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ABSTRACT

The research literature surrounding TGT, an instructional technique employing team competition, indicates that the technique facilitates social processes and academic achievement in the junior high school classroom. The present study extends the test of TGT by employing the technique in third grade classes, teaching basic language arts skills for a six-week period. Sixty students were randomly assigned to either a TGT or control condition. Students in the TGT condition were divided into leagues, and tournaments were organized around 22 simple instructional games, several of which were formed around each general curriculum objective. Post-treatment results indicate significant positive TGT effects on both the Hoyum-Sanders Elementary English Test and a treatment-specific test of language arts skills. TGT also appeared to increase cohesion among the students and decrease the number of social isolates in the classroom. No treatment effects were noted on several scales measuring student perceptions of the classroom. The results provide additional evidence of the usefulness of incorporating TGT into the classroom structure, even with young children. (Author)

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TEAMS-GAMES-TOURNAMENT: AN EFFECTIVE TASK AND REWARD STRUCTURE IN THE ELEMENTARY GRADES

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three programs to achieve its objectives. The Schools and Maturity program is studying the effects of school, family, and peer group experiences on the development of attitudes consistent with psychosocial maturity. The objectives are to formulate, assess, and research important educational goals other than traditional academic achievement. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. The Careers program (formerly Careers and Curricula) bases its work upon a theory of career development. It has developed a self-administered vocational guidance device and a self-directed career program to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the School Organization Program, examines the use of the Teams-Games-Tournament instructional process for teaching language arts at the elementary school level.

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Abstract

The research literature surrounding TGT, an instructional technique employing team competition, indicates that the technique facilitates social processes and academic achievement in the junior high school classroom. The present study extends the test of TGT by employing the technique in third grade classes, teaching basic language arts skills for a six-week period. Sixty students were randomly assigned to either a TGT or control condition. The results indicate significant positive TGT effects on both the Hoyum-Sanders Elementary English Test and a treatment-specific test of language arts skills. TGT also appeared to increase cohesion among the students and decrease the number of social isolates in the classroom. No treatment effects were noted on several scales measuring student perceptions of the classroom. The results provide additional evidence of the usefulness of incorporating TGT into the classroom structure, even with young children.

Introduction

The Teams-Games-Tournament (TGT) instructional approach incorporates team competition into the classroom by placing students on small task-oriented teams, creating a series of academic games around which students compete, and structuring an ongoing tournament as the basis for the team competition. The research to date on the effectiveness of TGT in facilitating academic achievement is considerable and has yielded essentially positive results (Edwards, et al., 1972; Edwards & DeVries, 1972, 1974; Hulten & DeVries, 1974). However, the abovementioned studies have focused primarily on the development of skills in mathematics by junior high school students (12-13 years of age). An important question, both theoretically and pedagogically, is whether this technique employing team competition can also facilitate achievement in children in the early primary grades. Also of interest is whether team competition, as defined by TGT, also has a positive effect in other subject areas, such as language arts. The present study empirically addresses both questions, thereby providing an important extension to the test of TGT as an instructional technique.

TGT in the Classroom: A Review

TGT is a comprehensive instructional technique which has extended some preliminary conceptions of team competition delineated by Deutsch (1949), Coleman (1959), and Bronfenbrenner (1970). TGT consists of three components: teams, games, and tournaments. The team component involves

the formation of four or five-member student teams. The teams are formed to create maximal heterogeneity within each team (on such dimensions as student academic ability, sex, and race) and equality across teams. Team membership remains intact and within-team cohesion is fostered by frequent team practice sessions and the placing of teammates in adjacent seats. The games component is defined by one or more instructional games which require knowledge of concepts or skills addressed by the target curriculum unit in order to win. In most cases the participating teachers design their own games using multiple-choice, true-false, or other objective-type content. The tournament component is comprised of weekly game-playing sessions in which each student competes with two other students of comparable academic ability from other teams. At the end of a tournament a "top scorer," "middle scorer", and "low scorer" is declared for each three-person game table. The individual game scores are converted to team scores and winning teams are declared. Public feedback of both team and individual scores for each weekly tournament are provided by classroom newsletters. A more detailed description of the TGT classroom procedures is available (DeVries, et al., 1973).

To date, a series of five field-experimental studies of TGT have been conducted in a variety of classroom situations. Table 1 summarizes the five studies--the subject area covered, grade level used, the length of

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Insert Table 1 About Here
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time the treatment was implemented, and the number of students involved.

The effects of TGT are noted in the four right hand columns of Table 1. Student achievement (often measured by standardized achievement tests) and student attitudes (toward the classwork, were the two outcome variables measured. Within the classroom process category, both peer tutoring/mutual concern and peer normative climate variables were assessed. Peer tutoring/mutual concern refers to the level of actual student collaboration on classroom tasks that occurred during the experiment. Peer normative climate refers to the level of encouragement and praise students report receiving from their classmates for performing well in the classroom. For all four types of measures the TGT classes were compared with control classes which received instruction relevant to the same curriculum objectives but which used traditional instructional techniques. These are typically defined by teacher-directed, group-level instruction, with individual competition being the reward structure used. The level of the TGT effect is indicated by either a "0" or a "+" (to receive a "+" the difference must be significant at a $P < .05$ level). If the dependent variable was not measured a "--" is indicated.

As Table 1 indicates, TGT has a consistently positive effect on achievement in mathematics. The effects on social studies skills have been minimal. A uniformly positive effect of TGT on student attitudes was also obtained. TGT also resulted in improved classroom processes for the studies in which such variables were measured. In short, TGT has a dramatic and widespread effect on a variety of student outcomes, particularly in mathematics. Such results indicate that TGT represents a marked improvement in instructional routine over that typically used in the classroom.

Extension of Test of TGT

The results of the studies of TGT listed in Table 1 raise two questions, the answers to which are important in understanding the dynamics of TGT and the variety of situations to which it can be applied.

The first concerns whether TGT's observed effect on student outcomes is limited to certain subject areas. As noted above, greater positive effects on student achievement were noted for TGT in mathematics classes than for TGT in social studies classes. Granted that different subject areas involve the teaching of substantively and perhaps even structurally different skill areas, such differences might require varied instructional approaches. The present study addresses this question by testing the effectiveness of TGT in another subject area, language arts.

The second question concerns the limited range in student age for the classrooms in which TGT has been tested. Although no clear analogue to Piaget's theory of cognitive development has been posited for social skills, it may be that much younger students (than the 12 or 13-year-olds studied) are not able to cope constructively with the variety of social situations in which TGT places the participants. The present study tests for that possibility by implementing TGT in third grade classes, involving eight and nine-year-old students.

Method

Subjects

The students in the project were sixty (60) third grade students in an elementary school in the Syracuse, New York area. Seventy percent of

the students were males. A measure of the subjects' verbal ability was obtained from the Gates-MacGinitie Reading Test (Primary C) which was administered in month one of the third grade academic year. The average grade equivalent scores for both Vocabulary ($\bar{x}$ = 4.3; range from 1.6 to 6.5) and Comprehension ($\bar{x}$ = 4.2; range from 1.9 to 7.0) indicate that (1) the students are, on the average, verbally advanced, and (2) there is considerable variation among the students in verbal skills.

Design

The study was conducted for a six-week period and involved a simple two-group comparison, contrasting TGT with a control treatment involving traditional instructional approaches. Each treatment group comprised a separate language arts class, with both classes meeting during the same time period of the day. Students were assigned, on a stratified-random basis (stratifying on verbal ability), to either of the two treatment groups. Each treatment group met daily for a 50-minute period. Teacher effect was partially controlled by rotation of teachers across treatment groups every 5-7 days, resulting in equal exposure of both teachers to both treatment conditions. Pre- and post-test measures of academic achievement were obtained, and post-test measures of classroom social process and student attitudes were administered.

Independent Variables

The independent variable of interest is instructional approach. Other factors which might affect learning were held constant. Of particular importance is the set of curriculum objectives addressed during the

six-week period. The learning activities of both treatment groups were focused on the following language arts skill areas:

--differentiating between groups of words that are sentences and those that are not sentences,

--identifying four types of sentences and choosing proper punctuation for each of the four types (statements, questions, commands, and exclamations),

--identifying the correct usage of commas, apostrophes, and quotation marks,

--identifying the proper usage of capital letters in a variety of contexts,

--identifying the correct plural forms of nouns,

--proper use of the past-present verb forms and subject-verb agreement,

--identifying correct abbreviations of a variety of nouns.

TGT Treatment--The implementation of the TGT treatment followed the structure described in the TGT Teacher's Manual (DeVries, et al., 1973), with the following minor variations in reward and task structures. With regard to student teams, the thirty-member class was divided into six five-person teams. The six teams were divided into two three-team leagues, entitled the "American League" and the "National League." The tournaments were organized around 22 simple instructional games that were designed using the GIGS structure outlined in DeVries, et al., (1973), by the two participating teachers. Three-to-four games were formed around each

general curriculum objective. The teachers also designed a worksheet for each game containing items from the game. The TGT students were required to complete the worksheets during the frequently held team-practice sessions.

The TGT tournaments were conducted twice weekly. Classroom newsletters were prepared and distributed once each week, summarizing the students' performance over the two prior tournament sessions. At the end of the six-week experimental period, "playoffs" were conducted between the first place teams from the two leagues.

The weekly schedule of TGT classroom activities took the following form:

Monday:	Review classroom newsletter Teacher lecture
Tuesday:	Teacher review Team practice session
Wednesday:	Tournament
Thursday:	Teacher review Team practice session
Friday:	Tournament

Control--The control classroom activities were addressed to the same set of curriculum objectives addressed by the TGT class. The instructional activities revolved around daily teacher lectures in which either new cognitive material was presented, or already presented material was reviewed. Students also performed daily on the same worksheets as those used in the TGT class. Students were nominally assigned to five-member teams, and teammates were encouraged to work together during work sessions

centered around the practice sheets. All feedback on performance (often in the form of number grades) was given at the individual student level.

A possible confounding factor in the interpretation of TGT treatment effects is that of the "Hawthorne Effect." That is, increases in achievement may be due to the fact that the TGT activities are different from those in which students are typically involved in classrooms. To at least partially control for this possibility, the Control students were confronted with a variety of new experiences. For example, they were exposed approximately twice a week to a variety of learning games. Such game playing was presented to the students as a reward for good work during the four preceding days. No formal contingencies were attached to winning at the games.

Dependent Variables

The dependent variables measured were (1) language arts skills, (2) classroom group process, and (3) student perception of class.

Language Arts Skills: Two measures of skill in language arts were administered; the Hoyum-Sanders Elementary English Test and a Treatment Specific Achievement Test. Both tests were administered on the first and last days of the experimental period.

The Hoyum-Sanders Elementary English test is a general test of knowledge of rules governing correctness in writing and ability to apply the rules to a variety of sentences. As noted in Buros (1972), the test is a reliable measure of student language arts skills. Two parallel forms of the test for grades II-IV were used: Test I-Form A

was given as the pretest and Test II-Form A was administered as the posttest. The 95-item test consists of six subtests, each measuring a separate skill area: I-Sentence recognition; II-Capitalization; III-Punctuation; IV-Contractions, possessives, spelling; V-Usage; and VI-Alphabetization. Appendix A contains the intercorrelations among all six subtests of the Hoyum-Sanders. The average intercorrelation is .20, indicating the various subtests measure fairly distinct skill areas. The data used for calculating the intercorrelations were the pretest scores of all students.

A problem in using the Hoyum-Sanders as a measure of the treatment effect is that several of the skill areas assessed by the test were not directly addressed by the curriculum unit. Consequently the authors devised a test which more directly measures changes in the targeted skill areas. This sixty-two item, multiple choice test, entitled "The Treatment Specific Achievement Test," consists of three subtests: Part I: Grammar, contractions, possessives, endings (23 items); Part II: Commas and Abbreviations (17 items); Part III: Quotation marks and sentence types (22 items). KR-20, as a measure of the internal consistency of each subtest, was calculated with the following results: Part I = .63; Part II= .74; Part III = .61. Appendix B contains intercorrelations among the three subtests of the Treatment Specific Achievement Test. The average intercorrelation is .49, indicating considerable overlap in skill areas tested by the three subtests.

Classroom Group Process: A student self-report measure, involving two sociometric-type questions, was administered on the last day of the experimental period. Students were asked to indicate (1) "which students in the class are your friends," and (2) "which students in this class have helped you with your language arts work?" Eight blank lines were placed under each question on which the respondent could write names of classmates.

Student Perceptions of Class: Eight questionnaire items were administered on a posttest basis assessing the following factors: (1) Attitude Toward Class, (2) Peer Climate, (3) Difficulty of Class, and (4) Importance of Doing Well. The students were presented with the following response format: "Yes", "No", and "Not Sure." Each item measures a somewhat unique perception and, consequently, is analyzed separately.

In order to obtain an estimate of the test-retest reliability of the student perceptions items, all items were administered twice to each subject, with approximately thirty minutes separating the two administrations. This test provided a rough estimate of the ability of the third grade subjects to respond to a series of attitudinal questionnaire items. On the average 84% of students responded similarly (from time one to time two) to the eight items (range of 80 to 89% across the items). Inconsistent responses (e.g., "Yes" on time one, "No" on time two) were observed for only 6% of the students for the average item. Given this test of consistency, the students appeared to provide fairly reliable responses to the student perception items.

Results

The analyses of the language arts achievement tests employed the general linear model approach to the analysis of covariance, as recommended by Cohen (1968). The advantages of this technique over traditional ANCOVA are two-fold. First, the more readily available regression analysis computer programs can be used for the bulk of the calculations. Second, terms representing interactions between the covariate and the treatment variable can be included directly in the analysis (Walberg, 1971).

Language Arts Skills

The details of the general linear analysis for the Hoyum-Sanders Elementary English Test are listed in Table 2, with treatment cell means and standard deviations included in Table 3. A separate analysis was

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conducted for each of the six subtests of the Hoyum-Sanders. In each analysis the independent variables were entered in the order they are listed. The A effect represents the correlation of the pretest Hoyum-Sanders score with that of the posttest; the B effect represents the multiple partial correlation of one treatment dummy variable (as suggested by Cohen, 1968) with the dependent variable. The A X B interaction term is derived from the product of A times B (Cohen, 1968) and represents a direct test (using multiple partial correlation) of the aptitude-by-treatment interaction effect. The Incremental R^2 term in Table 2 reflects the amount of additional variance in the dependent variable explained by

the addition of the term to the model. Of particular interest is the Incremental R^2 for the B effect, which represents the amount of dependent variable variance explained by between-group differences.

As Table 2 indicates, significant treatment differences were obtained for two of the six Hoyum-Sanders subtests. For Part II: Capitalization, the treatment effect accounted for 9% of the variance in the dependent variable ($F = 5.30$; $df = 1,50$; $P < .05$), and for Part III: Punctuation, the treatment effect accounted for 11% of the dependent variable variance ($F = 9.68$; $df = 1,50$; $P < .01$). As noted in Table 3 and Figures 1 and 2, both treatment effects are due to greater pre-posttest increases by the TGT subjects. None of the aptitude-by-treatment terms proved to have a significant effect for the Hoyum-Sanders.

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The results of the general linear analyses for the Treatment-Specific Achievement Test are contained in Table 4. Strongly significant treatment effects were noted for Parts II and III, accounting for 13% and 8% of the dependent variable variance, respectively (Part II: $F = 8.37$; $df = 1,50$; $P < .01$; Part III: $F = 4.57$; $df = 1,50$; $P < .05$). A marginally significant treatment effect ($P < .06$) was detected for Part I ($F = 4.03$; $df = 1,50$). As Table 4 and Figures 3 through 5 indicate, all treatment effects for the Treatment-Specific Achievement Test are due to greater improvement in scores by TGT subjects than by those in the Control condition. No aptitude-by-treatment interaction effects were noted for any of the subtests of the Treatment-Specific Achievement Test.

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Insert Table 4, Figures 3 - 5 About Here
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Classroom Group Process

The data from sociometric items were aggregated in two ways. The first, a simple measure of the number of times subjects were selected by classmates, indicates the level of cohesion existing in the classroom on both task-oriented and more strictly social dimensions. An examination of treatment group means indicates greater levels of cohesion in the TGT condition for both the task-oriented (who helped you: TGT $\bar{x}$ = 2.53, Control $\bar{x}$ = 1.37; $t = 3.28$, $df = 58$, $P < .01$, two-tailed), and the non-task measures (Friends: TGT $\bar{x}$ = 5.40; Control $\bar{x}$ = 4.33; $t = 1.25$, $df = 58$, n.s.), with only the former reaching statistical significance.

A second set of measures derived from the sociometric data focuses on the number of social isolates in the class. The two social isolate measures reflect the number of students in the class who (1) were not helped by any more than one of their classmates, and (2) were not listed as a friend by any more than one of their classmates. Both measures reflect the number of students who are recipients of minimal social contacts. For the "who helped you with language arts" item, five of the 23 TGT students (22%) were defined as social isolates, whereas 13 of the 22 Control students (59%) appeared to be social isolates ($\chi^2 = 6.54$, $df = 1$, $P < .02$). The positive TGT effect noted for helping was also present for the friendship item, although with less intensity. Three of the thirty TGT students (10%) were cited by either no other classmates or only one other classmate as a friend, whereas eight of the thirty Control students (28%)

were so categorized ($\chi^2 = 2.76$, df = 1, $P < .10$). In short, TGT appears to reduce somewhat the number of social isolates in the classroom although the magnitude of this effect remains in doubt.

Student Perceptions of Class

The student perceptions of their class are summarized in Table 5. The table indicates, separately for each item, the response distribution for both treatment groups. Also listed is the Chi-square test of associ-

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ation for each of the eight questions. As indicated before, the responses of third grade students to questionnaire items assessing perceptions of the classroom may be of questionable validity and consequently are not treated in detail. As Table 5 indicates, significant treatment effects were detected for only one of the eight questions. The Control students apparently enjoyed learning language arts to a greater degree than the TGT students.[1] This result stands in contrast to a slight trend of more TGT students enjoying coming to class (cf. items [1] and [2]).

A review of the response distributions of the student perceptions indicate that the majority of students in both treatment groups (1) enjoy their class, (2) believe their classmates want them to work hard and are friendly to them, (3) believe they do not have to work hard to do well, and (4) believe it is important to do well in the class.

Discussion

In general the results of the current study support those obtained in earlier empirical tests of TGT (see Table 1). TGT students evidenced greater competence in a variety of language arts skills, as measured both by a standardized test and a treatment-specific test of language arts. With regard to social processes in the classroom, greater cohesion and fewer social isolates were noted, particularly on task-related dimensions. Student perceptions of the class did not differ across treatment conditions, except for attitude toward language arts in which the control students exhibited a more positive attitude.

Language Arts Skills

In interpreting the TGT effects on language arts achievement it is useful to ask why more of the Hoyum-Sanders subtest scores were not affected by the treatment. A recent discussion of traditional educational tests by Carver (1974) may offer some explanation. Carver indicates that traditional tests are developed and evaluated in terms of the extent to which they reflect stable between-individual differences. To that extent they need not be sensitive to gain or growth in response to a specific classroom intervention. As to the Hoyum-Sanders the selection of such items was likely dictated by their ability to reliably differentiate among elementary school students who differ in overall cognitive ability.

Because the Hoyum-Sanders test included items tapping skills not addressed by the curriculum unit employed in the current study, the participating teachers were asked to rate the relevance of each Hoyum-Sanders item to what was taught during the six-week period. For the four Hoyum-

Sanders scales for which no treatment effects were noted, 44% of the items were rated as relevant to the curriculum unit. For the two scales which showed treatment effects, 70% of the items were noted as relevant. The results of these ratings clearly suggest the problem noted by Carver (1974), that is, standardized tests of achievement are often insensitive to classroom interventions that are designed to increase specific skills.

In interpreting the effects of any classroom intervention, it is important to assess not only the level of statistical significance of the effect, but also the strength or power of the effect. It is for this reason that the Incremental R^2 estimates are important. In the present study, the Incremental R^2 estimates for the five language arts test scales for which significant treatment effects were noted range from .07 to .13, with an average of .10. That is, the average significant treatment effect accounted for 10% of the variance in the language arts scores. Such effects, compared to other comparable classroom interventions, are powerful and provide strong validating support for the use of TGT in the classroom.

Another way to assess the power of TGT is to cite percentage of items answered correctly. For example, on Part II of the treatment-specific Language Arts test, the TGT students on the average answered 53% of the pretest items correctly. On the posttest, the average TGT student answered 77% of the items correctly. In contrast, the average Control student answered 54% of the items on the pretest and 61% of the posttest correctly. This analysis also reflects the strong effect TGT had on the acquisition of language arts skills.

An additional pattern in the data of interest is the lack of any significant aptitude-by-treatment interaction effects on both tests of language arts skills. In an early study of TGT (Edwards, et al., 1972), a class ability-by-TGT interaction was detected. That is, TGT appeared to result in greater gains (above that created by a traditional instructional approach) for classes comprised of low ability students. The remaining four empirical tests of TGT cited in Table 1 failed to find interactions, as does the current study. TGT does not appear to favor any particular subset of students. This is particularly important to note when assessing efficacy of the technique for high ability students, students for whom the technique appears to offer the least.

The results counter the argument that interventions which employ social structures, such as TGT, have no place in the elementary grades. Although eight and nine-year-old children may have difficulty handling cognitively complex tasks, they appear to thrive on socially complex tasks. TGT forms a highly interrelated and complex set of social relationships: the student is asked to differentiate between situations in which cooperation is appropriate and others in which competition is appropriate. Such variations of the social environment have been shown to positively affect academic performance of adolescents; the current study indicates that young children respond in a similar positive fashion to such interventions.

Classroom Social Processes

The positive TGT effect on the task-oriented measure of cohesion (i.e., number of students who helped the respondent) is similar to that

obtained in an earlier TGT study (DeVries & Edwards, 1973). Also replicated is the lack of any strong TGT effect on the nontask cohesion measure (i.e., number of friends). These results, plus those obtained for the social-isolation measures, indicate clearly that TGT creates considerably greater task-oriented interaction among students, but that basic friendship patterns may not be altered. Such results follow directly from the context in which the teams and their function are introduced to the students. The teams are clearly task-oriented and serve the purpose of helping the students acquire the targeted skills.

The limitations of the study derive primarily from the small number of teachers and students involved, as well as the highly specific curriculum area addressed. Replication across a variety of elementary school classes with students representing the entire range of academic ability and socioeconomic status would aid considerably in assessing the generalizability of the present results. The curriculum area covered in the present study consisted of basic skills viewed as prerequisites for more complex communication skills. Whether TGT is effective in also teaching such skills as reading comprehension has yet to be tested. The authors are currently conducting such an extension and the results of such work should reflect directly on the level of external validity of the results from the present study.

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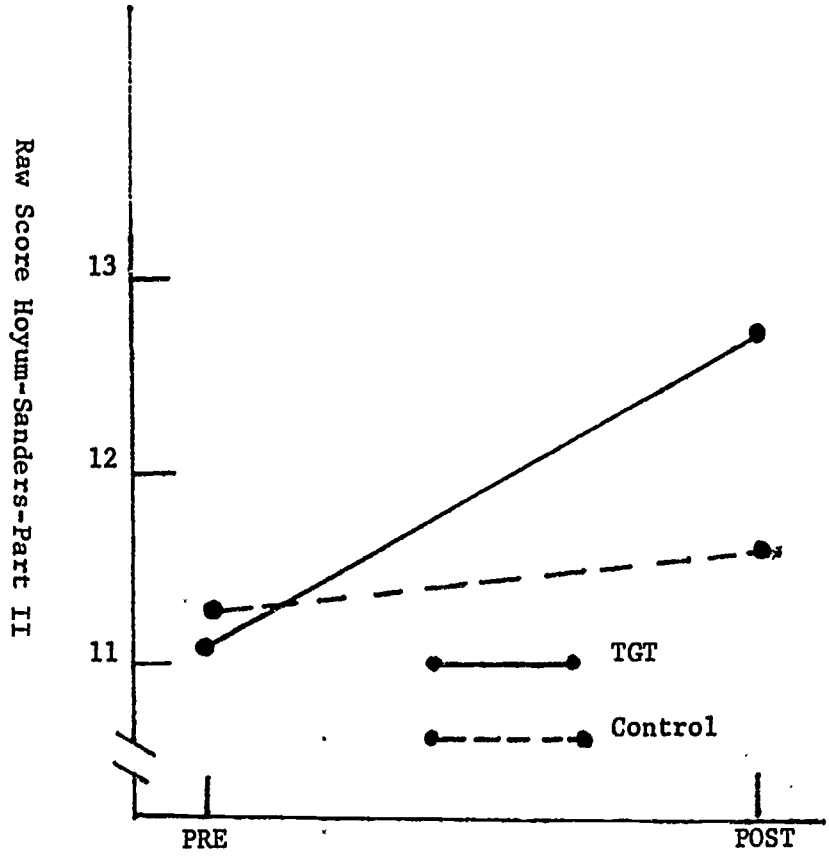


Figure 1: Treatment Group Means for Hoyum-Sanders Elementary English Test Part II

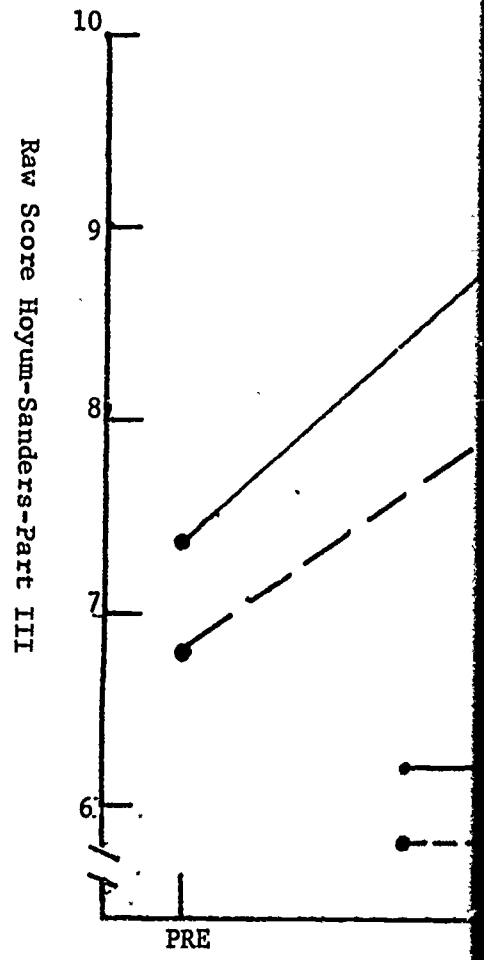
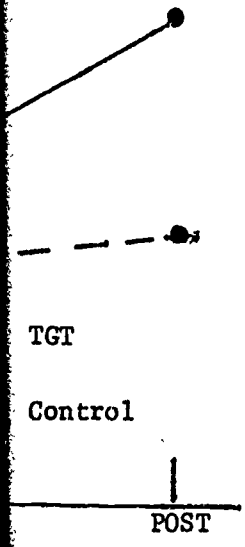


Figure 2: Treatment Gro
Sanders Eleme
Part III



ns for Hoyum-
English Test

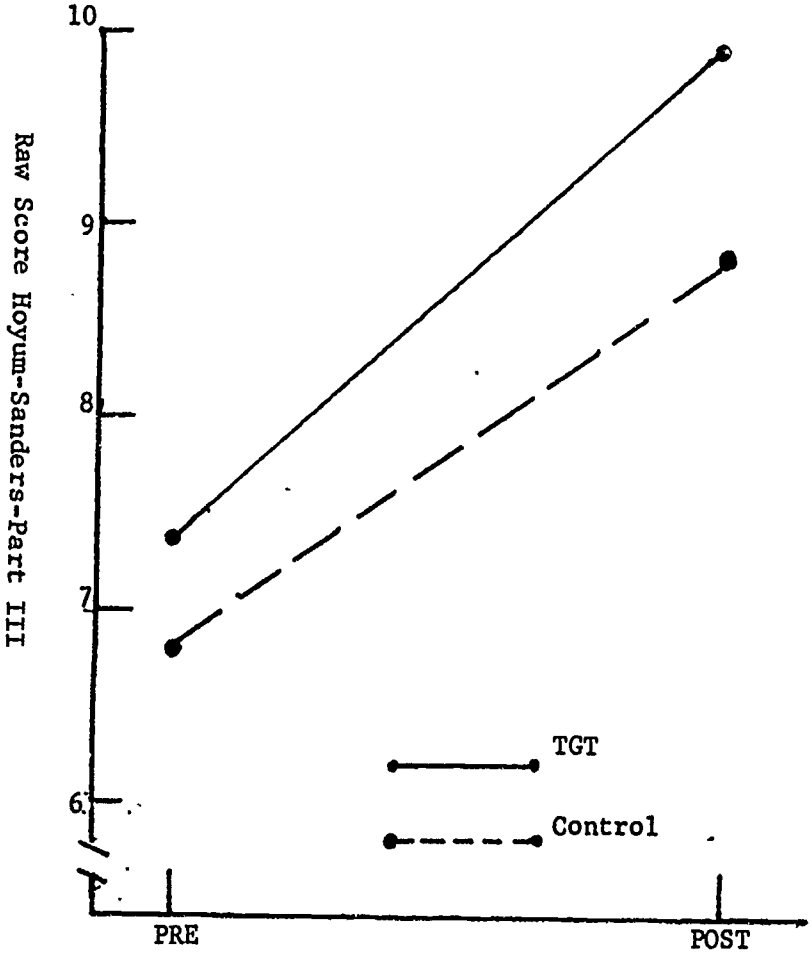


Figure 2: Treatment Group Means for Hoyum-Sanders Elementary English Test Part III

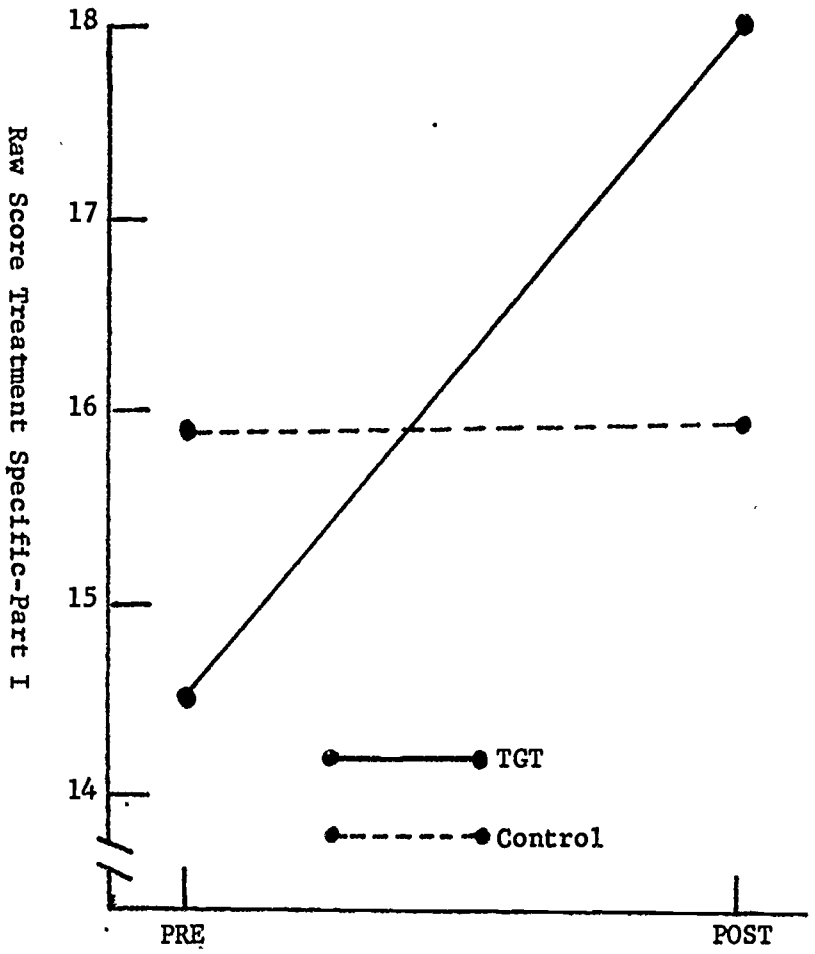


Figure 3: Treatment Group Means for Treatment-Specific Achievement Test-Part I

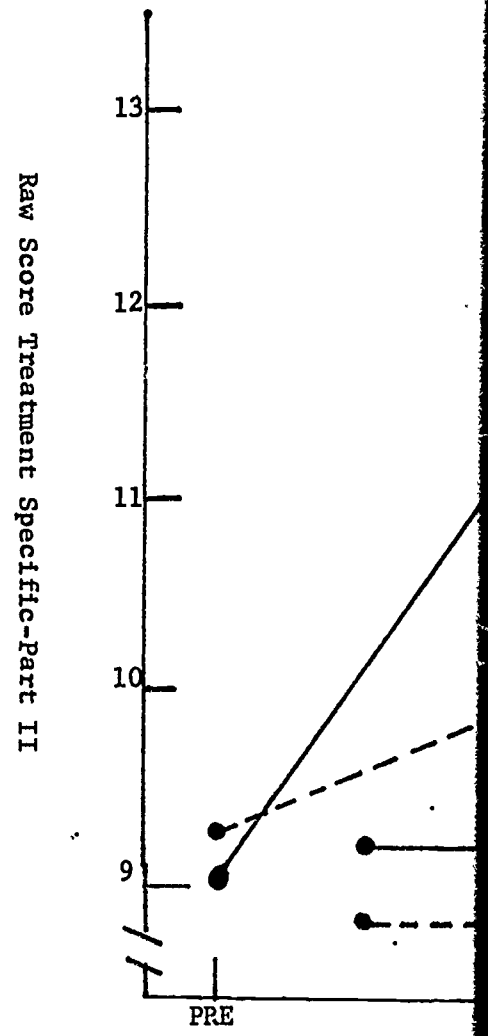
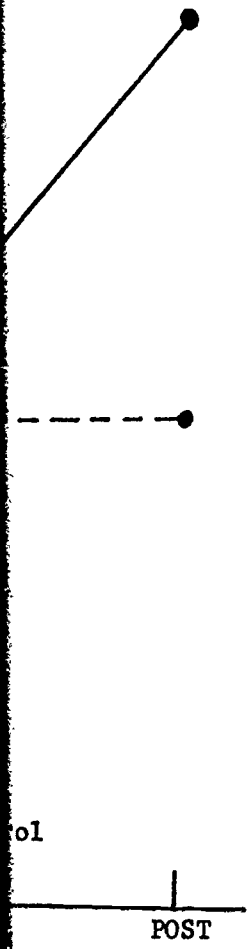


Figure 4: Treatment G
Specific A



ns for Treatment-
t Test-Part I

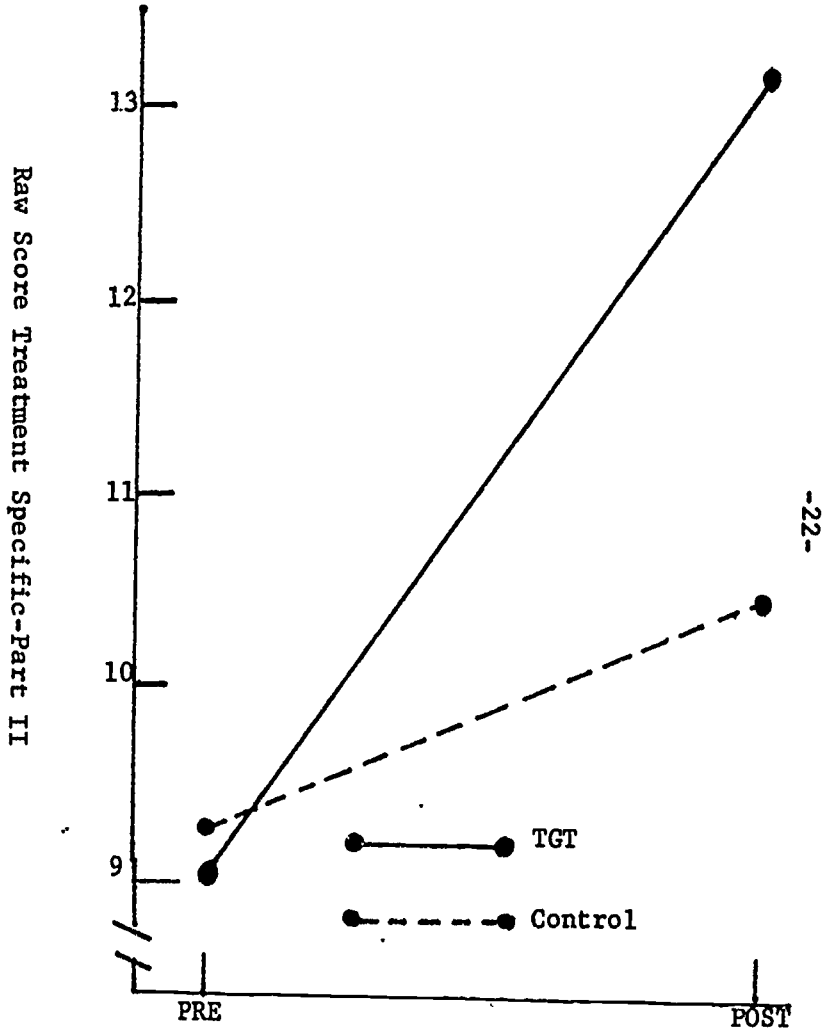


Figure 4: Treatment Group Means for Treatment-Specific Achievement Test-Part II

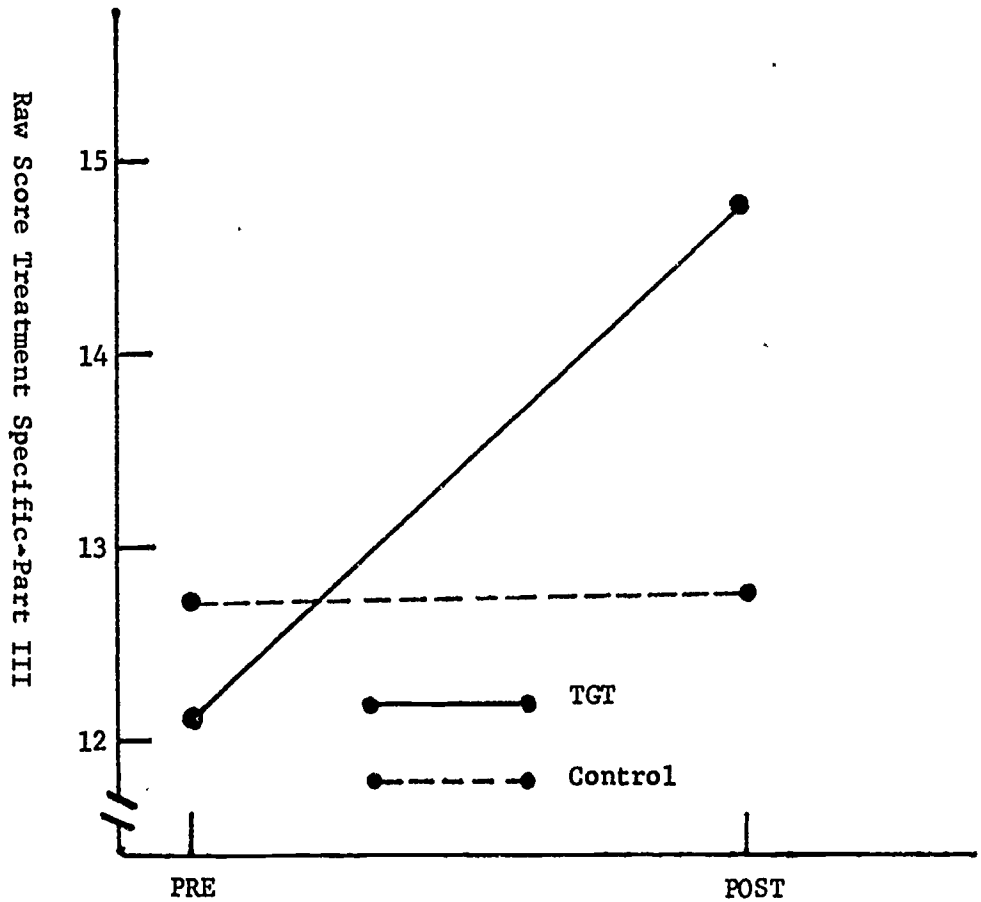


Figure 5: Treatment Group Means for Treatment-Specific Achievement Test-Part III

Table 1

Summary of TGT Effects on Students

Experiment	Subject Area	Grade Level	Length of Study (weeks)	No. of Students	Student Outcomes: Academic Achievement	Student Outcomes: Student Attitude	Classroom Process: Peer Tutoring/ Mutual Concern	Classroom Process: Peer Normative Climate
(1) Edwards, et al., (1972)	Math	7	9	96	+	--	--	--
(2) Edwards & DeVries 1972; DeVries & Edwards, 1973	Math	7	4	110	+	+	+	--
(3) Hulten (1974)	Math	7	10	299	+	+	--	+
(4) Edwards & DeVries (1974)	Math	7	12	128	+	+	+	0
	Social Studies	7	12	128	0	0	0	+
(5) DeVries, Edwards & Wells, 1974a, 1974b	Social Studies	10-12	12	191	+ ($P < .10$)	+	+	+

Table 2

Results of General Linear Analyses for
Hoyum-Sanders Elementary English Test

DEPENDENT VARIABLE	SOURCE OF VARIANCE	DF_1	Incremental R^2	F Ratio [1]
PART I Sentence Recognition	Ability (A)	1	.13	7.67**
	Treatment (B)	1	.00	< 1
	A X B	1	.03	1.41
	Total		.16	
PART II Capitalization	Ability (A)	1	.10	5.44*
	Treatment (B)	1	.09	5.30*
	A X B	1	.01	< 1
	Total		.20	
PART III Punctuation	Ability (A)	1	.32	23.71**
	Treatment (B)	1	.11	9.68**
	A X B	1	.00	< 1
	Total		.43	
PART IV Contractions, Possessives, Spelling	Ability (A)	1	.16	9.38**
	Treatment (B)	1	.04	2.27
	A X B	1	.04	2.51
	Total		.24	
PART V Usage	Ability (A)	1	.13	7.38**
	Treatment (B)	1	.01	< 1
	A X B	1	.00	< 1
	Total		.14	
PART VI Alphabetization	Ability (A)	1	.21	13.09**
	Treatment (B)	1	.01	< 1
	A X B	1	.04	2.69
	Total		.26	

[1] $df_2 = 50$

*$P < .05$

**$P < .01$

Table 3

Results of General Linear Analyses for Treatment-Specific Achievement Test

DEPENDENT VARIABLE	SOURCE OF VARIANCE	DF_1	Incremental R^2	F Ratio[1]
PART I Grammar, Contractions, Possessives and endings	Ability (A)	1	.12	6.92**
	Treatment (B)	1	.07	4.02*
	A X B	1	.00	< 1
	Total		.19	
PART II Commas and Abbreviations	Ability (A)	1	.10	5.61**
	Treatment (B)	1	.13	8.37***
	A X B	1	.00	< 1
	Total		.23	
PART III Quotations and Kinds of Sentences	Ability (A)	1	.11	6.22**
	Treatment (B)	1	.08	4.57**
	A X B	1	.00	< 1
	Total		.19	

[1] $df_2 = 50$

*P < .06

**P < .05

***P < .01

Table 4

Treatment Group Means for Language Arts Achievement Test

DEPENDENT VARIABLE		TGT		CONTROL	
		Pre	Post	Pre	Post
Hoyum-Sanders Elementary English Test					
PART I	$\bar{x}$	8.43	7.25	8.67	7.25
	S.D.	1.28	1.57	1.12	1.51
PART II	$\bar{x}$	11.07	12.68	11.25	11.58
	S.D.	2.17	2.01	2.00	2.48
PART III	$\bar{x}$	7.36	9.89	6.79	8.83
	S.D.	2.52	2.13	2.97	2.31
PART IV	$\bar{x}$	3.79	6.00	4.33	6.96
	S.D.	1.59	1.72	1.68	1.96
PART V	$\bar{x}$	22.96	27.39	25.04	27.08
	S.D.	5.22	3.30	4.81	4.68
PART VI	$\bar{x}$	5.75	6.50	6.38	7.17
	S.D.	2.15	2.09	2.28	1.80
Treatment-Specific Achievement Test					
PART I	$\bar{x}$	14.50	18.00	15.91	15.95
	S.D.	3.84	4.71	3.90	5.66
PART II	$\bar{x}$	9.00	13.11	9.25	10.45
	S.D.	3.81	3.56	4.06	4.86
PART III	$\bar{x}$	12.11	14.79	12.71	12.75
	S.D.	3.17	4.06	3.22	5.28

Table 5

Response Distributions for Attitude and Classroom Process Measures

DEPENDENT VARIABLE	TREATMENT GROUP	YES	NO	NOT SURE	Chi-Square df = 2
ATTITUDES					
(1) Like coming to class	TGT	88%	8%	4%	3.71
	Control	64%	27%	9%	
(2) Happier if not have to come to class	TGT	17%	79%	4%	3.65
	Control	18%	59%	23%	
(3) Like learning Language Arts	TGT	54%	21%	25%	10.62*
	Control	95%	5%	0%	
PEER CLIMATE					
(1) Other students want you to work hard	TGT	79%	17%	4%	2.49
	Control	64%	18%	18%	
(2) Other students friendly to you	TGT	63%	25%	12%	.25
	Control	59%	23%	18%	
DIFFICULTY OF CLASS					
(1) Work hard to do well	TGT	4%	54%	42%	2.78
	Control	18%	55%	27%	
(2) Easy to do well	TGT	58%	25%	17%	3.30
	Control	41%	18%	41%	
PERCEIVED IMPORTANCE					
(1) Important to do well in class	TGT	88%	8%	4%	1.25
	Control	95%	5%	0%	

NOTE: For all dependent variables N = 24 for TGT, N = 22 for Control.

*$P < .01$

Appendix A

Intercorrelations Among Scales of Hoyum-Sanders Elementary English Test

	Part I	Part II	Part III	Part IV	Part V	Part VI
Part I Sentence Recognition						
Part II Capitalization	-.05					
Part III Punctuation	.23	.16				
Part IV Contractions, Possessives, Spelling	.16	-.03	.32			
Part V Usage	.35	.37	.34	.14		
Part VI Alphabetization	.15	.14	.16	.19	.28	
TOTAL	.44	.49	.63	.40	.85	.52

N = 52 for all correlations

Appendix B

Intercorrelations Among Scales of
Treatment-Specific Language Arts Test

	Part I	Part II	Part III
Part I			
Grammar and Contractions, Possessives and Endings.			
Part II			
Commas and Abbreviations	.60		
Part III			
Quotations and kinds of Sentences	.49	.39	

N = 52 for all correlations