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ABSTRACT

The computer assisted instruction (CAI) program studied was implemented in eight elementary and four middle schools. The drill and practice program focused on reading and mathematics skills using a computerized curriculum developed by the Computer Curriculum Corporation. Students, qualifying under Title I guidelines, in grades 3-7 were provided with ten minutes of practice daily. The weight of the data support CAI. Students made at least a month gain per month of instruction on the computer curricula; middle school CAI students made significantly higher standardized test gains than did non-CAI students. Both CAI and control programs were equally effective in achieving reading gains. Elementary mathematics gains generally favored CAI students. Elementary teacher responses to questionnaires indicated that the teachers perceive CAI as beneficial to student achievement; middle school teachers were less positive but still moderately supportive. Student responses to questionnaires indicated that they perceived CAI drill and practice as personally beneficial and as an enjoyable activity. (Author/IRT)

FORT WORTH INDEPENDENT SCHOOL DISTRICT
FORT WORTH, TEXAS

DEPARTMENT OF RESEARCH AND EVALUATION

1975-76

EVALUATION REPORT

COMPUTER ASSISTED INSTRUCTION

A TITLE I PROGRAM

REVISED

Prepared for

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by

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September, 1976

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1975-76

COMPUTER ASSISTED INSTRUCTION

A TITLE I PROGRAM

Fort Worth Independent School District
Department of Research and Evaluation
Fae Lysiak, Assistant Director
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COST OF PROGRAM: $616,519.

Funding Sources:

Title I	$611,923.
SCE	$ 4,596.
Cost per Pupil:	$ 268.29

NUMBER OF PUPILS: 2,298

NUMBER OF STAFF: 12 Teachers and 12 Aides

NUMBER OF SCHOOLS: Twelve Title I Schools

DESCRIPTION: The C.A.I. Program was implemented in eight elementary and four middle schools. The drill-practice program focused on reading and mathematics skills utilizing a computerized curriculum developed by the Computer Curriculum Corporation of Palo Alto, California. Students, qualifying under Title I guidelines, in grades three through seven were provided with ten minutes practice daily on mathematics and on reading in a laboratory containing video screen terminals. A teacher-aide team was assigned to each laboratory.

OBJECTIVE: To determine if C.A.I. is a more effective supplemental method of teaching reading and mathematics than other Title I Programs.

RESEARCH FINDINGS: The C.A.I. students progressed through the CCC curriculum at a faster rate in mathematics than in reading. Students averaged a gain of about seven months on reading and 1.0 year on mathematics in the seven months' interval. In the Spring, fifth, sixth, and seventh graders averaged a grade placement of about 4.5 in reading and 4.0 in mathematics on the CCC curriculum.

CHAPTER I

COMPUTER ASSISTED INSTRUCTION: INTRODUCTION

Description of the Program

The Computer Assisted Instructional (C.A.I.) Program was provided during the 1975-76 school year for 2298 educationally deprived students in grades three through seven in eight elementary schools and in four middle schools. The C.A.I. Program was initiated to provide another avenue to help alleviate reading and mathematics deficits in these twelve Title I schools. Each of the twelve C.A.I. centers are equiped with fifteen computer terminals and one printer; as well as student desks for students to receive individualized instruction until their turn on the computer.

The C.A.I. Program curriculum consists of sequenced strands (lessons) in the areas of reading, mathematics, and language arts. The program is designed to assist the teacher in individualizing student instruction to a degree not previously possible. The computer is programmed to automatically sequence instructional activities tailored to the individual student's ability level and rate of progress, and will provide a printed record of each student's performance.

These instructional materials programmed into the computer include three curriculum areas, reading for grades 2.5 through 6.9; language arts for Primary three through six; and mathematics for Primary 1 through 6. All students participating in the C.A.I. Program were involved in the reading curriculum and/or language arts and mathematics.

Each student participating in the C.A.I. Program worked ten minutes each day at the terminal in the reading curriculum and another ten minutes on either language arts or mathematics, as determined by his individual needs.

Elementary School Schedule

The students participating in the elementary C.A.I. Program were scheduled into the center, in most cases, by class for a forty minute period. The classroom teacher accompanied her class and assisted with the individualized instruction of the students assigned to work at the tables. Fifteen students work on the terminals and fifteen students work at the table. The table work was planned by the C.A.I. teacher, the classroom teacher, or both. The lessons were designed to be supportive of the C.A.I. curriculum. Printouts were checked weekly and individual lessons were developed. The aides' main job responsibility was to monitor the students working on the terminals. Several elementary schools used a different organizational pattern. Specified Title I students from different reading classes attended the C.A.I. center as a group. In this organizational pattern, the classroom teacher did not come to the C.A.I. center with his/her students.

Middle School Schedule

The middle school students were scheduled into the C.A.I. center from a Title I reading class with a sixty minute period. Thirty students were assigned to the C.A.I. center for the first forty minutes of the period. These students worked twenty minutes on the terminals and twenty minutes at the tables. The Title I Reading teacher remained in the classroom with the other fifteen students. At the end of forty minutes, the

thirty students returned to the Title I Reading class and the fifteen students moved to the C.A.I. center for twenty minutes of instruction on the terminals.

Evaluation Design

The evaluation design for the Title I C.A.I. Program will include process and product evaluative questions. The evaluative questions to be answered by this evaluation are given below.

Elementary Product Questions To Be Answered:

1) Will C.A.I. students achieve greater gains on the I.T.B.S. mathematics subtests than similar students receiving Title I support in control schools?
2) Will C.A.I. students achieve greater gains on the Stanford Achievement Test, Mathematics Battery (Computation and Mathematics Application subtests), than similar students receiving Title I mathematics supplemental instruction?
3) Will C.A.I. students achieve greater gains on the I.T.B.S. reading Vocabulary and Reading subtests than similar students receiving Title I support in control schools?

Secondary Product Questions To Be Answered:

4) Will C.A.I. students achieve greater gains on the Gates-MacGinitie Reading Test than similar groups of students receiving Title I supplemental reading instruction?
5) Will C.A.I. students achieve greater gains on the Iowa Tests of Basic Skills Vocabulary and Reading subtests than similar groups of students receiving Title I supplemental reading instruction?

6) Will C.A.I. students achieve greater gains on the Stanford Achievement Test, Mathematics Computation subtest, than a similar group of students who are enrolled in regular mathematics classes only?

7) Will sixth grade students in C.A.I. achieve greater gains on the Iowa Tests of Basic Skills, Mathematics subtest, than a similar group of students who are enrolled in regular mathematics classes only?

8) What is the grade placement gain for students on the C.C.C. curriculum?

Process Evaluative Questions To Be Answered:

1) Will C.A.I. students show improvement in their regular mathematics and reading and/or language arts classes due to their participation in the C.A.I. Program?

2) Will the C.A.I. Program produce beneficial effects on students' motivation, attendance, work habits, and spelling?

Statistical Analysis

The experimental design is the pretest-posttest control group plan. The basic statistical analysis to be used will be the analysis of covariance utilizing pretest as covariates and posttests as criterion. The .05 level of confidence will be accepted as revealing significant differences in achievement.

Experimental Schools and Subjects

The Computer Assisted Instruction Programs were placed in eight elementary schools and four middle schools. Students spent twenty minutes daily on the computer. The C.A.I. schools and number of students are listed below.

Elementary Schools	Number of Students
#3 Worth Heights	225
#8 DeZavala	150
#9 Charles E. Nash	127
#13 Circle Park	219
#20 D. McRae	231
#25 Diamond Hill	122
#27 W. J. Turner	145
#42 H. V. Helbing	179

Secondary Schools	Number of Students
#150 Ernest Parker	225
#157 J. P. Elder	225
#164 Dunbar	225
#165 W. A. Meacham	225

Control Groups

Students in Title I elementary schools receiving supplemental math and reading instruction under the Title Resource Teacher Program will serve as a comparison group. These students were given the same standardized tests and at the same times as the experimental C.A.I. students.

At the secondary level, the Title I Secondary Reading students in the schools with the C.A.I. Program were administered the same tests at the same times as the C.A.I. students for comparison. In the Fall of 1975 students in schools that have C.A.I. Programs were randomly assigned to the Title I Secondary Reading Program or C.A.I. Program.

Treatment

Experimental Group

Students in grades three, four, and five qualifying for Title I instructional services in schools with C.A.I. programs were provided ten minutes of reading and ten minutes of math instruction daily on the C.A.I. terminals. The curriculum used was developed by Computer Curriculum Corporation. In addition to the twenty minutes on the C.A.I. terminals, students were provided twenty minutes of reading and math instruction by the C.A.I. Resource Teacher. This program was not entirely a supplemental program, as a part of the time on C.A.I. is taken from regular reading and/or math classes in many cases.

Sixth and seventh grade students in middle schools qualifying for Title I were scheduled from their regular reading classes (in most cases) to the C.A.I. Programs. Students spent twenty minutes on the C.A.I. terminals working in two subject areas, reading and math or math and language arts. For an additional twenty minutes students were provided reading instruction by the C.A.I. Resource Teacher. Students then returned to the regular reading classes for twenty minutes of instruction from the regular reading teacher. This program was supplemental to the regular math program, but it was not supplemental to the regular reading program as most students were taken from their regular reading classes.

Elementary Control Group

Title I students in grades three, four, and five in schools without C.A.I. Programs received supplemental reading and math instruction from the Resource Teacher assigned to the Title I schools. The Resource Teacher and Aide worked with small groups of ten to sixteen students daily for at least four and one-half months. This program was not entirely supplementary as students were often taken from their regular reading and/or math classes. Reading Clinic Teacher (2½ days a week), the classroom teacher, and High School Aides assisted students the other days. The Systems 80 Center and Reading Center Lab were operated on an individual prescriptive basis.

Middle School Control Groups Treatment

The Control Group at the middle school consisted of Title I students in C.A.I. schools who were randomly assigned to the Title I Reading

Program instead of the C.A.I. Program. The Title I Reading Program provided individualized reading instruction. The reading program was administered to small groups of students (no more than fifteen per group) by a teacher and aide. Students progress through the reading program at his own pace. Students participated in the program one class period (sixty minutes) for two trimesters.

Measures

1) The FWISD objective-based reading test, developed by the Reading Clinic, was modified for evaluation purposes and administered in the Fall and the Spring to all experimental and control groups. The levels of the test administered were appropriate to the reading ability and growth of each group tested. A random sample of C.A.I. and Control Group students were tested.

2) I.T.B.S. Reading subtest was also utilized as a Fall-Spring measure inasmuch as it was administered as part of the standardized testing program.

3) Math progress of experimental and control students was assessed with the math subtests of the ITBS. This instrument was administered in the Fall and in the Spring as part of the FWISD standardized testing program.

4) The Stanford Math Tests (Computation and Application) were given to a twenty percent random sample.

Testing Schedule

The testing schedule for C.A.I. Programs is given in Table 1. Students in the Control Group were given the same test on the same dates as the C.A.I. students.

Table 1. 1975-76 C.A.I. Testing Schedule

Grade	App. No. Enrolled	No. to be Tested	Name of Test	Form	Level	Date of Test
3	400	138	Stanford Math[1] Computation & Application	A=Pretest B=Posttest	Primary II	Sept. 29 May 1
3	400	400	Iowa Test of Basic Skills Vocabulary, Reading, Total Math, Spelling	5=Pretest 6=Posttest	9	Oct. 15 May 15
3	400	200	Criterion-Referenced Reading Test			May 5
4	800	200	Stanford Math[2] Computation & Application	A=Pretest B=Posttest	Primary III	Sept. 29 May 1
4	800	800	Iowa Test of Basic Skills Vocabulary, Reading, Total Math, Spelling	5=Pretest 6=Posttest	10	Oct. 15 May 15
4	800	200	Criterion-Referenced Reading Test			May 5

12

17

18

[1] Lowest Grade Equivalency 1.0

[2] Lowest Grade Equivalency 1.0 Comp. and 1.2 App.

Table 1. 1975-76 C.A.I. Testing Schedule

Grade	App. No. Enrolled	No. to be Tested	Name of Test	Form	Level	Date of Test
5	800	198	Stanford Math[3] Computation & Application	A=Pretest B=Posttest	Intermediate I	Sept. 29 May 1
5	800	800	Iowa Test of Basic Skills Vocabulary, Reading, Total Math, Spelling	5=Pretest 6=Posttest	11	Oct. 15 May 15
5	800	200	Criterion-Referenced Reading Test			May 5
6	600	121	Stanford Math[4] Computation	A=Pretest B=Posttest	Inter. I	Sept. 29 May 1
6	600	600	Iowa Test of Basic Skills Vocabulary, Reading, Total Math, Spelling	5=Pretest 6=Posttest	12	Oct. 15 May 15

3. Lowest Grade Equivalency 2.0

4. Lowest Grade Equivalency 3.0

Table 1. 1975-76 C.A.I. Testing Schedule

Grade	App. No. Enrolled	No. to be Tested	Name of Test	Form	Level	Date of Test
6	600	600	Gates-MacGinitie Reading Test	D-1=Pretest D-2=Posttest		Sept. 5 May 20
7	300	122	Stanford Math[5] Computation	A=Pretest B=Posttest	Inter. II	Sept. 29 May 1
7	300	300	Gates-MacGinitie Reading Test	E-1=Pretest E-2=Posttest		Sept. 5 May 20

[5] Lowest Grade Equivalency 3.0

CHAPTER II

PRODUCT EVALUATION RESULTS

Data were collected to answer evaluative questions concerning the mathematics growth of C.A.I. students and other Title I students. Two standardized mathematics tests were administered to students at the elementary grades. Results from each test were analyzed and are reported below after each evaluative question.

Elementary C.A.I.

Question No. 1 Will C.A.I. students achieve greater gains on the Iowa Tests of Basic Skills mathematics subtests than similar students receiving Title I Support in control schools?

Elementary School I.T.B.S. Results

The Iowa Tests of Basic Skills mathematics subtests (Concepts and Problem Solving) were administered to all third, fourth, and fifth grade FWISD students in the Fall, 1975 and in the Spring, 1976. These tests were administered by classroom teachers (not C.A.I. or Resource Teachers) as part of the regular FWISD testing program and should be relatively free of teacher bias.

Scores of Title I students from C.A.I. and Resource Teacher classes were obtained for comparison. An analysis of covariance statistical treatment was applied to adjust posttest scores for any group differences in initial ability as shown by Fall scores. The comparisons of C.A.I. students' scores with those of Resource Teacher students are shown in Table 2 by grade level.

Table 2. A Comparison of Mean Math Scores of C.A.I. and Resource Teacher Students by Grade on the Iowa Tests of Basic Skills

Program	N	Grade	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain**
C.A.I.	186	3	2.5	3.2	3.2*	.7
Resource Teacher	198	3	2.3	2.8	2.9*	.5
C.A.I.	345	4	3.3	3.8	3.9*	.5
Resource Teacher	164	4	3.4	3.8	3.7*	.4
C.A.I.	286	5	4.2	4.5	4.5	.3
Resource Teacher	194	5	4.1	4.5	4.5	.4

*Mean differences are significant at the .01 level.
**See Addendum A for fall-to-fall growth based on predicted scores.

The major finding generated by the data is that Title I students at grades three and four exposed to Computer Assisted Instruction gained significantly more from Fall-to-Spring on this mathematics test than did students of Title I Resource Teachers. At grade five, the difference between the gains was not significant. C.A.I. students out gained Resource Teacher students by two months at the third grade level and one month at the fourth grade level.

Question No. 2 Will C.A.I. students achieve greater gains on the Stanford Achievement Test, Computation and Math Application subtests, than similar students receiving Title I math supplemental instruction?

Stanford Math Tests

Two subtests, Computation and Application, of the Stanford Achievement Test battery were administered in the Fall, 1975 and Spring, 1976 to a random sample of C.A.I. students and Resource Teacher students. Tests

were administered to C.A.I. students by C.A.I. teachers and to Resource Teacher students by Resource Teachers. The Stanford test was identified by the elementary instructional division as one that might more nearly measure the skills dealt with by the C.A.I. curriculum, particularly the Computation subtest. A comparison of scores earned on the Application subtest in shown in Table 3.

Table 3. A Comparison of C.A.I. and Resource Teacher Scores on the Stanford Math Application Test by Grade

Grade and Treatment	N	Pretest GE	Posttest GE	Adj. Posttest GE	Gain
Grade Three					
CAI	95	2.7	3.4	3.2	.7
Resource Teacher	63	1.9	3.1	3.4	1.2
Grade Four					
CAI	149	3.1	3.8	3.7*	.7
Resource Teacher	70	2.6	3.7	4.0*	1.1
Grade Five					
CAI	154	3.9	4.7	4.4	.8
Resource Teacher	71	3.0	4.1	4.7	1.1

*Mean difference between CAI and Resource Teacher students differ significantly ($P = .05$).

The major finding generated by the data is that Resource Teacher students out gained C.A.I. students on the Stanford Math Application subtest at every grade level, and significantly so at grade four. Overall, Resource Teacher students gained more than C.A.I. students by two to three months.

The consistently lower pretest scores obtained by Resource Teacher students are unexplained. Only Title I students were sampled from both treatment groups even though, at most schools, all or most children were exposed to C.A.I. These low pretest scores of Resource Teacher students are responsible for concluding that gains favored those students even though actual posttest scores favored C.A.I. students.

The analysis of covariance treatment, in effect, measure the pre-treatment difference (fall scores) and determines the expected posttest difference based on the correlation between pre and posttests. The higher the correlation the more it is expected that posttest differences will be reflections of pretest differences, if the rate of progress of the groups is similar. The extent to which posttest differences deviate from that predicted is a measure of a different rate of growth for one of the groups.

In the case of the data just examined, the pre-to-posttest correlations were high ($r = .68, .77$, and $.87$ for grades 3, 4, and 5 respectively). Thus, the narrowing of difference on the posttest was interpreted by the analysis as a result of an increased rate of growth on the part of the Resource Teacher student group.

The gains on this test for both groups were 1.0 year for grade 3 (2.3 to 3.3); 9 months for grade 4 (2.9 to 3.8); and 9 months for grade 5 (3.6 to 4.5).

A comparison of scores earned by the two groups of students on the Stanford Math Computation subtest as shown in Table 4.

Table 4. A Comparison of Scores Earned by C.A.I. and Resource Teacher Students on the Stanford Math Computation Subtest

Grade and Treatment	N	Pretest GE	Posttest GE	Adj. Posttest* GE	Gain
Grade Three					
C.A.I.	95	2.8	3.8	3.6	1.0
Resource Teacher	63	1.9	3.5	3.8	1.6
Grade Four					
C.A.I.	149	3.3	4.7	4.6	1.4
Resource Teacher	70	2.7	4.5	4.7	1.8
Grade Five					
C.A.I.	154	4.1	5.9	5.6	1.8
Resource Teacher	71	3.1	4.8	5.3	1.7

*No mean differences in adjusted posttests were significant.

The major finding of data in Table 4 is that the trend was for Resource Teacher students to make greater gains than C.A.I. students, although none of the differences were significant.

Actual posttest differences favored the C.A.I. groups, but this was expected because of the large initial fall differences between the two groups. As in the Case of the Stanford Application subtest discussed above, pretest scores of the Resource Teacher students were much lower than those of C.A.I. students. It is this pretest difference that generates the finding that Resource Teacher students proceeded at a faster rate in gaining skills.

Pre-to-posttest correlations ($r = .61, .53,$ and $.72$) were not as high as on the Application subtest but generally higher than ITBS scores.

Generally, students in both groups earned higher posttest scores on the Computation subtest than on either the Stanford Application subtest or the ITBS math subtests.

Question No. 3 Will C.A.I. students achieve greater gains on the Iowa Tests of Basic Skills Vocabulary and Reading subtests than similar students receiving Title I support in control schools?

Test results for students receiving Title I C.A.I. Program instruction or Title I Resource Teacher Program instruction were analyzed to determine whether or not one of the programs produced better results. Analysis of covariance statistical treatment was applied to adjust posttest scores for group differences in Fall scores. Results of the Vocabulary and Reading subtests are given in Table 5.

Table 5. Comparison of Mean Scores of C.A.I. and Resource Teacher Students by Grade on the Iowa Tests of Basic Skills, Vocabulary and Reading Subtests

Program	N	Grade	VOCABULARY			
			Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain
C.A.I.	186	3	2.4	3.0	3.0*	.6
Resource Teacher	198	3	2.3	2.7	2.7*	.4
C.A.I.	345	4	3.0	3.3	3.3**	.3
Resource Teacher	164	4	2.9	3.6	3.6**	.7
C.A.I.	286	5	3.5	3.9	3.9**	.4
Resource Teacher	194	5	3.6	4.2	4.2**	.6

Program	N	Grade	READING			
			Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain***
C.A.I.	186	3	2.5	3.1	3.0*	.6
Resource Teacher	198	3	2.3	2.6	2.7*	.3
C.A.I.	345	4	3.1	3.3	3.3**	.2
Resource Teacher	164	4	3.1	3.6	3.6**	.5
C.A.I.	286	5	3.7	4.0	4.0	.3
Resource Teacher	194	5	3.8	4.2	4.1	.4

* Mean differences are significant at the .01 level.
** Mean differences are significant at the .05 level.
*** See Addendum A for fall-to-fall gains based on predicted scores.

Results indicate that the C.A.I. students at grade three achieved significantly greater gains on the Vocabulary and Reading subtests, but at grade four the Resource Teacher students achieved greater gains than

C.A.I. students. At grade five, the Resource Teacher students achieved greater gains on the Vocabulary subtest but there was no significant difference between the groups on the Reading subtest.

Evaluative data were collected to answer specific questions regarding the effectiveness of C.A.I. for Middle School mathematics and reading instruction. The results are reported after each question.

Question No. 4 Will C.A.I. students achieve greater gains on the Gates-MacGinitie Reading Test than similar groups of students receiving Title I supplemental reading instruction?

An analysis of covariance was computed between the C.A.I. students and the Title I Secondary Reading Program students in the four Middle Schools that had both programs. The results are given in Table 6.

Table 2. Comparison of Gates-MacGinitie Reading Test Grade Equivalencies for Secondary C.A.I. Students and Secondary Reading Program Students for Grades six and seven

Program	Grade	N	COMPREHENSION			VOCABULARY		
			Pretest Mean G.E.	Posttest Mean G.E.	Adj. Posttest Mean G.E.	Pretest Mean G.E.	Posttest Mean G.E.	Adj. Posttest Mean G.E.
C.A.I. (Title I)	6	269	3.6	4.4	4.2	3.8	4.3	4.2*
Secondary Reading (Title I)	6	318	3.2	3.9	4.1	3.5	4.0	4.1*
					F=1.84			F=4.55
					P=N.S.			P=.05
C.A.I. (Title I)	7	358	3.8	4.5	4.3	4.5	5.1	5.0*
Secondary Reading (Title I)	7	271	3.4	4.3	4.4	4.2	4.6	4.7*
					F=1.27			F=7.05
					P=N.S.			P=.01

*Significant differences.

There were no significant differences between C.A.I. and Secondary Reading Program students' scores on the adjusted posttest of the Gates Comprehension subtest at grades six or seven. There were significant differences at grades six and seven on the adjusted posttest of the Gates Vocabulary subtest. The differences favor the C.A.I. students at grade six and seven.

Question No. 5 Will C.A.I. students achieve greater gains on the Iowa Tests of Basic Skills Vocabulary and Reading subtests than similar groups of students receiving Title I supplemental reading instruction?

Middle School I.T.B.S. Results

The Iowa Tests of Basic Skills, Vocabulary and Reading subtests were given to all grade six students in the Fort Worth Independent School District in October of 1975 and to a random sample of sixth grade schools plus all sixth grade C.A.I. schools in May of 1976. The test results for Title I students in schools having the C.A.I. Program were analyzed separately for each Title I Program, Secondary Reading Program and Computer Assisted Instruction Program. At the beginning of the school year, all students qualifying for Title I services were randomly assigned to the Title I Secondary Reading Program or the Title I C.A.I. Program.

An analysis of covariance was applied to test data to determine if one of the Title I Programs produced greater end-of-year test scores on the Vocabulary and Reading subtests. C.A.I. students received Reading and Mathematics instruction, whereas, the students in the Title I Secondary Reading Program received special Reading instruction and only regular

Mathematics. Therefore, the Title I Secondary Reading students served as a comparison group for the C.A.I. Mathematics students. The results are reported in Table 7.

Table 7. Comparison of Mean Scores of C.A.I. and Title I Secondary Reading Students on the Iowa Tests of Basic Skills, Vocabulary and Reading Subtests

			VOCABULARY			
Program	N	Grade	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain
C.A.I.	308	6	3.8	4.2	4.1	.6
Title I Secondary Reading	319	6	3.4	3.5	3.7 F=18.6 P=.01	.1
			READING			
Program	N	Grade	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain
C.A.I.	308	6	4.0	4.3	4.2	.3
Title I Secondary Reading	319	6	3.7	3.9	4.0 F=2.77 P=N.S.	.2

Results of these tests indicate that C.A.I. students achieved significantly higher end-of-year scores on the Vocabulary subtest than students in Title I Secondary Reading. There were no significant differences on Reading subtest scores. C.A.I. students made a gain of three months on the Reading subtest, whereas, Title I Secondary Reading students gained two months.

Question No. 6 Will C.A.I. students achieve greater gains on the Stanford Achievement Test, Math Computation subtest, than a similar group of students who are enrolled in regular math classes only?

The Stanford Achievement Test, Computation Subtest, was given to a sample of C.A.I. students at the time they completed their C.A.I. math instruction. Thirty-two grade seven students and forty-two grade six students in the sample were tested March 1 after completion of two trimesters of C.A.I. math instruction. All others in the sample were tested May 10.

A random sample of students enrolled in the Title I Secondary Reading Program who were taking regular math was given the Stanford for comparison to C.A.I. students. Twelve grade seven students and twenty-six grade six students were tested at the end of the second trimester. All others in the sample were tested May 10.

Analysis of covariance was used to determine if C.A.I. students made significantly higher posttest results than the comparison group on the Stanford. Results are given in Table 8 by grade level.

Table 8. Comparison of C.A.I. Middle School Students and Comparison Group on Stanford Math Test, Computation Subtest

Group	Grade	N	Pretest G.E.	Posttest G.E.	Adj. Posttest G.E.	Actual Gain
C.A.I.	6	110	4.1	5.4	5.5	1.3
Comparison	6	93	4.6	5.2	5.0	.6
					F = 8.9	P = .01
C.A.I.	7	100	4.6	5.5	5.5	.9
Comparison	7	86	4.5	5.2	5.3	.7
					F = 1.46	P = N.S.

Results indicate that C.A.I. students at grade six made significantly greater gains in mathematics than a comparison group of Title I students who did not receive special mathematics instruction. At grade seven there were no significant differences between the groups; although, there was a tendency for C.A.I. students to make greater gains.

Question No. 7 Will sixth grade C.A.I. students achieve greater gains on the Iowa Tests of Basic Skills Mathematics subtest than a similar group of students who are enrolled in regular math classes only?

An analysis of covariance was computed on I.T.B.S. total math scores for C.A.I. students and Non-C.A.I. Title I students. Results are given in Table 9.

Table 9. A Comparison of C.A.I. Sixth Grade Students and a Non-C.A.I. Title I Group on the Iowa Tests of Basic Skills, Total Mathematics subtest

			MATHEMATICS			
Program	N	Grade	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	G.E. Gain
C.A.I.	308	6	4.5	4.8	4.8	.3
Title I Non-C.A.I.	319	6	4.4	4.7	4.7	.3
					F=3.95	
					P=.05	

Results indicate that C.A.I. students made significantly greater gains (P = .05) than Non-C.A.I. students.

Student Progress on CCC Curriculum

Question No. 8 What is the grade placement gain for students on the CCC curriculum?

Upon entering the CCC program, C.A.I. students usually establish a baseline with 10 to 15 sessions. On each succeeding week printouts were produced by the mini computers reporting student progress on the various trends in terms of grade level placement (GP) and on overall average GP for each skill area.

In order to monitor this progress for the large number of students served, a collection plan was jointly developed by FWISD and CCC. Every two weeks the discs containing each student's data were removed from the mini computers and mailed to CCC. CCC, then, retrieved and stored the data. At mid-year and at the end of 1976, these data were summarized in two ways: GP progress by number of sessions and by calendar dates. A summary was provided by grade level for the district, as well as by school, for each skill area: reading, mathematics, and language.

The collection dates selected for graphing are those where it seems rather certain that data from all schools were included in the summations. For many dates, representing a week, there were no scores recorded for individual schools for unexplained reasons.

Progress by students, as a group, through the CCC curriculum, in both reading and mathematics is shown in Exhibits A through G for students at each grade level. These graphs reflect the group summaries by collection date described above. The lines reflect progress from October 24 to May 27, about 7 months.

Gains by students during the year are shown, by grade level and subject area, in Table 10.

Table 10. Fall-to-Spring Gains on CCC Curriculum

Grade Level	Math	Reading
3	1.1 yr.	7 months
4)	1.0 yr.	8 months
5	1.0 yr.	7 months
6*	1.2 - 1.3 yr.	6 - 7 months
7*	8 - 9 months	5 - 6 months
Dunbar** Grade 6	1.5 yr.	9 months

*Two groups: those with fall-winter trimesters and those with fall-spring trimesters.
**Three trimesters on CAI.

Gains by middle school students reflect two trimesters of C.A.I. except at Dunbar where sixth graders remained on the program for three trimesters, extending their gains to 9 months in reading and 1.5 years in math. Dunbar gains were also included in total sixth graders gains.

On the surface, it appears that the math curriculum might have been more effective than the reading curriculum. Two factors, however, need to be kept in mind. First, the students' baseline in math was considerably below that in reading and possibly were starting at a point that might have been below their true math ability. CCC math baseline GP's were also substantially lower than those obtained at the same time on both the Stanford and the ITBS math subtests. Secondly, at no time during the year, including the end, did students score as high on the CCC math curriculum as they did

on the CCC reading curriculum. At the end of the year (May) students generally scored about one-half year lower on the math than on the reading curriculum.

As approximately seven months intervened between October 24 and May 27, it can be concluded that, on the average, students gained a month per month of instruction in CCC reading and considerably more on the math curriculum.

As for status of GP it may be noted that both the baselines and end of the year GP attained on the math curriculum were almost identical for 5th (3.9), 6th (3.9), and 7th (4.0) graders. End-of-the-year attainment on the reading continuum was slightly better as grade level increased. On the average, middle school students attained a GP of about 4.5 years on the reading curriculum and 4.0 years on the math curriculum at the end of the year.

Further analyses of progress of students at individual schools will be made in a later report.

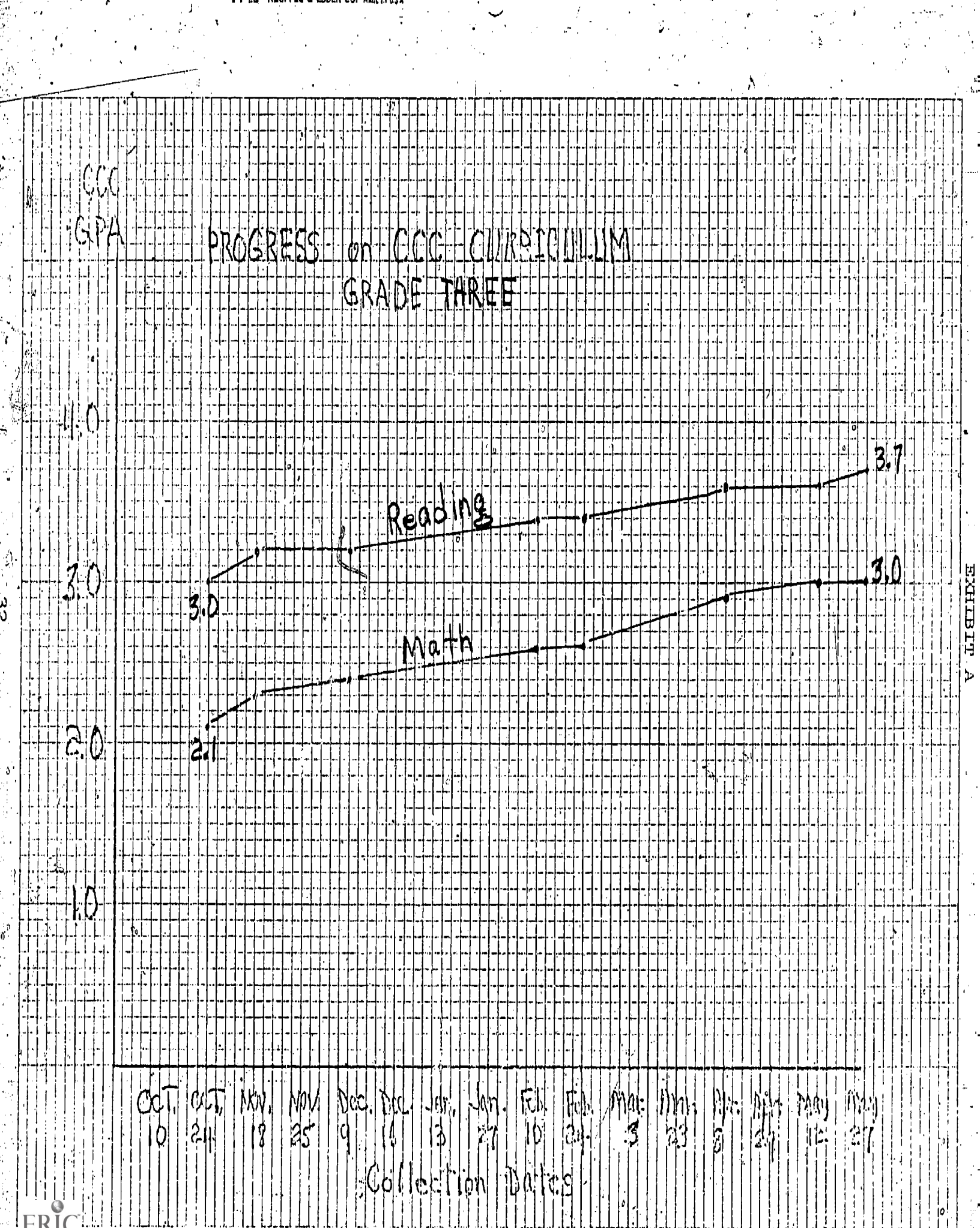

CCC
GPA
PROGRESS on CCC CURRICULUM
GRADE THREE
4.0
3.0
2.0
1.0
Reading
Math
3.0
2.1
3.7
3.0
Oct. 10
Oct. 24
Nov. 18
Nov 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 6
Apr. 20
May 11
May 27
Collection Dates

EXHIBIT A

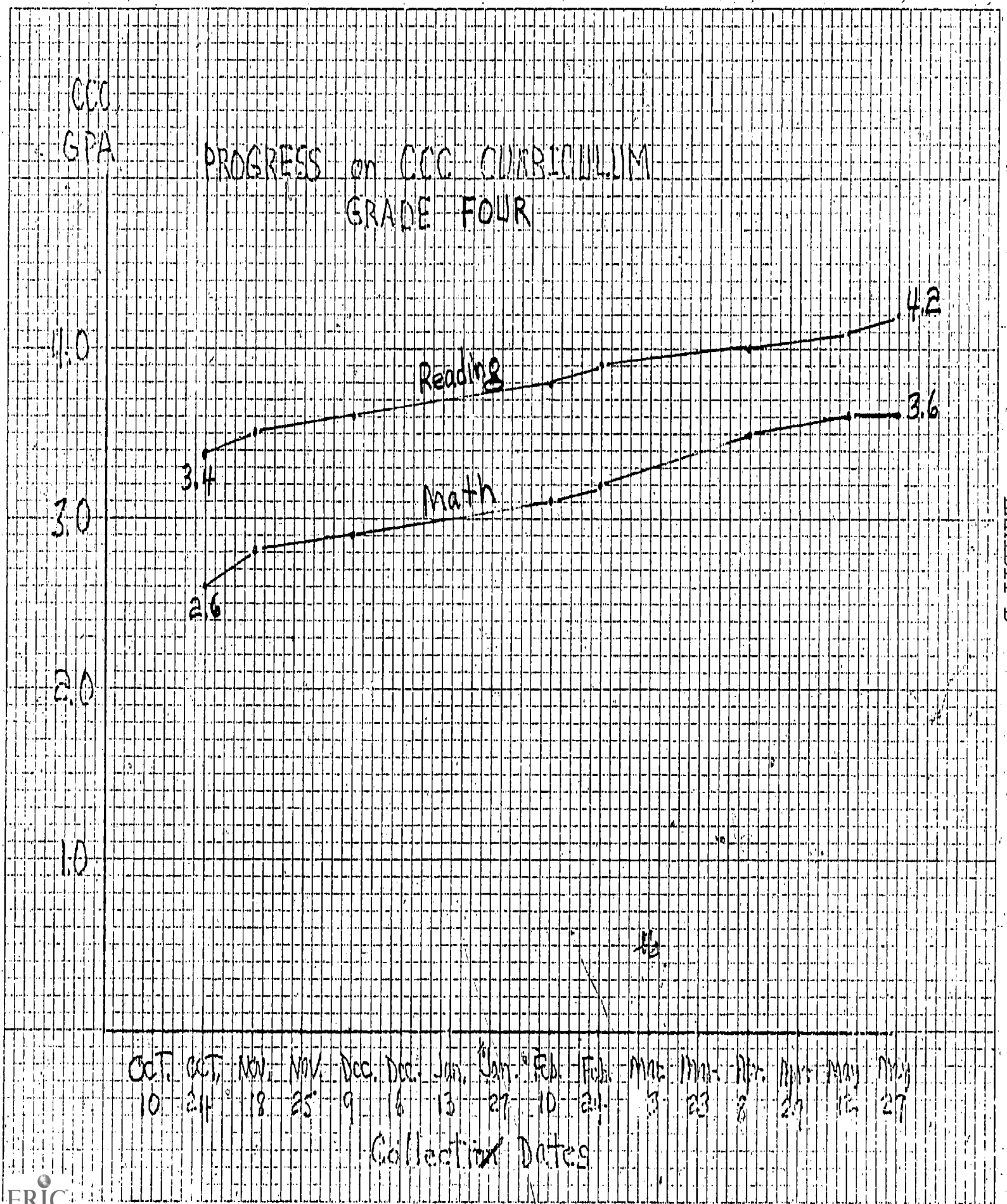

CCC
GPA
PROGRESS on C.C.C. CURRICULUM
GRADE FOUR
4.0
3.0
2.0
1.0
Reading
Math
3.4
3.6
4.2
2.6
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 8
Apr. 27
May 12
May 27
Collection Dates

EXHIBIT B

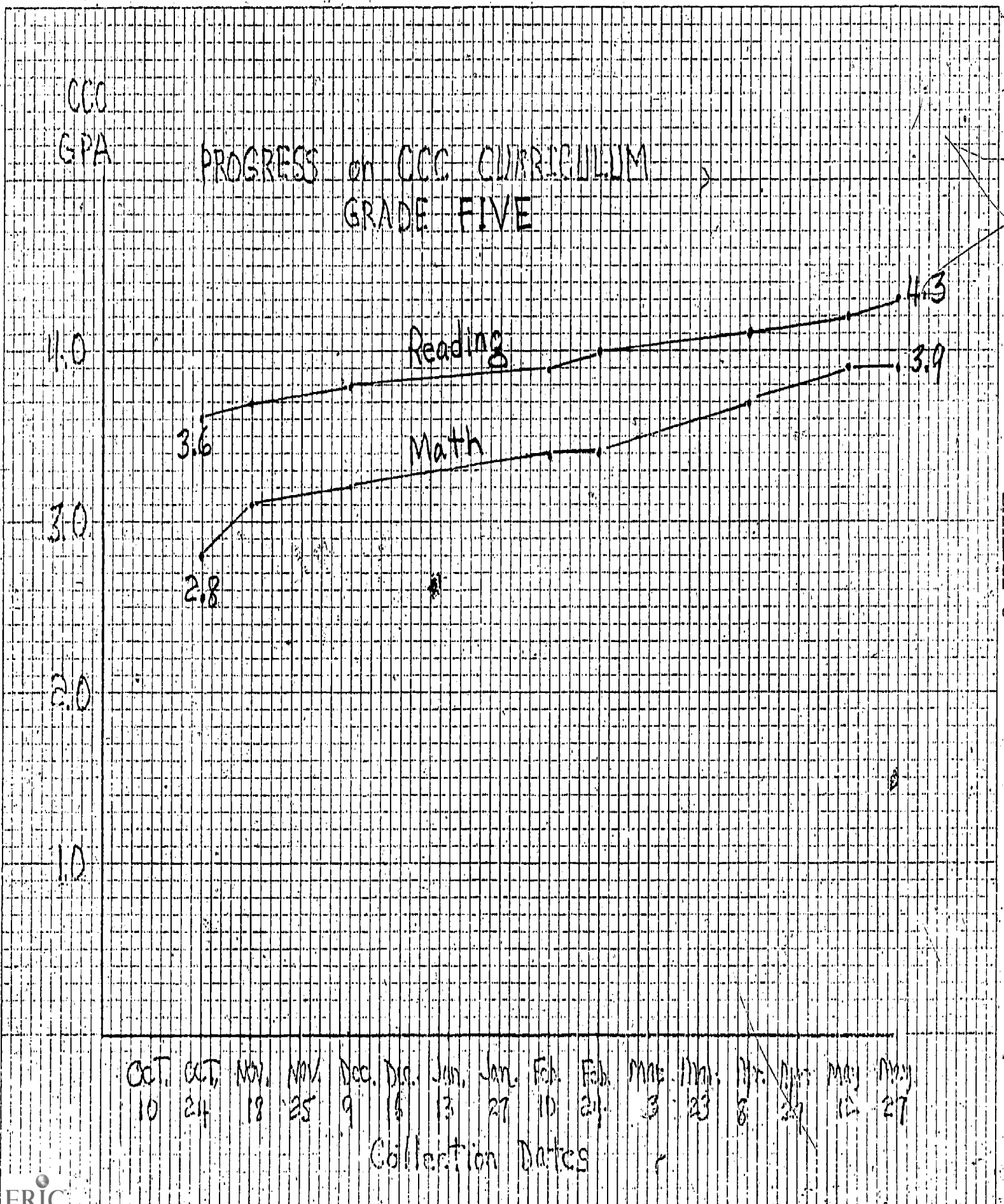

CCC
GPA
PROGRESS on CCC CURRICULUM
GRADE FIVE
4.0
3.0
2.0
1.0
Reading
Math
3.6
2.8
4.3
3.9
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 9
Mar. 23
Apr. 6
Apr. 20
May 11
May 27
Collection Dates

EXHIBIT C

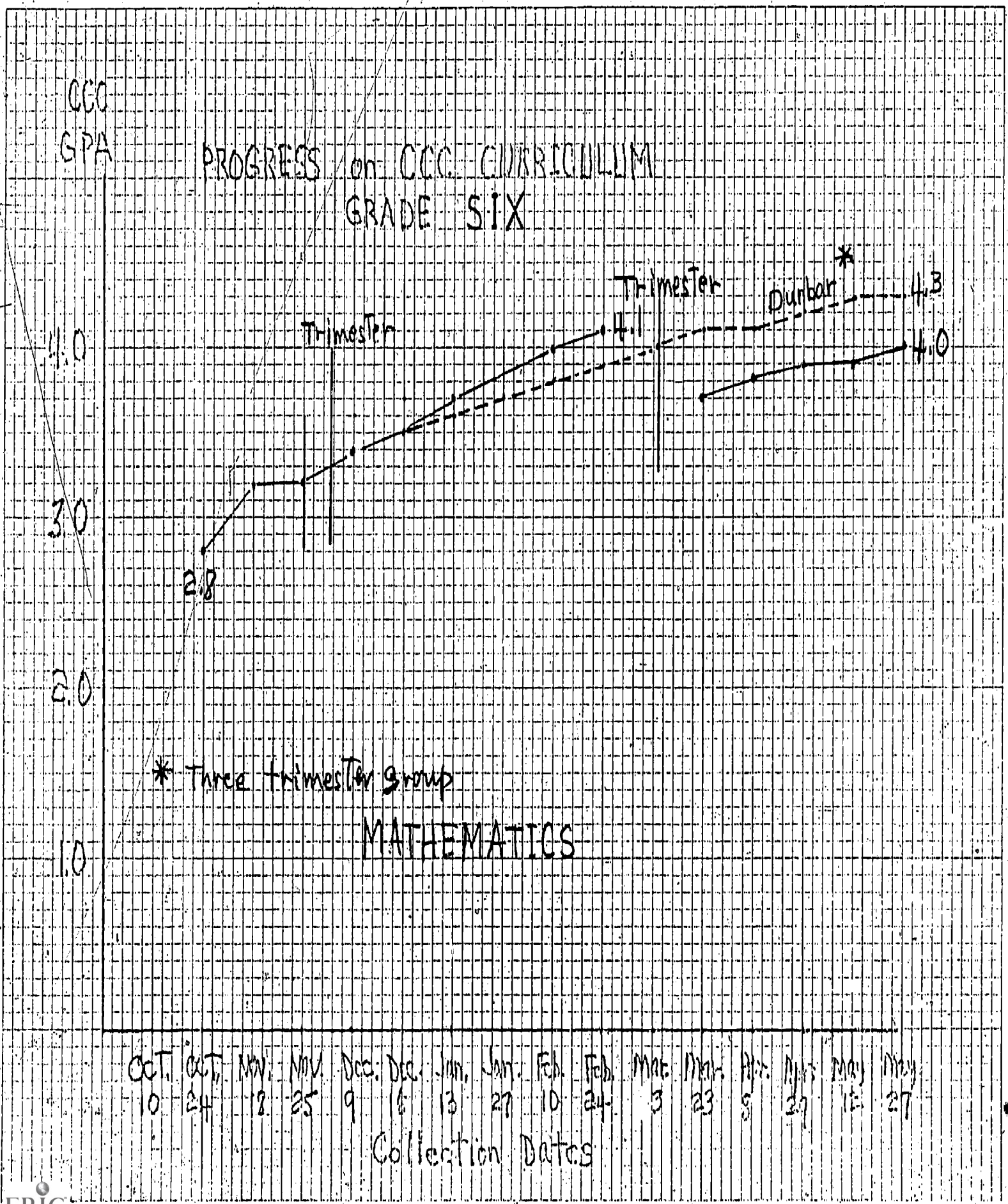

CCC GPA
PROGRESS on CCC. CURRICULUM
GRADE SIX
4.0
3.0
2.0
1.0
Trimester
4.1
Trimester
Dunbar*
4.3
4.0
2.8
* Three trimester Group
MATHEMATICS
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 6
Apr. 27
May 18
May 27
Collection Dates

EXHIBIT D

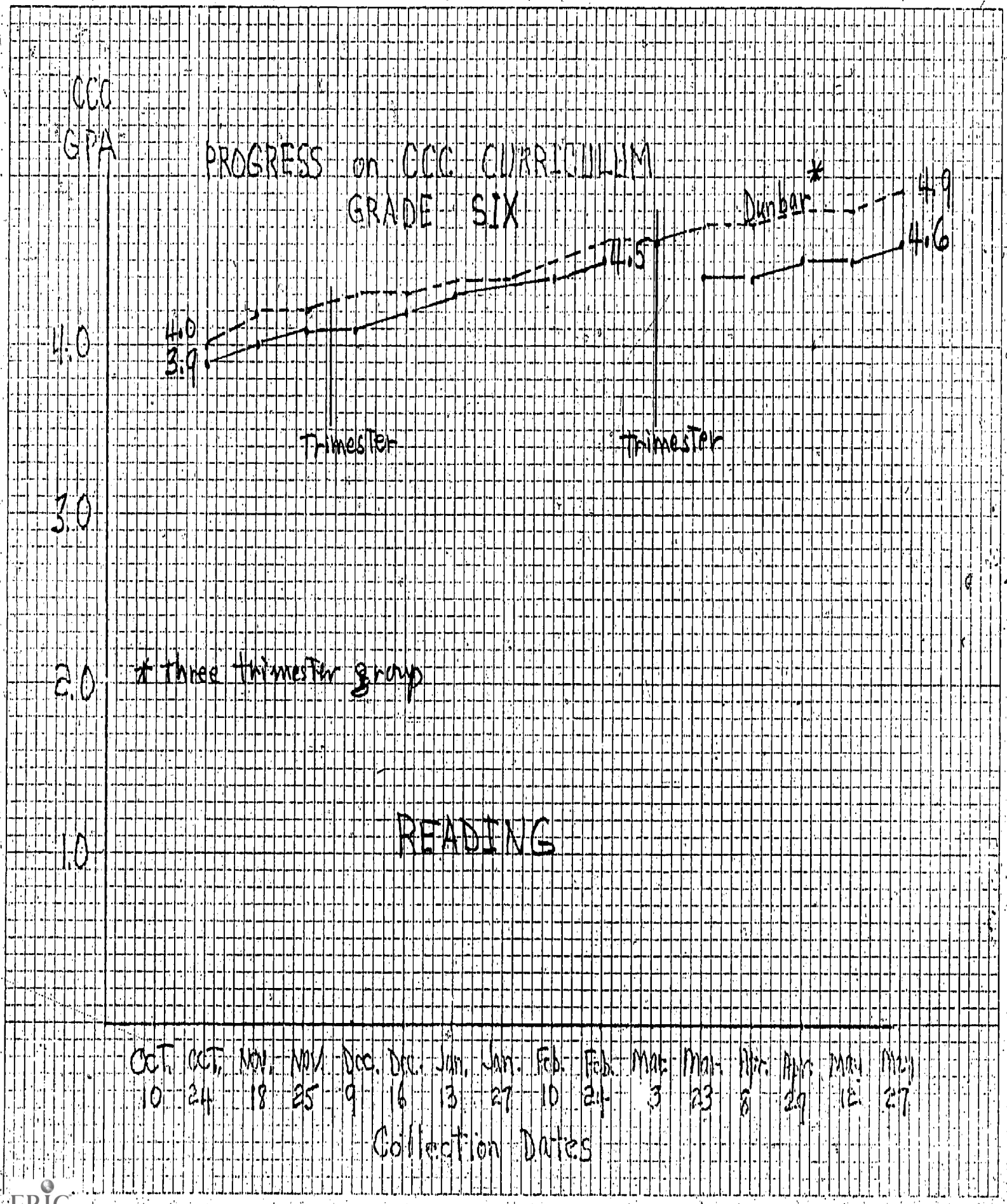

CCC GPA
PROGRESS on CCC CURRICULUM
GRADE SIX
Dunbar *
4.9
4.6
4.5
4.0
3.9
4.0
3.0
2.0
1.0
Trimester
Trimester
* Three Trimester Group
READING
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 6
Apr. 20
May 18
May 27
Collection Dates

EXHIBIT E

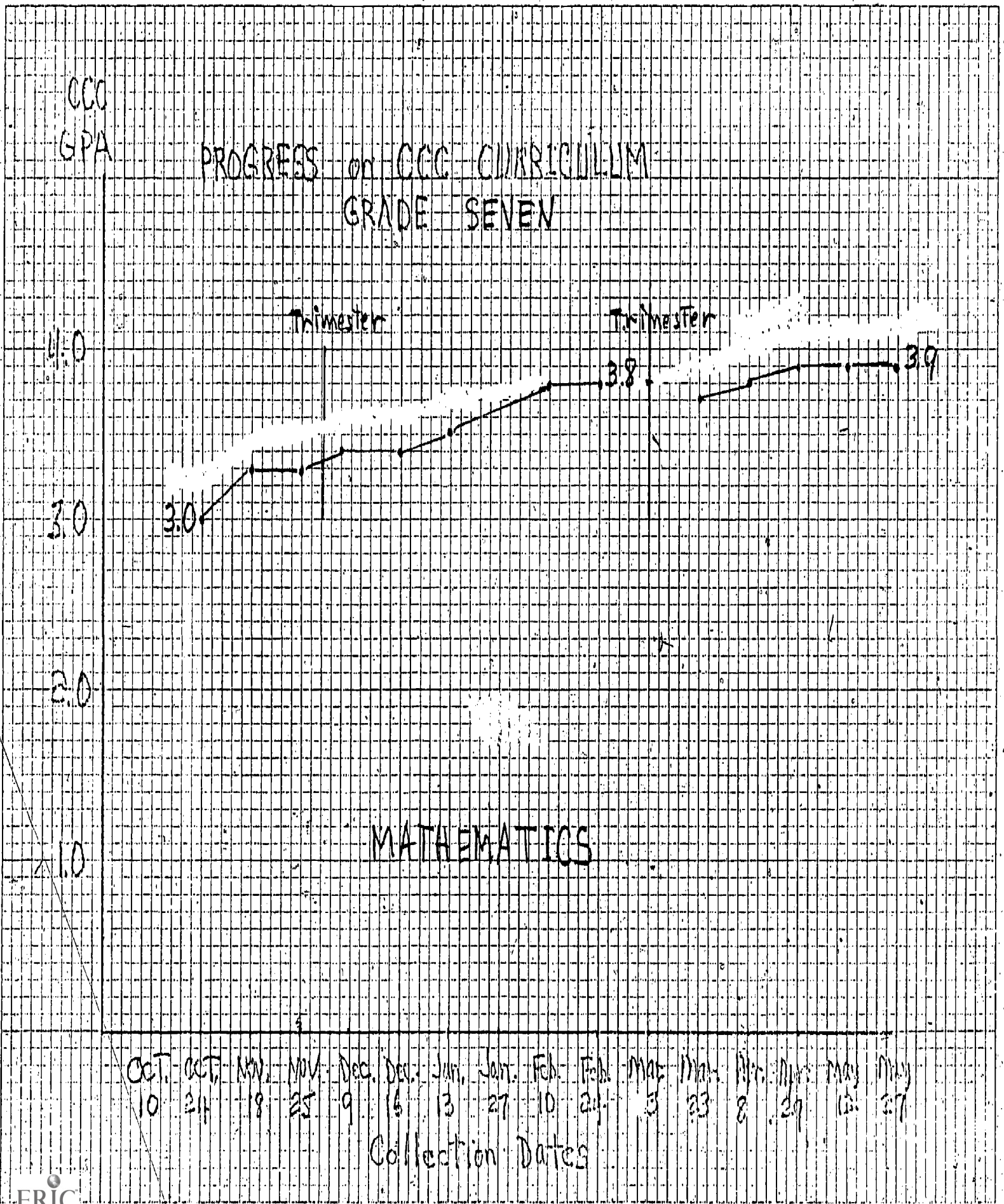

CCC GPA
PROGRESS on CCC CURRICULUM
GRADE SEVEN
Trimester
Trimester
4.0
3.0
2.0
1.0
3.0
3.8
3.9
MATHEMATICS
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 6
Apr. 20
May 11
May 27
Collection Dates

EXHIBIT F

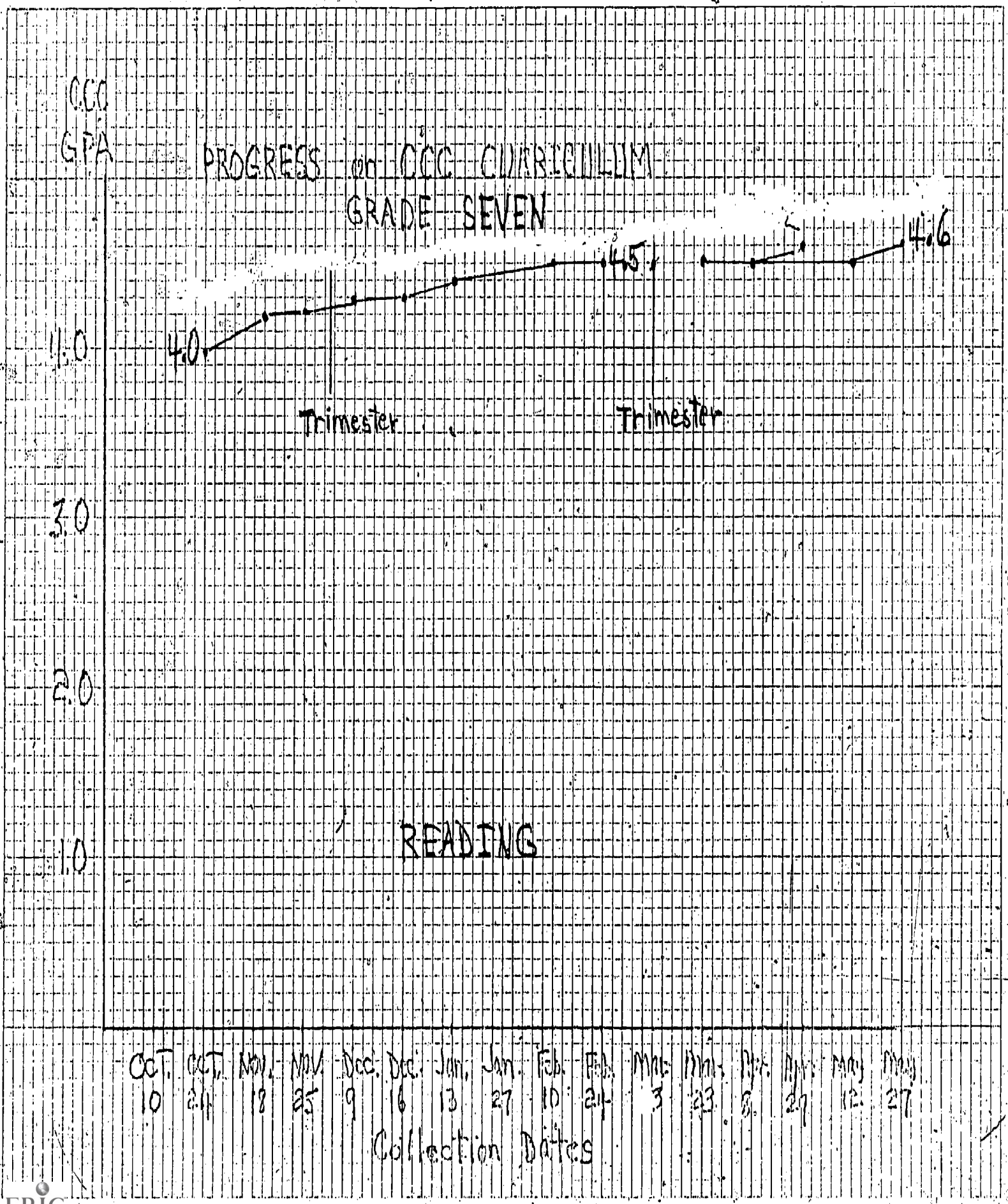

CCC GPA
PROGRESS on CCC CURRICULUM
GRADE SEVEN
4.6
4.5
4.0
1.0
Trimester
Trimester
3.0
2.0
READING
1.0
Oct. 10
Oct. 24
Nov. 18
Nov. 25
Dec. 9
Dec. 16
Jan. 13
Jan. 27
Feb. 10
Feb. 24
Mar. 3
Mar. 23
Apr. 6
Apr. 20
May 12.
May 27
Collection Dates

EXHIBIT G

CHAPTER III

PROCESS EVALUATION

Classroom teachers at both the elementary and secondary schools were surveyed to access their perceptions of how students were improving in the regular classroom curriculum as a result of their participation in the C.A.I. Program. Students were also asked to respond to questions pertaining to how the C.A.I. Program had helped them in mathematics, reading and/or language arts. Results of these questionnaires were summarized and are reported below after each process evaluative question. A copy of the questionnaires may be found in the Appendix.

Question No. 1 Will C.A.I. students show improvement in their regular math and reading and/or language arts classes due to their participation in the C.A.I. Program?

The Elementary Classroom Teacher Questionnaire was sent to six teachers in each of the eight C.A.I. schools. The sample included an equal number of teachers at each grade level (grades three through five). Thirty-five (73%) completed questionnaires were returned.

When asked what effect the C.A.I. Program had on mathematics, reading, and english achievement, teachers responded that the program had a positive effect on achievement in all three curriculum areas. Ninety percent of the classroom teachers responding on mathematics achievement were positive and gave the following statements as evidence: 1) students can recall facts faster; 2) horizontal addition and subtraction have improved; 3) C.A.I. has provided the extra drill needed to support classroom instruction; 4) the constant drill has improved retention; and 5) students are motivated to attempt mathematics tasks. Ninety-four percent of the

classroom teachers responding to the effect on reading achievement were positive. Teachers listed the evidence of achievement as follows: 1) sight word vocabulary has increased; 2) less difficulty with high frequency words; 3) improvement in comprehension; 4) increased reading speed and attention to details; and 5) improved attention.

Not all elementary C.A.I. students took the English program. Of the nineteen classroom teachers responding, seventy-nine percent felt that the effect on English skills was positive. The observed improvements in achievement are summarized as follows: 1) grammar usage improved; 2) improvement in sentence structure, capitalization, abbreviations, and paragraphs; and 3) improve use of proper pronouns, plurals, and verb usage.

The following information shows a percentage summary of responses by classroom teachers to questions:

What effect has the C.A.I. Program had on your students' math achievement?

Positive 90% No Effect 10%

What effect has the C.A.I. Program had on your students' reading achievement?

Positive 94% No Effect 6%

What effect has the C.A.I. Program had on your students' English achievement?

Positive 79% No Effect 21%

The Secondary Classroom Teacher Questionnaires were sent to sixty-seven teachers (Reading, Mathematics, and English) in four C.A.I. middle schools. Forty-five percent of the questionnaires were completed and

returned. The questionnaires requested that teachers give their opinion as to how C.A.I. students were achieving in regular classes. Classroom teachers were asked to respond only to the questions related to the subject area they taught; therefore, all teachers did not respond to every question.

When asked what effect the C.A.I. Program had on students' mathematics achievement, forty-three percent of the mathematics teachers responding stated that the program had a very favorable improvement effect; 28½ percent said some students have shown improvement; and 28½ percent said there had been little or no effect.

Reading teachers did not report any instances of very favorable improvement; however, seventy-seven percent of the reading teachers responding reported that the C.A.I. Program had caused some students to achieve more in reading and twenty-three percent said that the program had little or no effect on reading achievement.

Only two English teachers with C.A.I. students responded. One teacher stated that the C.A.I. Program had a favorable effect on English achievement and the other felt that the program had little or no effect on English skills.

In summary, the elementary classroom teachers were extremely positive that C.A.I. students were showing improvements in their regular mathematics, reading, and/or language arts. The secondary classroom teachers were approximately split as to whether C.A.I. had any beneficial effect on reading, mathematics, and/or language arts.

The C.A.I. Student Questionnaire was sent to a sample of C.A.I. students in grades three through eight. There were two hundred and fifty-eight responses, forty-six percent of which were from boys and fifty-four percent were from girls. Of the responses four percent were from grade three, twenty-five percent were from grade four, twenty-four percent were from grade five, twelve percent were from grade six, thirty percent were from grade seven, and five percent were from grade eight.

Ninety-eight percent of the responding students have taken C.A.I. reading, ninety-five percent have taken C.A.I. mathematics, and sixteen percent have taken language arts. When asked if the computer helped in specific curriculum areas, the students responded as follows:

Helped in Reading	93%	responded Yes
Helped in Mathematics	90%	responded Yes

Seventy percent of the students stated that their classroom grades had improved since using the computer. Twenty-seven percent said that their grades had stayed the same. C.A.I. students, generally, view the computer curriculum as being very helpful in regular classes.

Question No. 2 Will the C.A.I. Program produce beneficial effects on students' motivation, attendance, work habits, and spelling?

The elementary classroom teachers felt that the C.A.I. Program had beneficial effects:

a) on spelling	86%	Yes	14%	No
b) on motivation	84%	Yes	16%	No
c) on attendance	59%	Yes	41%	No
d) on independent work habits	77%	Yes	23%	No

e) others pride in work; learned to follow directions better; better independent thinking; better use of time; and a desire to excell in academic work

The secondary classroom teachers felt that the C.A.I. Program had beneficial effects:

a) on spelling	53%	Yes	47%	No
b) on motivation	50%	Yes	50%	No
c) on attendance	44%	Yes	56%	No
d) on independent work habits	56%	Yes	44%	No

In summary, more elementary classroom teachers observed a beneficial effect on spelling, motivation, attendance and work habits than did secondary classroom teachers.

CHAPTER IV

SUMMARY

The Computer Assisted Instruction (C.A.I.) Program was very successful in terms of student achievement. Elementary teachers and students were extremely positive about increased achievement in reading, mathematics, and English. Seventy percent of the students stated their classroom grades had improved since using the computer. Elementary teachers also stated the C.A.I. Program had beneficial effects on spelling, motivation, attendance, and independent work habits. Secondary teachers were approximately split as to whether C.A.I. had any beneficial effect on reading, mathematics, language, spelling, motivation, attendance, or independent work habits.

The C. A. I. students in grades three and four gained significantly more from Fall to Spring on the Iowa Tests of Basic Skills, Mathematics subtests (Concepts and Problem Solving) than did students of Title I Resource Teachers. At grade five, the difference between the gains was not significant.

A comparison of C.A.I. students and Resource Teacher students' scores on the Stanford Achievement Test, Math Application subtest, shows that Resource Teachers' students exceeded gains of C.A.I. students at every grade level, and significantly so at grade four. Upon comparison of scores of C.A.I. students and Resource Teacher students on the Stanford Achievement Test, Math Computation subtest, Resource Teacher students make greater gains than C.A.I. students; although, the differences were not significant.

Comparison of C.A.I. and Resource Teacher students by grade on the I.T.B.S., Vocabulary and Reading subtests, indicates that C.A.I. students at grade three achieved significantly greater gains on the Vocabulary

and Reading subtests, but at grade four the Resource Teacher students achieved greater gains than the C.A.I. students. At grade five, the Resource Teacher students achieved greater gains on the Vocabulary subtest; but, there was no significant difference between the groups on the Reading subtest.

In comparison of C.A.I. and Title I Secondary Reading Program students' scores on the Gates-MacGinitie Reading Test, the scores indicate significant differences in favor of the C.A.I. students at grades six and seven. The Iowa Tests of Basic Skills, Vocabulary and Reading subtests, results indicate that sixth grade C.A.I. students achieved significantly higher end-of-year scores on the Vocabulary subtest than students in Title I Secondary Reading. There were no significant differences on Reading subtest scores.

Results of the Stanford Achievement Test, Mathematics Computation subtest, indicate that C.A.I. students at grade six made significantly greater gains in mathematics than a comparison group of Title I students who did not receive special mathematics instruction. At grade seven, there were no significant differences between the groups.

Comparison of C.A.I. sixth grade students and Non-C.A.I. Title I students on the I.T.B.S., Total Mathematics subtest, scores indicate that C.A.I. students made significantly greater gains than Non-C.A.I. students.

Conclusions are difficult to draw because results are so varied using different measures. A Table (number eleven) showing areas where significant differences were found follows.

Table 11. Summary of Significant Differences in Reading and Mathematics for C.A.I. and Resource Teacher Students

Grade Level	MATHEMATICS			READING			
	I.T.B.S.	Stanford		Gates-MacGinitie		I.T.B.S.	
		Application	Computation	Read Comp.	Vocabulary	Vocabulary	Reading
Three	SIG. (C.A.I.)	N.S.	N.S.			SIG. (C.A.I.)	SIG. (C.A.I.)
Four	SIG. (C.A.I.)	SIG. (R.T.)	N.S.			SIG. (R.T.)	SIG. (R.T.)
Five	N.S.	N.S.	N.S.			SIG. (R.T.)	N.S.
Six	SIG. (C.A.I.)		SIG. (C.A.I.)	N.S.	SIG. (C.A.I.)	SIG. (C.A.I.)	N.S.
Seven			N.S.	N.S.	SIG. (C.A.I.)		

C.A.I. students' progress through the CCC curriculum was greater in mathematics than in reading. Students averaged a gain of seven months on reading and 1.0 year on mathematics in the seven months' interval. In the Spring, fifth, sixth, and seventh graders averaged a grade placement of about 4.5 in reading and 4.0 in mathematics on the CCC curriculum.

A comparison of end-of-year CCC grade placement and end-of-year standardized scores is given in Table 12.

Table 12. Comparisons of End-of-Year Grade Placement on CCC and Standardized Tests

Grade Level	End-of-Year Reading G.E.			End-of-Year Mathematics G.E.			
	CCC	I.T.B.S.		CCC	Stanford		I.T.B.S.
		Voc.	Read.		App.	Comp.	
3	3.7	3.0	3.1	3.0	3.4	3.8	3.2
4	4.2	3.3	3.3	3.6	3.8	4.7	3.8
5	4.3	3.9	4.0	3.9	4.7	5.9	4.5
6	4.6	4.2	4.3	4.0	-	5.4	4.8
7	4.6	-	-	3.9	-	5.5	-

Standardized achievement test grade placements in mathematics tended to exceed CCC mathematics grade placements by a few months. The reverse was true for reading. Middle schools, generally, attained an average that was below grade five in reading and above grade five in mathematics.

Summary Statements

1) C.A.I. was more effective at grade three than the comparison Title I Program in increasing I.T.B.S. scores in reading and mathematics.

2) Students in C.A.I. grades six and seven made greater reading gains than similar students in Title I Reading Programs.

3) Standardized achievement test grade placements in mathematics tended to exceed CCC mathematics grade placements by a few months. The reverse was true for reading.

4) Progress of C.A.I. students through the CCC curriculum was greater in mathematics than in reading. Students averaged a gain of about seven months on reading and 1.0 year on mathematics in the seven months interval.

5) Elementary classroom teachers and grade three through seven C.A.I. students' responses to questionnaires indicated that they perceived C.A.I. as beneficial. Middle school classroom teachers were less positive but still moderately supportive of C.A.I.

6) Elementary mathematics gains generally favored the C.A.I. students when compared to Resource Teacher students.

7) Both Title I Programs at the elementary level were equally effective in achieving reading gains.

ADDENDUM A

PREDICTION OF FALL ITBS SCORES
OF TITLE I STUDENTS FROM SPRING ITBS SCORES

The Iowa Tests of Basic Skills (Reading and Mathematics subtests) were given in October, 1974 and again in April, 1975 to all Title I students in grades three, four, and five. The results indicated that when raw scores were converted to grade equivalents students' gains of two months or less were made in Reading and three months or less were made in Mathematics.

The I.T.B.S. was normed only in the Fall and normative data are extrapolated for Spring norms; therefore, the use of this test to measure achievement test gains may be misleading. This being true, the I.T.B.S. scores for Fall, 1975 were collected on all children who were in Title I Programs in 1974-75. Change in Reading and Mathematics I.T.B.S. scores from Spring, 1975 to Fall, 1975 was determined for all students for whom data were available. The results are given in Table 1.

Table 1. Correlation Study of Title I Students' Spring, 1975 and Fall, 1975 I.T.B.S. Reading and Mathematics Scores

Grade		Reading Mean G.E.			Mathematics Mean G.E.		
Spring	Fall	N	Spring 1975	Fall 1975	N	Spring 1975	Fall 1975
3	4	133	2.7	3.2	142	2.9	3.5
4	5	198	3.0	3.6	183	3.5	3.9
5	6	152	3.6	4.3	124	3.9	4.4

*Correlations of spring to fall scores were .44 to .79.

Results indicate that Title I students scored about 6 months higher on fall ITBS reading and mathematics subtests than in the previous spring.

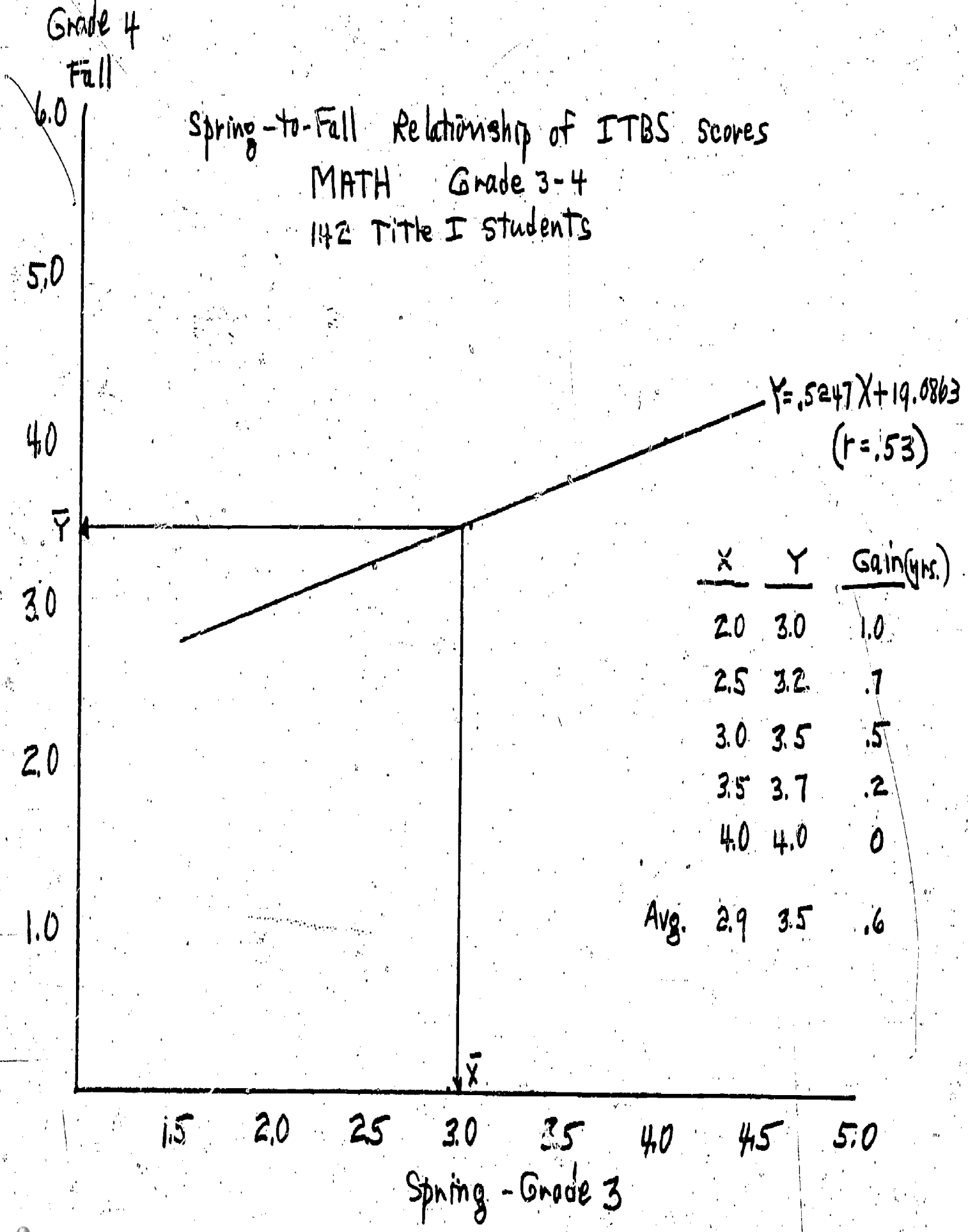
A linear regression of fall scores on spring scores produced data required to predict fall scores from spring scores. Utilizing the regression lines depicted in Exhibits A through F, spring scores of C.A.I. and non-C.A.I. students (Tables 2 and 5) were translated to 'predicted fall scores'. These predicted scores are reported in Table 2. They indicated that these Title I students will average an annual gain of about $8\frac{1}{2}$ months on reading and mathematics on the ITBS subtests in a 1 year interval. This, of course, translates to about .85 month gain per month of instruction.

The regression lines indicate that the improvement in scores is mostly due to the improvement of scores by students on the lower end of the distribution of spring scores. One measurement implication is that the higher base of the next level test raised "guess scores", but that the students were unable to utilize the higher ceiling.

Comparisons of 1975 spring and 1976 spring scores in Tables 1 and 2 show that Title I students in both C.A.I. and R.T. programs increased their spring status considerably in 1975-76. It may be hypothesized that the introduction of a competitive program (C.A.I.) spurred student achievement, also, in the traditional (Resource Teacher) Title I program (John Henry effect).

Table 2. Predicted Annual Gains of Title I Students

Grade and Treatment	N	READING				MATHEMATICS			
				Predicted				Predicted	
		Fall '75	Spring '76	Fall '76	Gain	Fall '75	Spring '76	Fall '76	Gain
Grade Three									
C.A.I.	186	2.5	3.1	3.5	1.0	2.5	3.2	3.6	1.1
R.T.	198	2.3	2.6	3.2	.9	2.3	2.8	3.4	1.1
Grade Four									
C.A.I.	345	3.1	3.3	3.8	.7	3.3	3.8	4.2	.9
R.T.	164	3.1	3.6	4.0	.9	3.4	3.8	4.2	.8
Grade Five									
C.A.I.	286	3.7	4.0	4.5	.8	4.2	4.5	4.8	.6
R.T.	194	3.8	4.2	4.6	.8	4.1	4.5	4.8	.7



X	Y	Gain(yrs.)
2.0	3.0	1.0
2.5	3.2	.7
3.0	3.5	.5
3.5	3.7	.2
4.0	4.0	0
Avg. 2.9	3.5	.6

X	Y	Gain (yrs.)
1.5	2.6	1.1
2.0	2.9	.9
2.5	3.1	.6
3.0	3.4	.4
3.5	3.7	.2
Avg. 2.7	3.2	.5

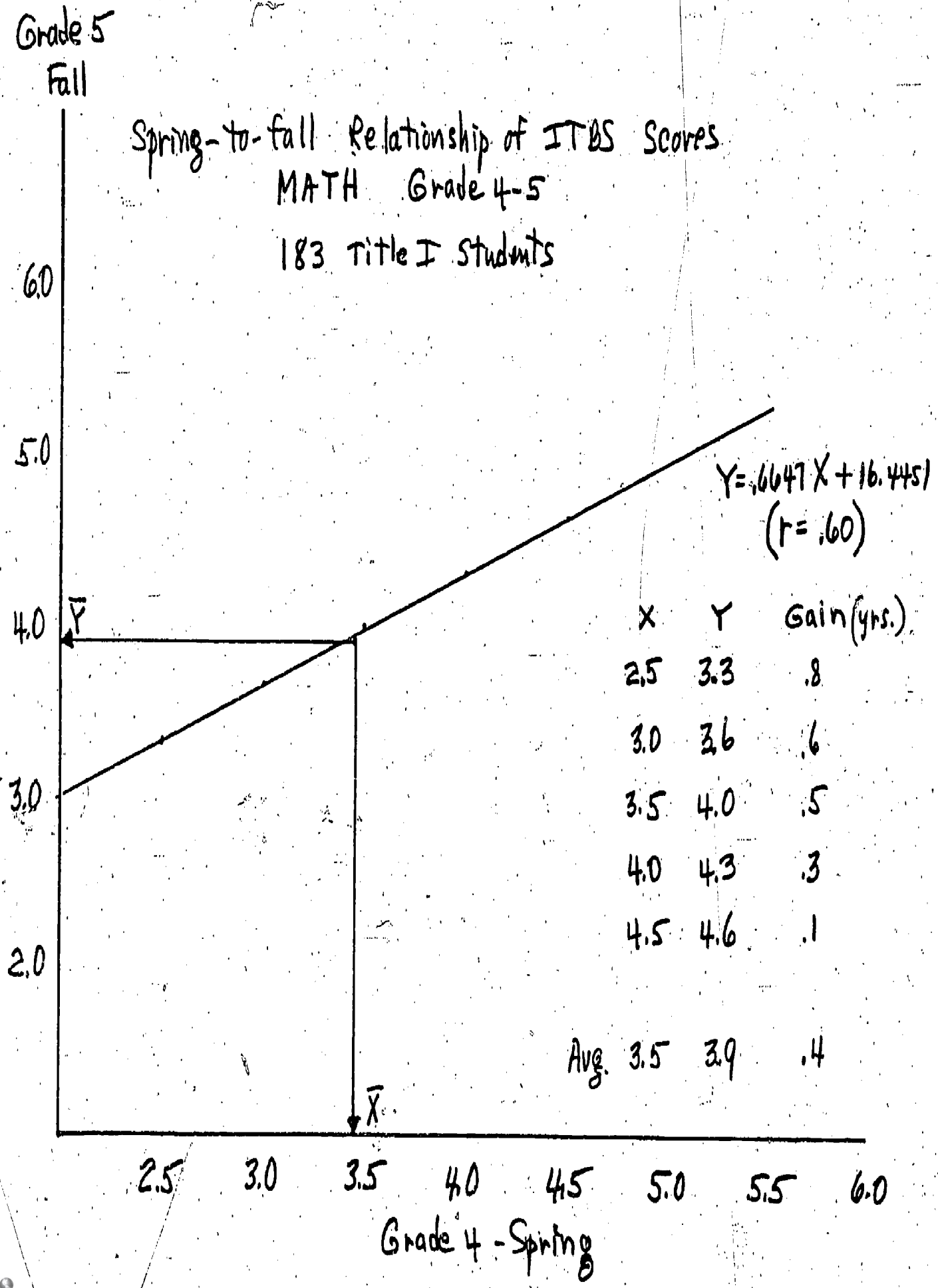
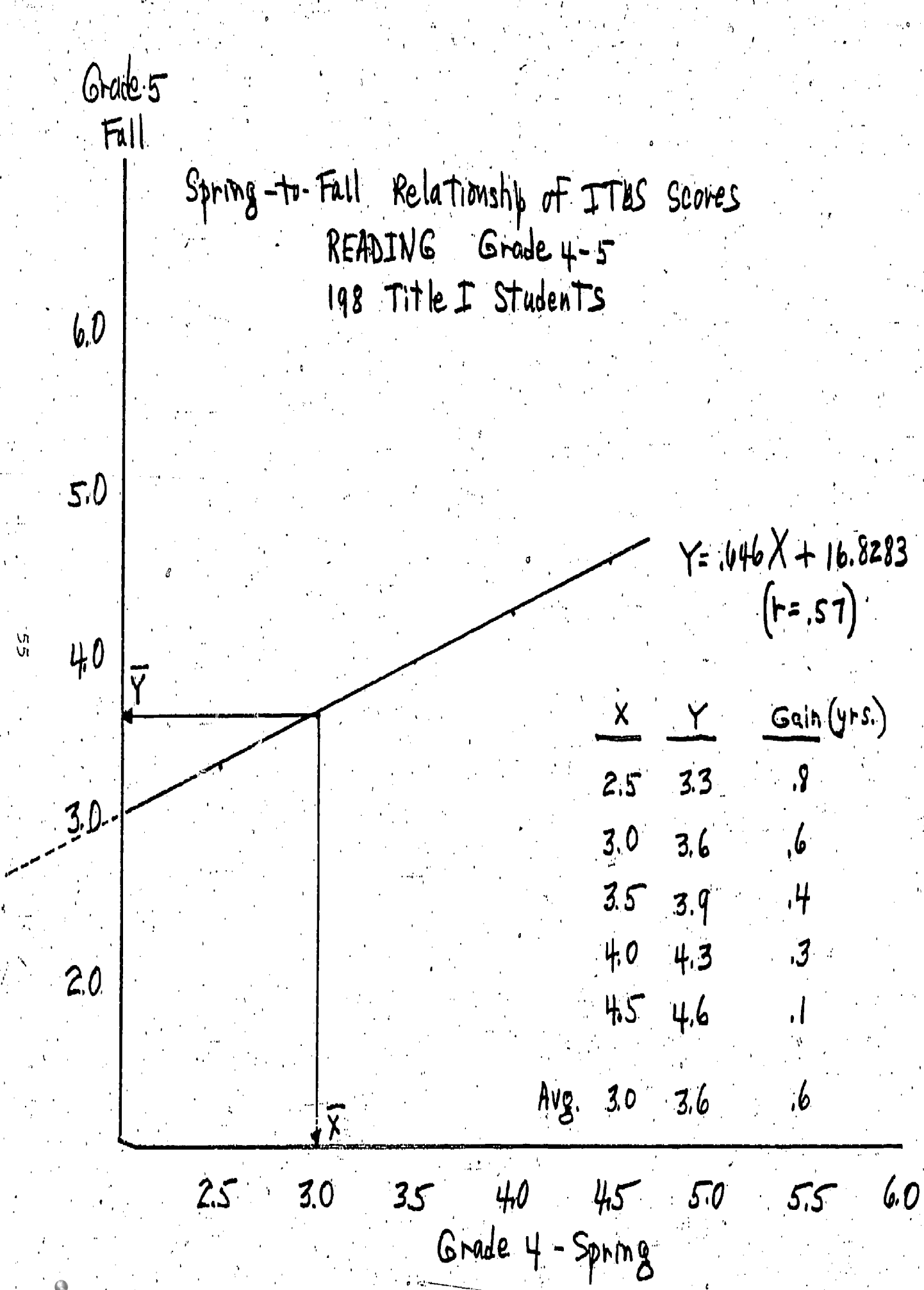

Grade 5
Fall
Spring-to-fall Relationship of ITBS Scores
MATH Grade 4-5
183 Title I Students
6.0
5.0
4.0
3.0
2.0
$\bar{Y}$
$\bar{X}$
Y=.6647X+16.4451
(r=.60)
X Y Gain(yrs.)
2.5 3.3 .8
3.0 3.6 .6
3.5 4.0 .5
4.0 4.3 .3
4.5 4.6 .1
Avg. 3.5 3.9 .4
2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0
Grade 4 - Spring

Exhibit 1.0

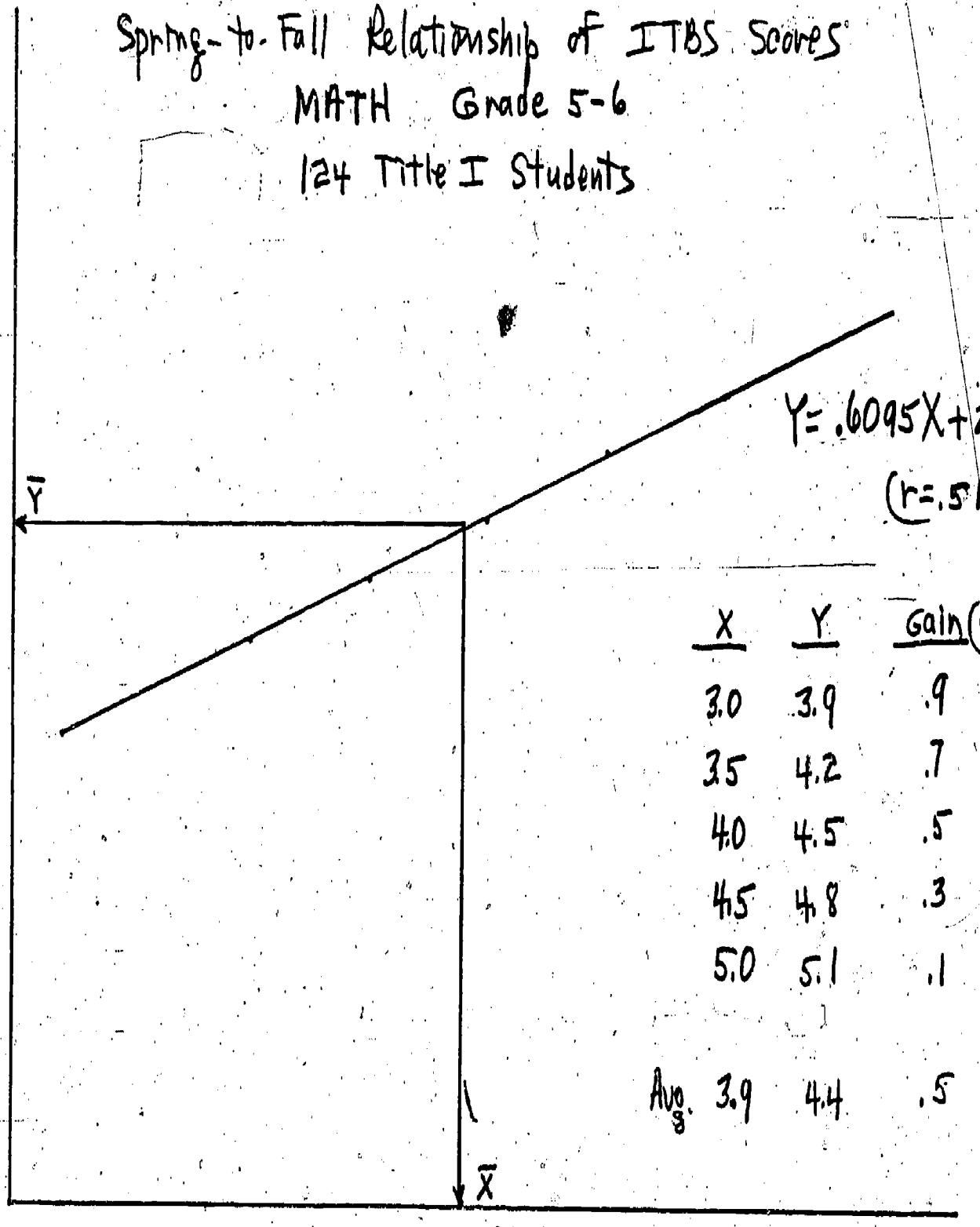


X	Y	Gain (yrs.)
2.5	3.3	.8
3.0	3.6	.6
3.5	3.9	.4
4.0	4.3	.3
4.5	4.6	.1
Avg. 3.0	3.6	.6

EXHIBIT D

Grade 6
Fall

Spring-to-Fall Relationship of ITBS Scores
MATH Grade 5-6
124 Title I Students



$Y = .6095X + 20.4963$

$(r = .51)$

X	Y	Gain (yrs.)
3.0	3.9	.9
3.5	4.2	.7
4.0	4.5	.5
4.5	4.8	.3
5.0	5.1	.1
Avgs. 3.9	4.4	.5

X	Y	Gain (yrs.)
2.5	3.8	1.3
3.0	4.0	1.0
3.5	4.3	.8
4.0	4.5	.5
4.5	4.7	.2
5.0	4.9	-.1
Avg. 3.6	4.3	.7

APPENDIX

1975-76 C.A.I. PROGRAM

ELEMENTARY CLASSROOM TEACHER QUESTIONNAIRE

Grade Level Taught_____

1. What eff has the C.A.I. Program had on your students' math achievement?

_____

_____

_____

2. What effect has the C.A.I. Program had on your students' reading achievement? _____

_____

_____

3. What effect has the C.A.I. Program had on your students' English achievement? _____

_____

_____

4. To what extent have you used "printout information" regarding individual student progress in the C.A.I. Program with your regular classroom instructional program? (circle one)

1	2	3	4	5
none	very little	some time	frequently	very much

5. Has C.A.I. had any beneficial effect:

a) on spelling _____yes _____no

b) on motivation _____yes _____no

c) on attendance _____yes _____no

d) on independent work habits _____yes _____no

e) others _____

APPENDIX A

(continued)

1975-76 C.A.I. Program

Elementary Classroom Teacher Questionnaire

Page two

6. What is your overall assessment of the C.A.I. Program? (circle one)

1	2	3	4	5
of negligible value	of some value	of moderate value	of substantial value	of great value

7. What is your attitude toward C.A.I.? _____

_____

_____

8. Have the C.A.I. Resource Teacher and Aide been helpful to you?

_____ yes _____ no

9. What are your suggestions to improve this program? _____

_____

_____

_____

10. Other comments (optional) _____

_____

_____

_____

THANK YOU.

UPON COMPLETION, PLEASE RETURN TO THE OFFICE OF RESEARCH AND EVALUATION

APPENDIX B

1975-76 C.A.I. PROGRAM

SECONDARY CLASSROOM TEACHER QUESTIONNAIRE

1. What effect has the C.A.I. Program had on your students' math achievement? (only math teachers respond) _____

2. What effect has the C.A.I. Program had on your students' reading achievement? (only reading teachers respond) _____

3. What effect has the C.A.I. Program had on your students' English achievement? (only English teachers respond) _____

4. To what extent have you used "printout information" regarding individual student progress in the C.A.I. Program with your regular classroom instructional program? (circle one)

1	2	3	4	5
none	very little	some time	frequently	very much

5. Has C.A.I. had any beneficial effect:

a) on spelling ____ yes ____ no

b) on motivation ____ yes ____ no

c) on attendance ____ yes ____ no

d) on independent work habits ____ yes ____ no

e) others _____

1975-76 C.A.I. Program
Secondary Classroom Teacher Questionnaire
Page two

6. What is your overall assessment of the C.A.I. Program? (circle one)

1	2	3	4	5
of negligible value	of some value	of moderate value	of substantial value	of great value

7. What is your attitude toward C.A.I.? _____

_____

_____

8. Have the C.A.I. Resource Teacher and Aide been helpful to you?

_____ yes _____ no

9. What are your suggestions to improve this program? _____

_____

_____

_____

10. Other comments (optional) _____

_____

_____

_____

THANK YOU.

UPON COMPLETION, PLEASE RETURN TO THE OFFICE OF RESEARCH AND EVALUATION

1975-76 C.A.I. PROGRAM

C.A.I. STUDENT QUESTIONNAIRE

1. I am a _____ (boy/girl) in _____ grade.

2. Check what subject you have worked on the computer.

   _____ Reading _____ Math _____ Language Arts

3. Do you like to use the computer? _____ yes _____ no

4. What do you like about using the computer? _____

   _____

5. Do you believe the computer has helped you to be a better reader?

   _____ yes _____ no

6. Do you believe the computer has helped you with your math?

   _____ yes _____ no

7. Do you believe the computer has helped you with your Language Arts?

   _____ yes _____ no

8. Have your classroom grades (1) improved; (2) stayed the same; or (3) dropped since you have used the computer? _____

9. List the subjects you like best in school in the order of preference. (For example: 1 - like the best 2 - like the next best .. etc.)

   _____ Reading _____ Math _____ English

   _____ Social Studies _____ Science _____ Other

10. Do you have any suggestions that might improve the computer program?

    _____

    _____

THANK YOU.

DEPARTMENT OF RESEARCH AND EVALUATION

ADDENDUM B TO C.A.I. EVALUATION 1975-76

Fort Worth Independent School District
Department of Research and Evaluation
Fae Lysiak, Assistant Director
Sherry Wallace, Assistant Evaluator, Title I

The C.A.I. Evaluation Report of September gave the major findings of the Elementary and Secondary C.A.I. Program. This report is concerned with some specific findings relevant to the Middle School Program. Questions answered by this evaluation are given under each question.

Question No. 1 Will students receiving three trimesters of C.A.I. instruction make greater gains on standardized reading tests than students receiving only two trimesters?

Students in grade six are generally scheduled for only two trimesters in C.A.I. At Dunbar grade six students spent three trimesters in the C.A.I. Program. A comparison with gains of students at other middle schools was made to determine if three trimesters produced greater grade equivalency scores on the Gates-MacGinitie Reading Test, Comprehension subtest. Results are given in Table 1.

Table 1. Comparison of Different Number of Trimesters in C.A.I. on Scores of the Gates-MacGinitie Reading Test, Comprehension Subtest

No. of Trimesters	N	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Posttest Mean G.E.	Gain
Three	84	3.7	4.5	4.5*	.8
Two	213	3.7	4.3	4.3	.6

*(t=2.16 P=N.S.) Differences are not significant.

Students enrolled for three trimesters of C.A.I. did not make significantly greater gains on the Gates Reading Comprehension Test than students enrolled for two trimesters; however, gains favored those with three trimesters.

Question No. 2 Will three trimesters of C.A.I. instruction produce greater gains on the Stanford Achievement Test than two trimesters and will two continuous trimesters produce greater gains than two split trimesters?

C.A.I. Trimester Analysis

Students at grades six and seven generally spend two trimesters in C.A.I. At Dunbar grade six students spent three trimesters in the C.A.I. Program. A comparison with gains of students at other middle schools was made to determine if three trimesters produced greater grade equivalency scores on the Stanford Achievement Test, Computation subtest, than two trimesters and if it makes any difference if a student has two continuous trimesters of C.A.I. or has C.A.I. one trimester, misses one trimester, and then takes C.A.I. the next trimester. Results of this analysis of trimesters are shown in Table 2.

Table 2. Analysis of C.A.I. Middle School Mathematics Trimesters

Grade	N	No. of Trimesters	Pretest Stanford Math Mean G.E.	Posttest Stanford Math Mean G.E.	Adjusted Posttest Math Mean G.E.
Six	39	2 (cont)	4.0	5.3	5.3
Six	37	2 (split)	4.1	5.4	5.4
Six	29	3	4.4	5.7	5.6 F=.52 P=N.S.
Seven	41	2 (cont)	4.5	5.1	5.2
Seven	40	2 (split)	4.6	5.5	5.5 F=2.26 P=N.S.

Students who spent two trimesters in C.A.I. mathematics made about the same gains regardless of whether those two trimesters were consecutive or split. There was no significant difference in gains between sixth grade students who took two trimesters and those who took three trimesters of C.A.I. mathematcis; however, gains favored those with three trimesters.

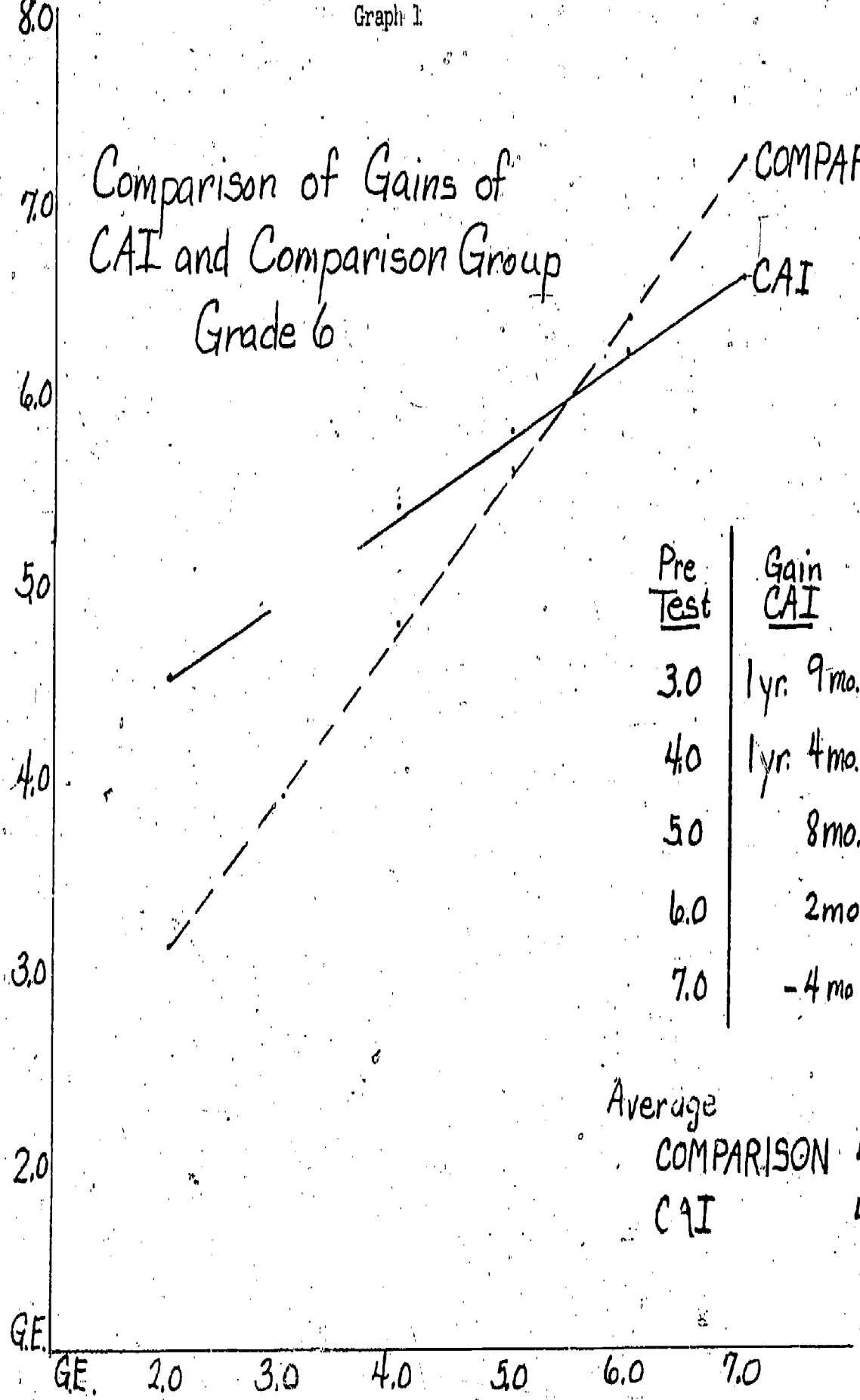
Question No. 8 Will the mathematics growth of C.A.I. students on the Stanford Achievement Test, Computation subtest, vary by initial competence in mathematics?

A comparison of gains of Title I students who did not receive special mathematics instruction and C.A.I. students by grade level indicates that grade six students in C.A.I. who scores below 5.5 on the pretest made greater gains than similar students in regular mathematics. Students in regular mathematics who scored above 5.5 made greater gains than similar students in C.A.I. mathematics. At grade seven, students who scored below 5.0 on the pretest made greater gains in C.A.I. and those who scored below 5.0 made greater gains in regular mathematics. Graphs 1 and 2 show the comparison of gains by program based upon pretest scores.

These data indicate that C.A.I. was more effective with students in the lower range of achievement.

Graph 1

Comparison of Gains of CAI and Comparison Group Grade 6



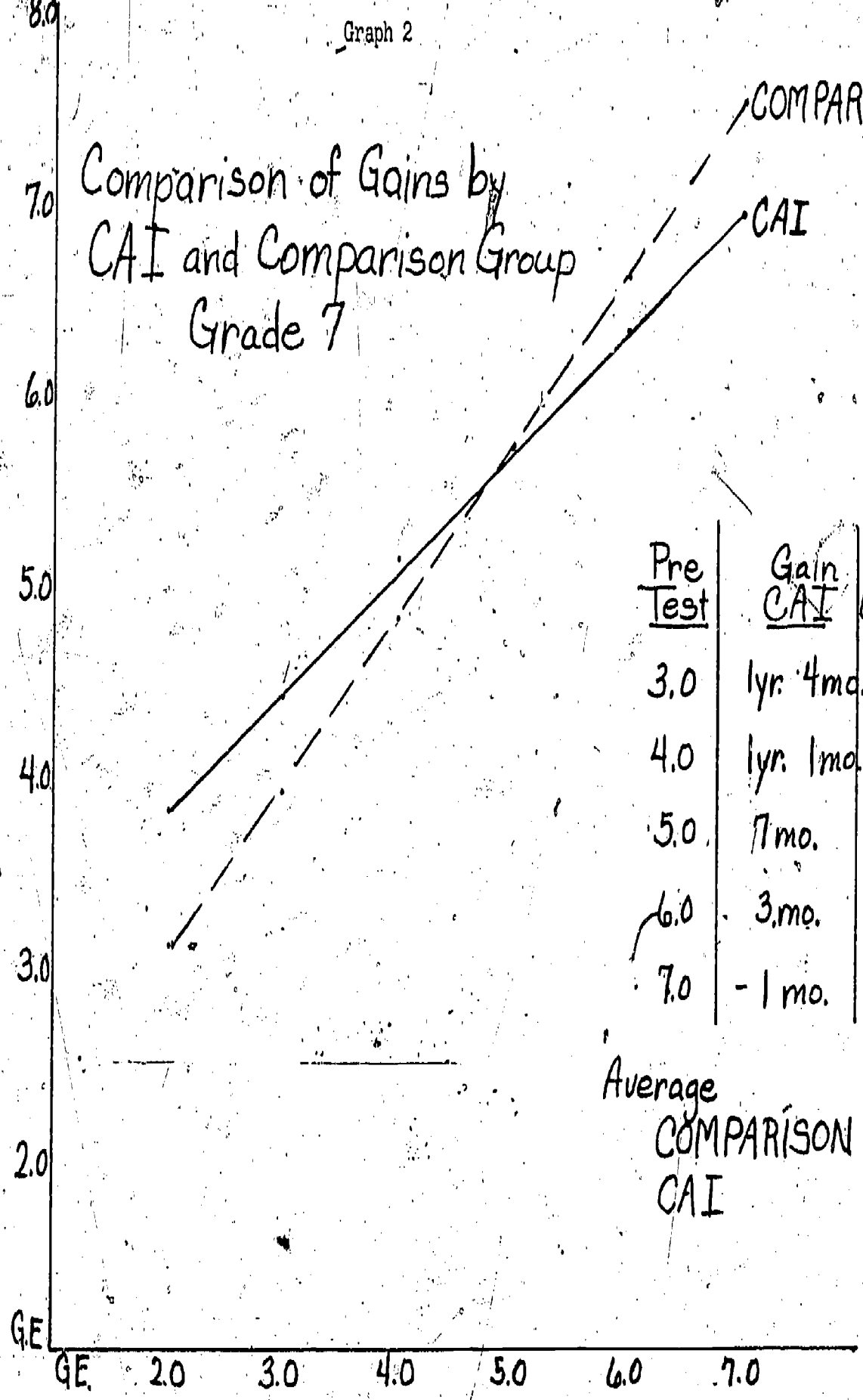
Pre Test	Gain CAI	Gain COMPARISON
3.0	1yr. 9mo.	9mo.
4.0	1yr. 4mo.	8 mo.
5.0	8mo.	6mo..
6.0	2mo.	4mo.
7.0	-4 mo	2 mo.

Average

COMPARISON	4.6	6 mo.
CAI	4.1	1yr. 3mo.

Graph 2

Comparison of Gains by CAI and Comparison Group Grade 7



Pre Test	Gain CAI	Gain COMPARISON
3.0	1yr. 4mo.	9mo.
4.0	1yr. 1mo.	8 mo.
5.0	7mo.	7mo.
6.0	3.mo.	6 mo.
7.0	- 1 mo.	5mo

Average

COMPARISON	4.5	7mo.
CAI	4.5	9mo.

Question No. 4 Will C.A.I. students' spelling test scores show greater improvement than a comparison group of Title I Reading students?

The Spelling subtest on the Iowa Tests of Basic Skills for students in C.A.I. and the Title I Secondary Reading Program were compared. Results are reported in Table 3.

Table 3. Comparison of Grade Six C.A.I. Students' and Title I Secondary Reading Program Students' Iowa Tests of Basic Skills, Spelling Subtest G.E.

Program	N	Pretest Mean G.E.	Posttest Mean G.E.	Gain
C.A.I.	156	3.9	4.3	.4
Secondary Reading	120	3.5	3.8	.3

Results indicate that C.A.I. students and Title I Reading students made similar gains on the Spelling subtest of the ITBS.

Question No. 5 Will three trimesters of C.A.I. produce greater results than three trimesters of Secondary Reading?

Dunbar middle school enrolled Title I grade six students in either Secondary Reading or C.A.I. for three trimesters rather than two trimesters like most middle schools. Data from this school were analyzed and reported in Table 4. All students in both programs scoring below 2.9 on the Gates pretest were eliminated from this analysis.

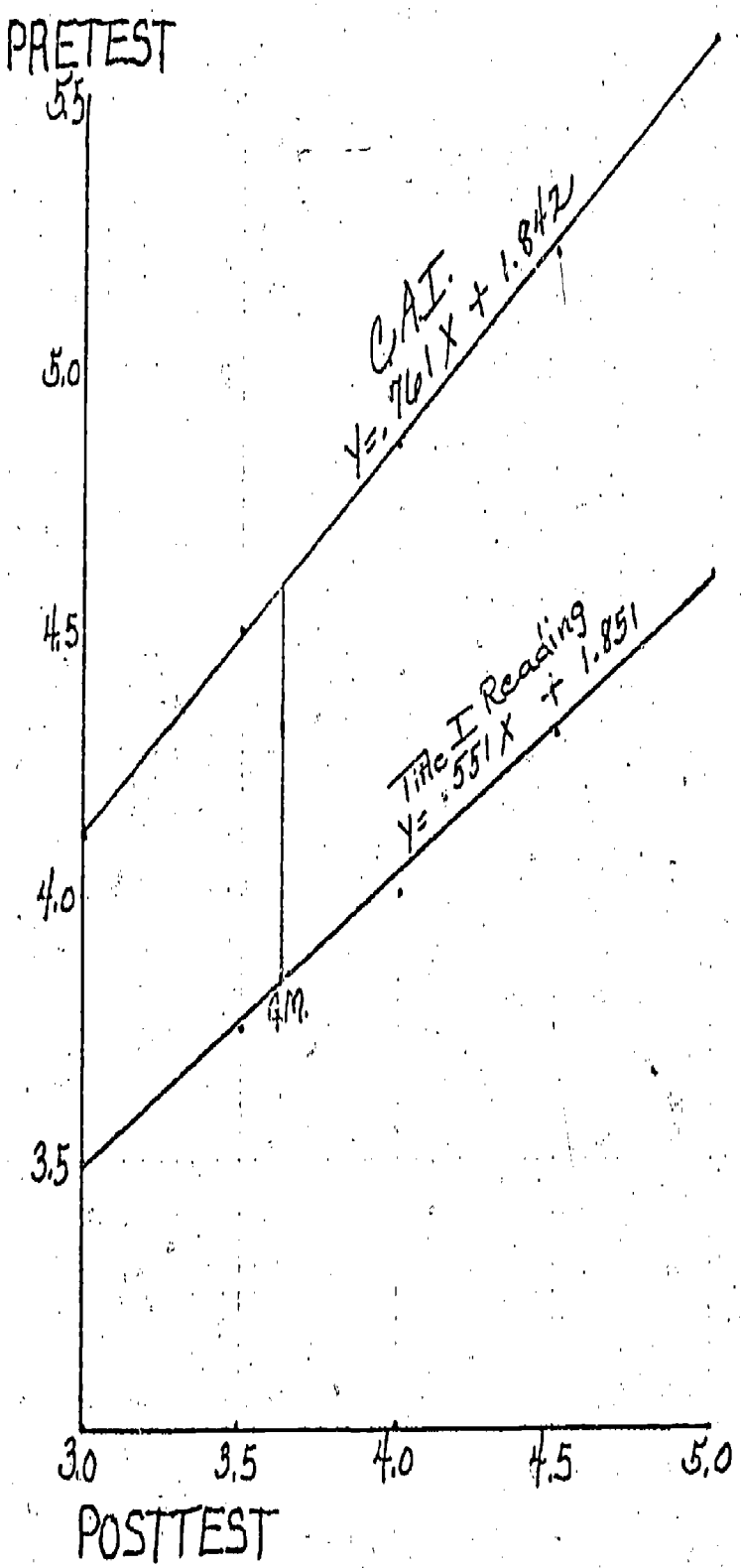
Table 4. Comparison of Three Trimesters of C.A.I. and Title I Secondary Reading (Gates Comprehension Subtest)

Program	N	Grade	Pretest Mean G.E.	Posttest Mean G.E.	Adjusted Post G.E.	Gain
C.A.I.	101	6	3.8	4.7	4.6*	.9
Title I Secondary Reading	64	6	3.5	3.8	3.9*	.3
					F = 30.4 P = .01	

* Differs significantly.

Results indicate that the students receiving special reading instruction in the C.A.I. Program made significantly greater gains on the Gates than students in the Title I Secondary Reading Program. The rate of growth for students scoring at various points on the pretest are graphically illustrated in Exhibits A and B. C.A.I. students at all ability levels made larger gains than their peers in the Title I Reading Program.

EXHIBIT A

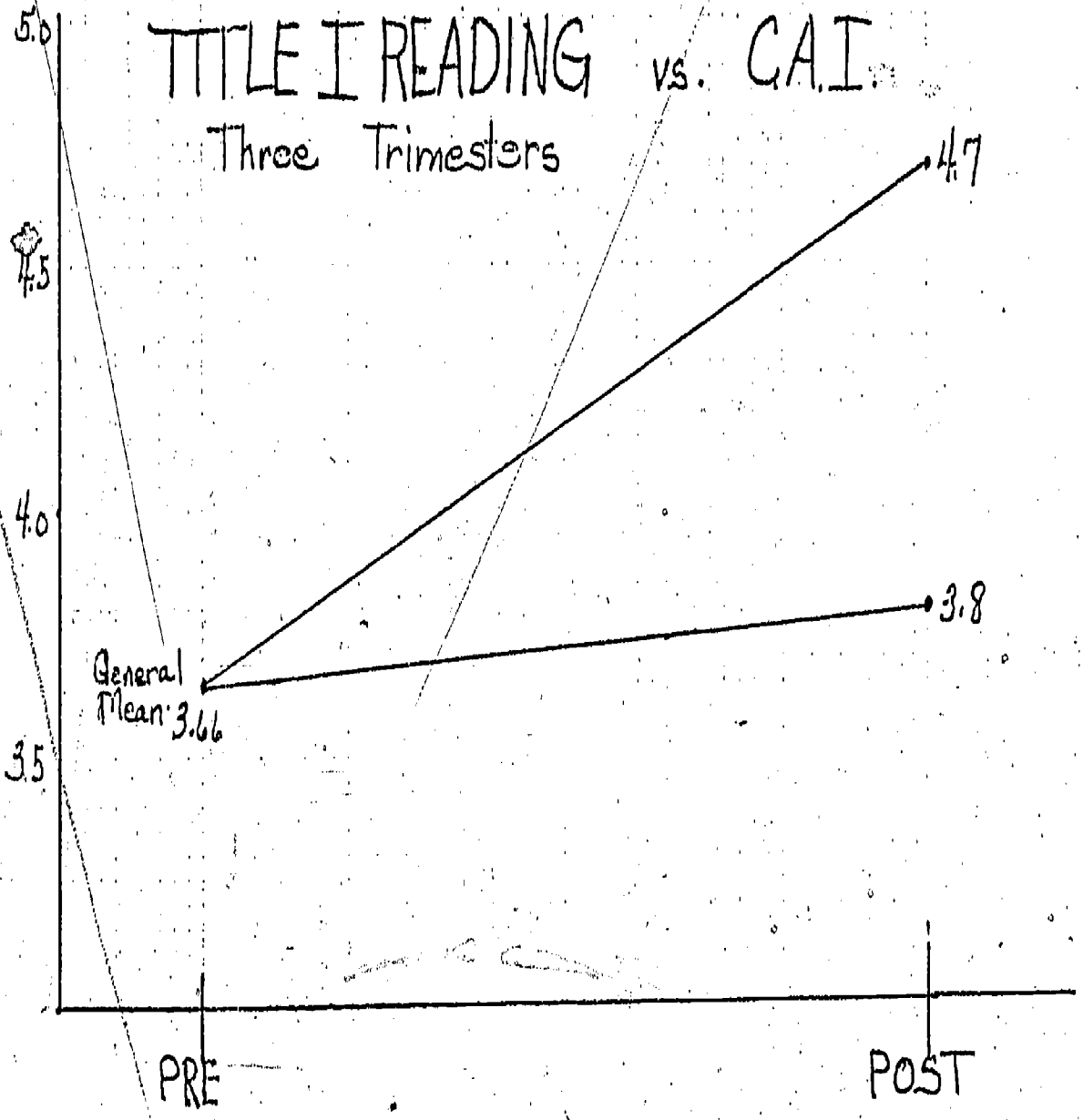


TITLE I READING vs. C.A.I.

Three Trimesters

EXHIBIT B

PRE - POST TEST G.E.



Summary of Findings

1) Three trimesters of C.A.I. did not produce significantly greater gains on reading or mathematics standardized tests over two trimesters. In all cases, the differences did favor three trimesters.

2) Continuous trimesters of C.A.I. did not produce gains different from split trimesters.

3) Student achievement on standardized mathematics tests varied by program according to pretest levels. Low scoring students on the pretest made greater gains in the C.A.I. Program; whereas, higher ability students made greater gains in regular mathematics.

4) C.A.I. students receiving three trimesters of reading instruction made significantly greater gains than students in three trimesters of Title I Secondary Reading.