

SOUTH BRUNSWICK, N.J.

THE CENTER ON TEACHING

A TITLE IV-C PROJECT

EVALUATION REPORT

1979-1980

Prepared by

Wendy G. Oxman, Ph.D.
Nicholas M. Michelli, Ed.D.

Gemini Educational Services, Inc.
Glen Ridge, N.J.

Program Description

The Center on Teaching is a Title IVC dissemination project designed to train teachers and administrators in ^{the "Spectrum of"} ~~alternative~~ Teaching Styles." The styles, ^{eight} ~~six~~ in number, range from command (with an emphasis on teacher control of factors in the learning environment and predictable student behaviors) to discovery (with an emphasis on divergent thinking).

For each given style, expected teacher behavior and student behavior is prescribed with the responsibility for various decisions clearly placed. Teachers are trained for various lengths of time in the styles with follow-up monitoring. Those receiving less training are expected to master fewer styles.

Previous Research and Research Objectives

Previous research on the effect of the program conducted by Richard C. Anderson of the University of Illinois has demonstrated that, relative to comparison group teachers, teachers trained in the program:

1. exhibit flexibility in the use of alternative styles;
2. give significantly more individual attention to their students;
3. spend significantly less time dominating classroom discussions;
4. make more efficient use of class time;
5. report spending more time in preparation, spending less time giving directions in class, needing less time for discipline problems, getting more subject matter taught, and giving more individualized instruction.

Students in the program demonstrated:

1. increased awareness of their role in decision making and the ability to shift styles;
2. more independence and acceptance of responsibility for decisions;
3. increased clarity of expectations.

In 1979, a research program was begun to analyze the impact of the program on student achievement. It was found that fourth grade students (N=61) of

project-trained teachers performed significantly better than expected, based upon their previous rate of growth. The perceived effectiveness of the program, as reported by project-trained teachers on a questionnaire, was also investigated. Positive attitudes and enthusiasm among the teachers was noted.

The research begun in 1979 was extended to 1980 to determine whether the mathematics achievement results could be replicated with a somewhat larger group, and whether teachers continued to view the program as effective.

The first segment of research dealt with the perceived effectiveness of the program as reported by teachers who have been trained by project staff in two communities.

The second segment of research dealt with the impact of the program on the mathematics achievement of elementary grade students of program-trained teachers. Specifically, the objective of the research was to determine whether elementary school students of program-trained teachers perform significantly better in the area of mathematics than would have been predicted over time as measured by standardized testing instruments.

Teacher Perception of the Program

As part of the 1980 evaluation of the Center on Teaching Program, the questionnaire used in the prior year was revised by the project directors in consultation with the evaluators. The questionnaire elicited background information (grades and subjects taught, length and extent of involvement with the program, length of teaching experience). The 1980 questionnaire presented 37 statements of an evaluative nature to be responded to on a Strongly Agree - Strongly Disagree 5-point scale and seven additional items with a 5-point all-none quantitative scale. The questionnaire also elicited open-ended responses to questions regarding the Spectrum's perceived strengths and weaknesses, and elicited further information regarding the Spectrum in practice, as well as

suggestions for change. The extent to which participants use Spectrum episodes in each style in their classrooms, and self ratings of fidelity to each style were also requested. Ratings assigned by project directors were also analyzed.

In this section, responses to the questionnaires are presented. A total of 37 questionnaires were returned for analysis. Not all respondents answered every question, however:

Of the 37 respondents, most were teachers of grades 3 - 6. The average length of Spectrum involvement was 7.4 months, and the average length of teaching experience was 11.73 years. A total of 30 were regular classroom teachers; three were special education teachers and three were teachers of special subjects.

Responses to the evaluative statements are presented in Table 1. The mean response to each positively presented item was converted to a numerical scale (Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2, Strongly Disagree = 1). For those items which are presented negatively, the scale was reversed, so that Strongly Disagree = 5, Disagree = 4, Undecided = 3, Agree = 2, and Strongly Agree = 1. In Table 1, the negative items presented are modified so that they appear positive (i.e. "the analysis sheets are superfluous" reads "the analysis sheets are (not) superfluous"). Thus, all frequencies may be reviewed in the same manner; the higher the response, the more positive the attitudes of the group of respondents toward that aspect of the Spectrum.

Table 1
Responses to Evaluative Statements on Spectrum Questionnaire

Item	No. of Respondents	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean
		N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	
1. I believe that deliberate teaching behavior is a chain of decision making.	36	23	63.9	12	33.3	1	2.8					4.61
2. The Spectrum offers me concrete knowledge about different teaching styles and their impact on learning behaviors.	37	23	62.2	13	35.1	1	2.7					4.60
3. The analysis of verbal behavior in each style expanded my knowledge of the relationship between teaching behavior and learning behavior.	37	18	48.7	17	46.0	2	5.4					4.43
4. The Spectrum offers me ways of reaching my objectives more clearly and more efficiently.	37	22	59.5	14	37.8	1	2.7					4.57
5. The Spectrum helped me become more flexible in my teaching behavior.	37	13	35.1	10	27.0	6	16.2	8	21.6			3.76
* 6. The objective Videorecording, during micro, was (not) a threatening experience.	37	11	29.7	20	54.1	1	2.7	5	13.5			4.00
7. The Analysis Sheets followed the structure of each style.	37	15	40.5	21	56.8			1	2.7			4.35
8. Doing the Analysis with a peer was very helpful.	37	23	62.2	11	29.7	2	5.4	1	2.7			4.51
9. The objective Videorecording helped me see that I can intentionally change my behavior.	37	18	48.7	19	51.4							4.49
10. The Analysis Sheets are very helpful.	36	10	27.8	25	69.4	1	2.8					4.25

(continued)

Table 1 (continued)
Responses to Evaluative Statements on Spectrum Questionnaire

Item	No. of Respondents	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean
		N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	
11. The Micro experience was a worthwhile link between the theory part and the implementation in the classroom.	39	20	54.1	17	46.0							4.54
* 12. Preparing for using the Spectrum in my classes (does not) take more time than it is worth.	36	12	33.3	23	63.9	1	2.8					4.31
13. I adopted most of the ideas I learned during Spectrum training.	37	11	29.7	19	51.4	4	10.8	2	5.4	1	2.7	4.00
14. Using the Spectrum deliberately made a positive difference in my behavior with my students.	37	13	35.1	15	40.5	3	8.1	5	16.2			3.95
* 15. My experience as a teacher before Spectrum training had (not) been more useful than the Spectrum training program.	36	6	16.7	15	41.7	9	25.0	6	16.7			3.58
* 16. My College Methods courses were (not) more useful than the Spectrum training.	36	16	44.4	11	30.6	8	22.2	1	2.8			4.17
17. My teaching philosophy has expanded as a result of the Spectrum training.	37	7	18.9	23	62.2	3	8.1	3	8.1			3.87
18. In my classes I am more deliberate about the specific decisions as prescribed by the Spectrum.	35	6	17.1	26	74.3	2	5.7	1	2.9			4.06
* 19. My teaching philosophy (does not) preclude the use of some of the teaching styles.	35	8	22.9	17	48.6	5	14.3	4	11.4	1	2.9	3.77

(continued)

Table 1 (continued)

Responses to Evaluative Statements on Spectrum Questionnaire

Item	No. of Respondents	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean
		N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	
20. The Spectrum (does not) take away a teacher's individuality.	36	14	38.9	20	55.6	1	2.8	1	2.8	1	2.8	4.31
21. I believe all teachers could benefit from the Spectrum training.	35	10	28.5	18	51.4	4	11.4	2	5.7	1	2.9	3.97
22. My students are learning much more since we began using the Spectrum.	35	9	25.7	15	42.9	11	31.4					3.94
23. My students seem much happier than students I taught before I used the Spectrum.	35	6	17.1	5	14.3	17	48.6	7	20.0			3.29
24. We cover much more material since I implemented the Spectrum.	36	11	30.6	12	33.3	11	30.6	2	5.6			3.85
25. We cover the subject matter in greater depth since the implementation of the Spectrum.	35	7	20.0	10	28.6	10	28.6	8	22.9			3.46
26. I (do not) have many more discipline problems since implementing the Spectrum.	36	13	36.1	21	58.3	2	5.6					4.25
27. My students like learning by different teaching styles.	36	10	27.8	21	58.3	4	11.1	2	2.8			4.11
28. I spend much more time with individuals in my class(es) since implementing the Spectrum.	36	9	25.0	13	36.1	6	16.7	8	22.2			3.64
29. I (do not) spend much more time for directions and logistics when I use the Spectrum.	36	6	16.7	18	50.0	2	5.6	9	25.0	1	2.8	3.53

(continued)

Table 1 (continued)

Responses to Evaluative Statements on Spectrum Questionnaire

Item	No. of Respondents	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		Mean
		N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	N	Per Cent	
30. Students understand very clearly what the expectations are in Spectrum episodes.	36	12	33.3	23	63.9	1	2.8	1	2.8	4.28		
31. Students work much more diligently when in Spectrum, compared with the way my students worked before I used the Spectrum.	37	8	21.6	14	37.8	10	27.0	4	10.8	1	2.8	3.65
32. In Spectrum episodes, my students are actively engaged on-task much more than before I used the Spectrum.	35	9	25.7	18	51.4	3	8.6	5	14.3			3.89
33. I know much more about each student's learning behavior as a result of the insights I gained in Spectrum training.	37	8	21.6	19	51.4	7	18.9	3	8.1			3.87
* 34. Initially, the follow-up classroom visits (Macro) were (not) threatening to me.	37	9	24.3	15	40.5	2	5.4	9	24.3	2	5.4	2.46
* 35. The follow-up classroom visits (Macro) were (not) threatening to me all along.	36	14	38.9	22	61.1							4.39
* 36. I could (not) have done just as well without the follow-up class visits.	37	19	51.4	15	40.5	1	2.7	1	2.7	1	2.7	4.35
37. The follow-up classroom visits (Macro) were supportive and helpful.	37	22	59.5	12	32.4	2	5.4	1	2.7			4.49

* Items negatively phrased have been reversed for presentation for ease of interpretation.

As indicated by the data presented in Table 1, more than 80 per cent of the respondents agreed with the positive form of 24 of the 37 statements presented. Of the remaining 13 items, three (Item 5: The Spectrum helped me become more flexible, Item 15: My (prior) experience had (not) been more useful, and Item 33: I know more about students' learning behavior) yielded significant differences between the mean ratings in two communities which differed widely in the length of program involvement, or related significantly to the number of months of program involvement. It appears from this evidence that it takes time and experience using Spectrum in the classrooms to get to the point at which one can see progress and usefulness of this kind. Of the remaining ten items on which less than 80 per cent agreement was indicated, three were the same items on which a number of teachers responded with indecision to last year's questionnaire. Some teachers were not sure whether students were happier, nor whether they covered more content or in greater depth since they started to use the Spectrum.

The remaining items were further reviewed for their relationships with the other available indicators of quantity of use and fidelity.

Item 14 "Using the Spectrum deliberately made a positive difference on my behavior..." related to self reported use of Style A (Command) and to self-reported fidelity to Style \hat{B} (Canopy).

Items 28, 29, 31, and 32, which were highly interrelated, (I spend much more time with individuals, (do not) spend much more time for directions and logistics, students work more diligently, and are more actively engaged on task) were all related to use of and/or fidelity to Style 8: Divergent Production. The more time spent with individuals related, as well, to assigned ratings*, ratings of student capabilities in Style B, and fidelity to Style \hat{B} (Canopy) and F (Guided Discovery). The more time spent on logistics, the lower the ratings of pupil capabilities in Styles A and E (Slanty Rope). The more diligently students

* see page 11 for description of assigned ratings

worked, the greater the use of Styles A and G, and fidelity to Style E (Slanty Rope). Active on-task behavior was related to fidelity to Style E (Slanty Rope). Most of these relationships were limited to teachers within the community with the longest period of program involvement, since Styles E - G had not been studied by the teachers who were newer to the program.

Item 19 (My teaching philosophy (does not) preclude the use of some of the teaching styles) was related to grade level and teaching experience. The higher the grade level and the longer the teaching experience, the greater the agreement with the positive form of this statement. Item 34, regarding the initial perception of the follow-up visits as threatening, seemed unrelated to the question of program effectiveness.

Table 2 presents the teachers' perceptions of the capabilities of pupils to respond appropriately within each of the styles.

Table 2

Teacher Perceptions of Pupil Capabilities in the Styles

<u>Item</u>	<u>No. of Users</u>	<u>All</u>		<u>Most</u>		<u>Some</u>		<u>Few/None</u>	
		<u>N</u>	<u>Per Cent</u>	<u>N</u>	<u>Per Cent</u>	<u>N</u>	<u>Per Cent</u>	<u>N</u>	<u>Per Cent</u>
38	37	13	35.1	23	62.2	1	2.7		
39	37	27	73.0	10	27.0				
40	37	15	40.5	21	56.8	1	2.7		
41	31	7	22.6	20	64.5	3	9.7	1	3.2
42	7	2	28.6	5	71.4				
43	2	1	50.0	1	50.0				
44	19	5	26.3	13	68.4	1	5.3		

Nearly all teachers who used a style responded that all or most of their students were able to make the decisions, respond to the demands, or otherwise respond appropriately to the requirements of that style.

Fidelity to Styles, Reported Pupil Capabilities, and Quantity of Use

Ratings were assigned by the project directors to each teacher on a scale from 9 (high) to 1 (low) in terms of the teacher's fidelity to the Spectrum styles. Teachers also rated themselves on fidelity to the structure of each of the styles, assigning themselves "1" if they "deliberately plan and teach the episodes by following the structure of the styles," "2" if they "use the structure of the styles only as a guide for teaching," and "3" if they "don't follow the structure of the styles." Table 3, for each style, presents the correlations among the number of times per week Spectrum episodes in that style were used, (according to teacher reports), overall assigned ratings, self ratings of fidelity to that style (with scale reversed for ease of interpretation), and judgment of student capabilities in that style.

The significant correlations presented in Table 3 suggest that the greater the quantity of use (number of times per week the style was reported to have been used), the higher, in general, the ratings of the capabilities of the students to respond appropriately to the requirements of that style. Quantity of use related positively to self ratings of fidelity to Style B (practice). Ratings assigned to the teachers related positively to the quantity of use of Styles A, B, and D. With regard to Style G (divergent production), the more often it was used, the higher the ratings of pupil capabilities ($r = + .59^{***}$); but the lower the self ratings of fidelity to that style ($r = -.32$). It may be that the nature of Style G needs to be clarified in terms of the inherent flexibility implied by the technique.

Table 3

Correlations Among Ratings of Fidelity to Styles,
Student Capabilities, and Quantity of Use

	OAR	QOU	SRF	JSC
Style A: Command				
Overall Assigned Rating (OAR)		.43*	.22	.04
Quantity of Use (QOU)			.26	.39*
Self Rating of Fidelity (SRF)				.13
Judgment of Student Capability (JSC)				
Style B: Practice				
Overall Assigned Rating (OAR)		.58***	.19	.34
Quantity of Use (QOU)			.46*	.04
Self Rating of Fidelity (SRF)				.03
Judgment of Student Capability (JSC)				
Style B: Canopy				
Overall Assigned Rating (OAR)		.45	.30	.55***
Quantity of Use (QOU)			.11	.34*
Self Rating of Fidelity (SRF)				.31
Judgment of Student Capability (JSC)				
Style C: Reciprocal				
Overall Assigned Rating (OAR)		.17	-.13	n.a.
Quantity of Use (QOU)			-.14	n.a.
Self Rating of Fidelity (SRF)				n.a.
Judgment of Student Capability (JSC)				
Style D: Self Check				
Overall Assigned Rating (OAR)		.52**	-.02	.15
Quantity of Use (QOU)			.29	.56**
Self Rating of Fidelity (SRF)				.83***
Judgment of Student Capability (JSC)				
Style E: (Slanty Rope)				
Overall Assigned Rating (OAR)		.00	.92	.08
Quantity of Use (QOU)			.61	.63**
Self Rating of Fidelity (SRF)				.41
Judgment of Student Capability (JSC)				

(continued)

Table 3 (continued)

Correlations Among Ratings of Fidelity to Styles,
Student Capabilities, and Quantity of Use

	OAR	QOU	SRF	JSC
Style F: (Guided Discovery)				
Overall Assigned Rating (OAR)		.20	n.a.	.36
Quantity of Use (QOU)			n.a.	.60**
Self Rating of Fidelity (SRF)			n.a.	n.a.
Judgment of Student Capability (JSC)				
Style G (Divergent Production)				
Overall Assigned Rating (OAR)		.20	.43	.23
Quantity of Use (QOU)			-.32	.59***
Self Rating of Fidelity (SRF)				.23
Judgment of Student Capability (JSC)				

* p < .05

** p < .01

*** p < .001

The relationships between the ratings of the overall fidelity to the Spectrum assigned by the project directors and the teachers' questionnaire responses were analyzed. These ratings were not significantly related to the community, grade level, years of teaching experience, or length of program. The ratings of fidelity, however, related to reported quantity of use of episodes in Styles A, B (Practice), B (Canopy), and D (Self Check), and with ratings of pupil capability in Style B. The assigned ratings were unrelated to self-ratings of fidelity to the individual styles. Ratings of fidelity were also related significantly to several of the questionnaire items; in general, the higher the ratings, the more positive the perceptions of program effectiveness.

Open-Ended Questionnaire Responses

As program strengths, most teachers noted their improved abilities in clarifying objectives and procedures, and in communicating these in clear and common language to students. They commented upon the value of improvements in the students' knowledge of the teachers' expectations of them. The emphasis on student decision making and responsibility, and on the use of non-judgmental feedback were also cited as program strengths.

Few respondents noted program characteristics as weaknesses. Some problems they related in Spectrum use were lack of time to plan curriculum activities and to prepare materials, especially at first, difficulty in implementing Spectrum in an intermediate grade without prior preparation, and difficulties in terms of working in a situation with other teachers who were not involved in the program. Some students had difficulty in shifting from a Spectrum teacher to a non-Spectrum teacher, (e.g. a substitute) and many reported that they had had conflicts with the non-Spectrum teachers in their schools. A few respondents would have preferred shorter sessions and a longer period of time in which to learn the Styles, and less pressure to perform as Spectrum teachers.

As suggestions for changes, teachers suggested that the initial contact with the teachers might be through printed material, such as a newsletter, to enable them to make a more informed judgment about participation. It was felt that some teachers who chose not to participate were later sorry, and felt they had not had an adequate opportunity to understand the implications of non-participation. This may have caused friction and negative reactions to the "attention that the Spectrum teachers received from administration and outside visitors," it was suggested. Resentment from non-participants when faced with pupil requests for Spectrum related information was also evident. Some non-participants felt threatened, as there were rumors that it was to be used as a tool for teacher evaluation.

Further suggestions included more follow-up consultation visits, and discussions, more materials, particularly in Style C, and more work in Style G.

In addition to the responses analyzed above, the teacher questionnaire asked respondents to "tell about one dramatic change and/or an anecdote that happened in your class," and to summarize what the Spectrum has done for them. Nearly all respondents provided anecdotes or summaries.

Many of the teachers' anecdotes related to the children's spontaneous use of Spectrum terminology and concepts. For instance, teachers noted:

One thing I found interesting was that once the students learned the vocabulary, which I had doubted they could, they were using the terms themselves to each other or to myself. I also found then when we did something they knew exactly what style it was. On a class trip to a museum, the guide giving the lecture asked the class a question where they had to think of possible answers and one little girl turned to me and said, "She doing Style G."

When a substitute had the class for one day, the children constantly asked if she (substitute) would give them feedback. The substitute was confused as to what kind of feedback to give (value judgments or not). The students cleared things up by explaining to the substitute to use the terms "correct" or "incorrect". And so she did.

On the bus on our way to a field trip - question: "Are we taking this trip in Style A?"

When I go around in Style C, I still tend to talk to doer. One day a girl said to me, "that's my job to be observer and talk to the doer, not yours!"

Most of my students are now so aware of their roles as learners, they will even tell me when I am inaccurately using a Style.

Many teachers noted an increased efficiency in time, for the class as a whole, and for individual children who benefited from explicit knowledge of the teacher's expectations. Many teachers expressed surprise and delight at the ability of children to consciously make and implement decisions was noted. For example,

The greatest change has been with those children who in the past may have procrastinated or had difficulty completing work on time. These children have become very aware of their starting pace and rhythm, and time parameters.

A child who is very immature and who has had a great deal of difficulty making decisions, sat and actually thought about a decision before taking action. (One small step for man, one enormous occurrence for him!)

Teachers also commented on students' increased respect and tolerance for each other. They "can provide feedback to their peers using verbal behavior that is appropriate;" they "were helpful to each other in Style C." Students were also seen as increasing in ability to organize tasks for themselves, to grow in self confidence, readiness to undertake difficult tasks, and in the ability to estimate appropriate difficulty levels for themselves.

Teachers summarized the effects of the program on their own work in a variety of ways. Most often, they cited the increased productivity and improved use of time. Classrooms were seen as better organized, calmer and more pleasant, with fewer discipline problems. Teachers indicated that the emphasis on pupil decision making was especially helpful, and that the use of private, non-judgmental feedback to pupils helped them to understand pupil behavior and learning and to help the children. More than one teacher referred to the Spectrum as having helped him/her "clean up my act"-in the sense of clarifying purpose and expectations in planning. Other teachers emphasized the awareness of the need for clarifying objectives and expectations, and planning activities that are consistent with the intent and nature of the objective.

Several teachers indicated that they enjoyed teaching more, were less frustrated and tired, and experienced less stress, since using the Spectrum in the classroom.

Mathematics Achievement

As part of the evaluation of the Center on Teaching program, pretest and posttest scores on the mathematics subtests and total mathematics test of the Comprehensive Tests of Basic Skills (CTBS) were analyzed. Pretest scores for fourth grade students who were enrolled in three program classes and fifth graders enrolled in two program classes were available from the results of the regular district wide testing program. Posttest answer sheets for these students were obtained from an administration of the test by classroom teachers late in the school year and scored by hand. Form T Level 1 was used for grade 4; Form T Level 2 for grade 5.

Analysis of pretest to posttest change followed a "Model A" analysis. Pretest percentile equivalents were converted to expected posttest raw scores and then to anticipated normal curve equivalents (NCE's) with reference to posttest norms, to yield posttest data that would be expected in the absence of special treatment. Anticipated and actual posttest raw scores were converted to NCE's by converting percentile rank equivalents of the mean raw scores to z scores and then to NCE's.

A series of correlated t tests were performed to determine the significance of the difference between anticipated and actual posttest data. Table 4 presents these results for fourth grade; Table 5 presents fifth grade results.

Table 4

Pretest-Posttest Analyses of Fourth Grade Center
on Teaching Participants' Scores in Mathematics (N=65)

	<u>Pretest</u>		<u>Anticipated Posttest</u>		<u>Actual Posttest</u>		
	<u>Mean Score</u>	<u>Percentile Equiv.</u>	<u>Raw Score</u>	<u>NCE</u>	<u>Raw Score</u>	<u>Perc.</u>	<u>NCE</u>
Computation	34.82	51	39.0	50.5	42.55	66	58.7
Concepts	19.19	65	20.6	58.1	21.28	73	62.9
Application	17.06	54	19.6	52.1	20.86	60	55.4

Analyses of Anticipated vs. Actual Posttest Scores

	<u>NCE Difference</u>	<u>Pre-Post Correlations</u>	<u>SED</u>	<u>t correlated</u>
Computation	8.2	.01	3.70	2.21*
Concepts	4.8	.35	3.00	1.60
Application	3.3	.55	2.50	1.32

* $p < .05$

Table 5

Pretest-Posttest Analyses of Fifth Grade Center
on Teaching Participants' Scores in Mathematics (N=39)

	<u>Pretest</u>		<u>Anticipated Posttest</u>		<u>Actual Posttest</u>		
	<u>Mean Score</u>	<u>Percentile Equiv.</u>	<u>Raw Score</u>	<u>NCE</u>	<u>Raw Score</u>	<u>Perc.</u>	<u>NCE</u>
Computation	35.02	74	40.0	63.6	41.21	79	67.0
Concepts	15.82	65	16.6	58.1	19.98	89	75.8
Application	17.12	71	19.0	61.7	21.37	84	71.1

Analyses of Anticipated vs. Actual Posttest Scores

	<u>NCE Difference</u>	<u>Pre-Post Correlations</u>	<u>SED</u>	<u>t correlated</u>
Computation	3.4	.39	3.72	.91
Concepts	17.7	.36	3.81	4.65***
Application	9.4	.29	4.02	2.34*

* $p < .05$

*** $p < .001$

The results of the analyses of mathematics achievement indicates that fourth grade students exceeded expectation in Computation, while fifth graders exceeded expectation in both Concepts and Application.

Summary

The Center on Teaching Project trains teachers in the use of specific teaching styles, within which expected teacher behavior and student behavior is prescribed, with responsibility for various decisions clearly placed. Prior research has demonstrated that teachers exhibit greater flexibility, give more individual attention, and make more efficient use of class time, while students demonstrate increased responsibility and awareness of roles and expectation. The impact of the program on mathematics achievement in fourth grade was assessed, with highly significant, positive results. In a prior questionnaire study, teachers' responses revealed positive attitudes and enthusiasm.

In this report, the results of an analysis of mathematic achievement among fourth and fifth grade project-trained teachers are presented. The responses of project-trained teachers to the 1980 questionnaire are also reported. Significant relationships ($p < .05$) among questionnaire responses, self-ratings of fidelity to and use of the various styles, and ratings of general Spectrum fidelity assigned by the project director are also presented.

In general, teacher respondents were enthusiastic about the program; 80 per cent or more agreed with the positive form of most of the items presented. The more they used a particular style, the more sure they were that all children were able to respond appropriately in that style. In general, the higher the assigned ratings of program fidelity, the more positive the attitudes toward the program. Teachers felt that the program's greatest strengths were in helping them to clarify objectives and expectations, to communicate these to pupils, and in helping them to teach children to make decisions and to take responsibilities. They also noted increased efficiency

and better discipline among the children.

The significant increase in mathematics achievement found in the prior year's analysis was replicated in this study. On all subtests, students in fourth and fifth grades improved over expectation based upon prior growth rates. In fourth grade the improvement reached statistical significant on the computation subtest; in fifth grade, there was statistically significant improvement in Application and Concept.