

Average Treatment Attributes by School - Grade 7

School	Site	Level of Innovation	Degree of Individual-ization	Individual-ization in Decision-Making	Individual-ization of Instructional Pace	Use of Performance Agreements	Utilization of Student Evaluation	Scheduling Charac-teristics	Classroom Group Organ-ization	Affective Evaluation	Treatment Years for the Grade
31	4	18.8	7.5	1.0	2.0	2.3	2.3	1.0	2.5	1.0	3.3
99	5	12.2	4.7	1.0	1.0	1.0	1.7	2.0	1.0	1.0	1.0
60	11	14.9	5.8	1.3	1.3	1.0	2.3	1.0	1.0	1.0	1.0
85	9	21.1	6.8	1.2	1.5	1.8	2.3	2.3	2.0	1.0	1.0
4	8	11.0	5.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0
86	9	11.7	4.5	1.1	1.0	1.0	1.4	1.0	1.0	1.0	1.0
61	11	15.3	5.4	1.3	1.4	1.0	1.7	1.0	1.8	1.0	1.0
55	3	19.5	7.8	1.4	2.5	1.0	2.8	1.3	1.3	1.0	1.8
97	6	11.2	4.7	1.0	1.0	1.0	1.7	1.0	1.0	1.0	3.0
94	13	16.3	5.8	1.0	1.4	2.4	1.0	1.0	2.5	1.0	1.0
27	12	22.7	8.9	1.6	2.4	2.3	2.7	2.0	1.9	2.0	1.0
20	1	19.2	8.3	1.4	1.9	2.1	2.9	1.0	2.1	1.0	1.3
67	10	18.8	7.6	1.3	2.5	1.8	2.1	1.0	2.1	1.0	1.0
35	7	21.5	8.0	1.0	2.0	2.0	3.0	3.0	2.0	1.0	1.0
24	6	12.8	5.3	1.0	1.0	1.0	2.3	1.0	1.5	1.0	1.0
98	6	12.2	4.7	1.0	1.0	1.0	1.7	1.0	2.0	1.0	2.0
21	1	18.6	7.0	1.3	1.8	1.8	2.1	1.0	2.3	2.2	1.0
76	2	14.5	5.7	1.0	1.0	1.5	2.2	1.0	1.5	1.0	1.0
75	2	16.3	6.6	1.0	1.5	1.6	2.5	1.0	1.9	1.3	1.0

TABLE A-22

Average Resource Variables By School - Grade 3

School	Site	School - Classroom Design	Use of Materials	Classroom Environment	Study Arrangements	Access to Resources	Teacher/Student Contact Hour Ratio	Aide/Student Contact Hour Ratio	Volunteer/ Student Contact Hour Ratio	Teacher Inservice Training
90	13	1.0	2.2	2.0	2.1	2.0	3.9	---	1.9	1.0
74	2	1.0	1.7	2.7	1.8	2.3	3.5	---	---	1.0
26	12	2.5	2.4	2.7	3.0	3.0	5.0	1.6	1.6	3.0
72	2	1.0	2.1	2.0	2.8	2.7	3.0	2.6	---	3.0
91	13	1.0	2.6	1.3	2.0	3.0	3.1	0.8	1.5	1.0
93	13	3.0	2.4	2.3	2.2	3.0	4.7	2.3	2.5	2.5
92	13	1.0	3.0	2.7	3.0	3.0	3.6	3.3	1.9	3.0
81	9	2.5	2.4	3.0	2.4	3.0	3.2	---	---	3.0
79	9	2.5	2.1	2.3	2.0	3.0	3.3	3.3	---	3.0
71	2	1.0	2.0	2.3	2.7	3.0	3.3	---	---	2.0
25	12	3.0	2.6	2.7	2.7	3.3	6.7	1.5	2.7	1.0
59	11	1.0	2.1	2.0	1.8	2.3	3.0	2.3	2.3	2.0
73	2	3.0	2.4	2.5	2.7	2.7	3.5	0.9	---	3.0

TAPLE A-23

Average Resource Variables By School - Grade 6

School	Site	School - Classroom Design	Use of Materials	Classroom Environment	Study Arrangements	Access to Resources	Teacher/Student Contact Hour Ratio	Aide/Student Contact Hour Ratio	Volunteer/ Student Contact Hour Ratio	Teacher Inservice Training
9	1	1.5	1.7	2.0	1.7	2.3	3.4	3.4	---	2.0
30	4	1.0	2.5	2.0	1.7	3.0	4.2	3.5	---	2.5
32	7	1.0	2.0	1.8	1.7	1.7	3.3	1.6	---	2.0
33	7	1.0	1.5	2.0	1.8	1.5	3.5	---	1.3	2.0
2	5	1.0	2.0	1.3	1.7	3.0	4.4	---	---	1.0
92	13	1.0	3.0	2.7	3.0	3.0	3.6	3.3	1.9	3.0
74	2	1.0	1.7	2.7	1.8	2.3	3.5	---	---	1.0
63	10	1.0	2.2	2.0	1.5	2.2	3.6	1.1	---	2.5
7	1	2.1	2.9	3.0	2.7	2.8	3.3	---	---	2.0
34	7	2.5	1.6	1.8	2.2	2.3	3.0	1.1	---	2.0
91	13	1.0	2.6	1.3	2.0	3.0	3.1	0.8	1.5	1.0
17	1	1.0	2.0	2.0	2.0	3.0	5.0	2.6	---	2.0
96	6	1.0	2.0	2.0	1.7	3.0	3.6	---	---	1.0
1	5	1.0	2.1	1.3	2.2	3.0	5.1	---	---	1.5
8	1	2.5	1.6	1.7	2.0	1.7	3.3	---	---	2.0
19	1	1.5	2.1	2.0	1.7	3.0	3.9	---	---	2.0
73	2	3.0	2.4	2.5	2.7	2.7	3.5	0.9	---	3.0
15	1	1.0	2.6	2.3	2.5	3.0	3.7	---	---	2.0
97	6	1.0	1.9	2.3	1.7	3.0	5.0	---	---	1.0
64	10	1.0	2.2	2.0	1.5	2.2	3.6	1.1	---	2.3

(continued)

TABLE A-23 (continued)

School	Site	School - Classroom Design	Use of Materials	Classroom Environment	Study Arrange-	Access to Resources	Teacher/Student Contact Hour Ratio	/Student ntact Ratio	Volunteer/ Student Contact Hour Ratio	Teacher Inservice Training
99	6	1.0	1.9	2.0	1.5	3.0	4.0	[illegible]	---	1.0
10	1	1.0	2.0	2.0	2.7	3.0	4.0	6.5	---	2.5
27	12	2.0	2.3	2.7	2.2	[illegible]	3.6	1.4	---	3.0
3	8	1.0	2.8	2.7	2.8	[illegible]	3.9	---	---	3.0
72	2	1.0	2.0	2.0	2.0	2.7	3.5	---	---	1.0
90	13	1.8	1.9	1.8	2.0	[illegible]	3.9	1.3	1.3	1.0
59	11	1.0	2.1	2.0	1.8	[illegible]	3.0	2.3	2.3	2.0
98	5	1.0	2.0	2.0	1.7	2.8	3.6	---	---	1.0
93	13	3.0	2.4	2.7	2.7	3.0	4.8	---	2.5	2.5
71	2	1.0	2.0	2.3	2.7	3.0	3.3	---	---	2.0
81	9	2.6	2.5	2.5	2.2	3.0	2.9	2.1	---	3.0
55	3	1.0	2.0	2.0	1.3	2.7	3.0	2.2	---	1.0
61	11	1.4	2.0	2.2	1.7	[illegible]	3.3	---	---	2.0
79	9	2.5	2.1	2.2	1.8	3.0	3.2	1.8	---	3.0

TABLE A-24

Average Resource Variables By School - Grade 7

School	Site	School - Classroom Design	Use of Materials	Classroom Environment	Study Arrangements	Access to Resources	Teacher/Student Contact Hour Ratio	Aide/Student Contact Hour Ratio	Volunteer/Student Contact Hour Ratio	Teacher Inservice Training
31	4	1.0	2.3	1.7	1.0	3.0	3.7	3.1	---	2.5
89	5	1.0	1.8	2.2	1.7	2.7	4.2	---	---	1.0
60	11	1.0	1.3	1.8	1.7	1.5	3.4	---	---	2.0
85	9	2.5	1.9	2.8	2.2	2.2	3.7	2.0	---	2.0
4	8	1.0	1.9	2.0	1.3	2.3	5.0	---	---	1.0
86	9	1.0	1.4	2.0	1.7	1.0	3.3	---	---	2.0
61	11	1.0	1.7	2.5	1.7	2.3	3.3	---	---	2.0
55	3	1.0	2.0	2.0	1.3	2.7	3.0	2.2	---	1.8
97	6	1.0	1.9	2.3	1.7	3.0	5.0	---	---	1.0
94	13	2.0	2.0	2.0	2.3	2.2	3.9	2.8	3.9	1.0
27	12	2.0	2.3	2.7	2.2	2.8	3.6	1.4	---	3.0
20	1	1.0	1.8	2.9	1.8	2.3	3.3	---	4.0	2.3
67	10	1.0	1.8	2.2	2.2	2.6	4.1	4.6	---	2.3
35	7	2.5	1.4	2.7	1.8	2.0	2.9	1.4	---	2.0
24	6	1.0	1.6	1.7	1.5	2.3	3.9	---	---	1.0
98	6	1.0	2.0	2.0	1.7	2.8	3.6	---	---	1.0
21	1	1.2	2.0	2.1	2.3	2.2	3.4	0.6	---	2.0
76	2	1.0	1.5	2.8	1.7	2.3	3.1	---	---	1.3
75	2	1.0	1.9	2.4	2.3	2.7	3.5	4.5	---	1.5

ATTACHMENT B

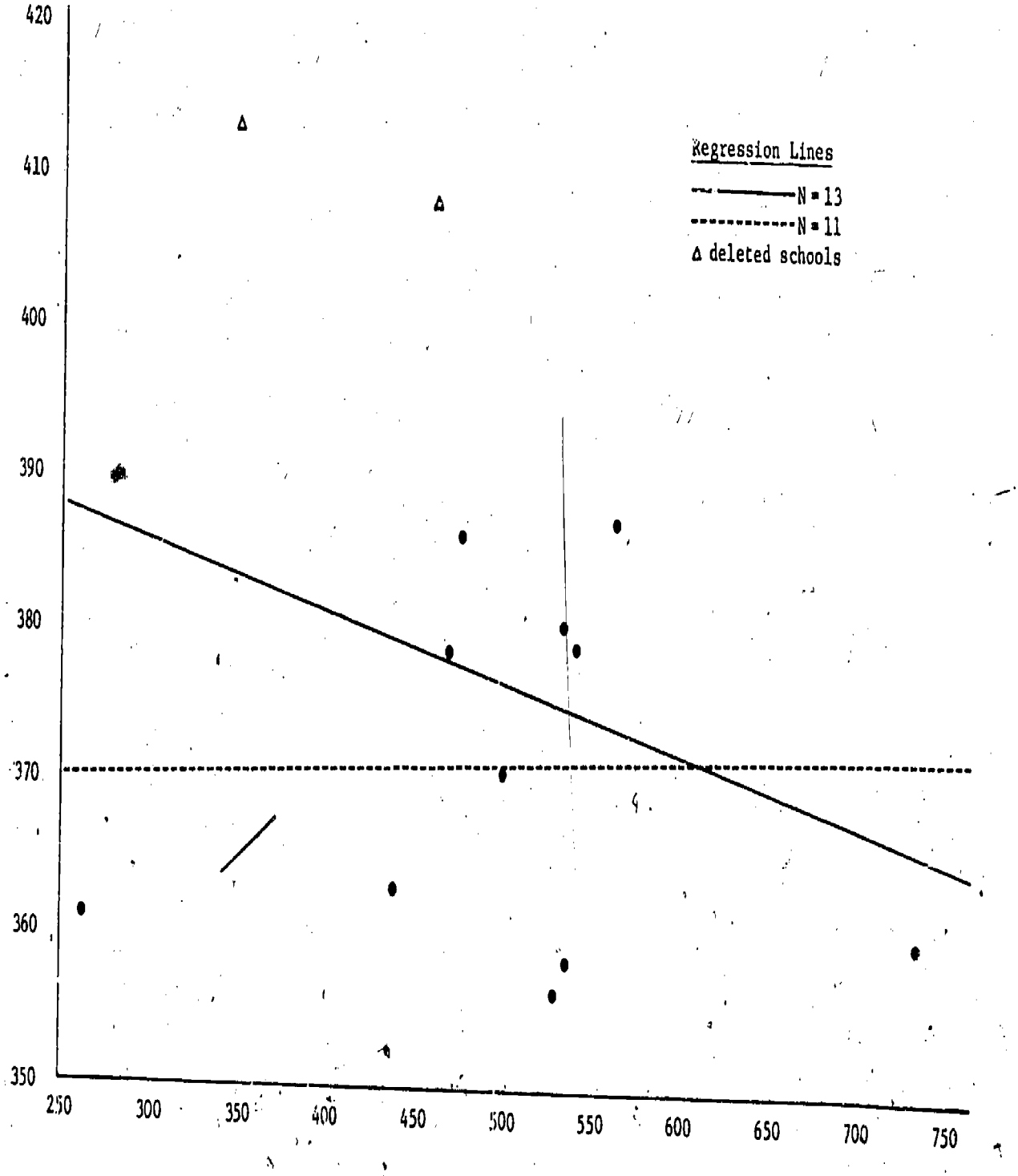

Figure B-1. Plot of the CTBS Battery Total adjusted school posttest means (vertical axis) on Total Time Before the Posttest during the posttest year (horizontal axis) - grade 3 analysis.