

CENTER ON TEACHING

Summary of Research on the Spectrum '75 – '76

Presented to the Spectrum Teachers and Administrators Conference

Crossroads Middle School, South Brunswick, New Jersey

November 1976

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Introduction:

The following is a summary of the two years study of the Spectrum in action. The study was conducted by Dr. Richard C. Anderson and his colleagues of the Laboratory for Cognitive Studies in Education, University of Illinois. (The full report including the statistical procedures and analysis, the appendices etc., are available at the C. O. T.)

The purpose of this summary is to give you an idea of what happened to all those Questionnaires and Videotapes which recorded the Spectrum in action, your reactions and those of your students.

This summary consist of the statements of hypotheses (What we thought Spectrum Teachers and Students do in class) and statements of results (What, in fact, occured in classes during the period of the research ). The results, indeed, help us focus on the areas where INTENT and ACTION are congruent and those areas where discripencies still exist. For those who are interested in the details of the statistical procedures and item by item analysis, the full document is available at the C. O. T.

The results of this study and the conclusions of today's conference should help us expand our knowledge and improve the implementation of the Spectrum in the classroom.

And again, Thank you very much for your frustrations, consistency and contribution.

  
Sara

## Hypotheses

Based on an analysis of the philosophy, teachings and methods of the Spectrum of Teaching Styles it was reasonable to make the following hypotheses:

1. Spectrum teachers will give significantly more individual attention to students during class time than Control teachers (both in terms of frequency of individual contacts and in percentage of class time used for giving individualized attention).
2. Spectrum teachers will spend significantly less time than Control teachers dominating classroom academic discussions.
3. More efficient use of class time will be made in Spectrum classes than non-Spectrum classes. Specifically, Spectrum students will pay closer attention in class, the class pace will be faster, less time will be wasted getting started, students will spend more time on school work, students will give their teachers fewer discipline problems, and students will waste less time than non-Spectrum students.
4. Spectrum students will show more favorable attitudes toward their education than non-Spectrum students.

## Rationale

Anderson and Faust (1973) have argued “Not all students will have the same difficulties with a lesson”. This means that the teacher must make individual diagnoses for individual students and groups of students’ (pp. 176). In order to provide private, immediate feedback it is imperative that teachers take time to observe individuals as they

are working in class and be available for individual consultations with students. One of the goals of the Spectrum is to train teachers to interact privately with individual in order to give them immediate feedback and appropriate new assignments. This study attempted to discover whether differences in the number of contacts with individuals and/or time spent with individuals existed between Spectrum and non-Spectrum classrooms.

Flanders (1970), after reviewing a large number of studies of teacher effectiveness, concluded that students tend to achieve best in classes in which teachers make use of ideas and attitudes expressed by students, were not critical, and did not dominate discussion. In spite of the fact that these findings are relatively well known no consistent and integrated effort has been made to help in-service teachers implement these ideas. It is a goal of the Spectrum to decrease the amount of time teachers dominate academic discussion. This is done by training teachers to implement procedures which make students active learners rather than passive listeners. This study attempted to determine whether differences in the amount of academic time dominated by teachers existed between Spectrum and non-Spectrum teachers.

Rosenshine (1976) has reviewed a large body of literature which indicates that students' academic growth is positively correlated (1) with amount of time structured by the teacher; (2) with time spent on subject matter (whether in textbooks or in teacher-student verbal interactions); and (3) with time spent in seatwork with academic workbooks which students proceeded through at their own pace. Wiley and Harnischfeger (1974) found that the average number of hours of schooling provided in a particular school positively related to academic achievement. Very clearly, then, the more time students are able to spend in subject matter related activities, the greater the

likelihood that they will achieve at high levels. Gump (1974) however, has reported that it is not unusual to find that up to 40% of a student's time on any given day is spent in "non-core, nonsubstance phases" consisting of moving about, waiting, and "getting organized". The average nonsubstance time he reports is approximately 25%. This does not even include time which students waste while fooling around during academically-oriented episodes. This was found in both "open" and "traditional" classrooms. Costin, Greenough and Menges (1971) did an extensive review of empirical studies which indicated students' ratings can provide reliable and valid information on the quality of courses and instruction. Therefore meaningful information related to the efficient use of classroom time, such as class pace, amount of attention paid, time spent on school work, discipline problems and wasted time, can be obtained from student ratings. Despite the need for more efficient use of classroom time few school districts are providing an in-service teacher training program which emphasizes this need. A third goal of the Spectrum is to increase the efficiency in use of class time. From the above review it is clear that: 1) there is probably a great deal of room for improvement in the amount of time spent on-task in most classrooms; 2) with larger amounts of time spent on-task students are more likely to attain higher levels of achievement; and 3) student ratings of classroom instruction are reliable and valid, therefore useful for finding out how class time is used in terms of class pace, student attention, time spent working, discipline problems, time wasted getting started and overall wasted time. This study attempted to show whether differences in efficient use of class time existed between Spectrum and non-Spectrum classrooms. A fourth goal of the Spectrum is to positive student affect with regard to their education. Certainly teachers hope that students will have a positive

attitude toward their education, but few programs currently available systematically attempt to implement those procedures inherent in the Spectrum which should tend to result in more favorable attitudes (i.e., increased socialization, more teacher-student interaction, precisely defined expectations, etc.). This study attempted to show whether differences in attitudes toward their education existed between Spectrum and non-Spectrum students.

### Evaluation Strategy

The evaluation technique used to measure the variables mentioned above utilized student and teacher questionnaires and systematic analysis of videotapes of actual classroom sessions. The design of the study was Quasi-experimental (Campbell & Stanley, 1966) since it was impossible to randomly assign teachers to conditions and students to teachers. Because not all variables can be controlled in a quasi-experiment great pains were taken to get control teachers and students comparable to the trainees. The evaluation study relied on replication and the principle of converging evidence from various sources to determine where differences existed between Spectrum and non-Spectrum classrooms.

Direct achievement data on students was, of course, impossible to obtain due to the large range of ages and subject matters taught in Spectrum classrooms. The strategy was to measure those traits of teachers and students which have strong relationships with student achievement. Among these are time spent on task (Rosenshine, 1976), teacher time spent with individuals (Anderson & Faust, 1973), less teacher domination of academic discussion (Flanders, 1970), attention (Lahaderne, 1968) and class pace

(Rosenshine, 1970). Three sources of data were used in this study: student and teacher questionnaires, both of which were administered both years of the evaluation study, and videotaped episodes of actual classroom instruction done by (Last line missing off paper.)

### Conclusions

Putting all of the evidence together, Hypothesis 1 is decisively confirmed. In two large studies Spectrum pupils described themselves as receiving more individual attention from teachers than did non-Spectrum pupils. In both years Spectrum teachers reported giving more individual attention than Control teachers. Finally, analysis of videotaped classroom episodes showed that Spectrum teachers spent over twice as much time ( $p < .005$ ) as Control teachers in academically oriented interactions with individual students. Conclusion: Spectrum teachers appear to give more individual attention.

Hypothesis 2 was clearly supported. Results of the chronometric analysis of the classroom videotapes showed that Spectrum teachers spent less than half as much time as Control teachers in such activities as disseminating information, lecturing, and reading aloud ( $p < .001$ ). Conclusion: Spectrum teachers appear to display less domination of academic discussions.

The results of the various phases of this evaluation are consistent with Hypothesis 3. In both 1975 and 1976 Spectrum students reported moving at a faster pace and paying closer attention than non-Spectrum students. Other trends in the student questionnaire data favoring the Spectrum and appearing in both years were fewer discipline problems, more time spent in hard work, and less wasted class time. All of these trends were also

seen in both years in the comparisons of the reports of Spectrum and Control teachers. (There was one negative trend in the data. In one of the two years, Spectrum students said they spent more time getting started to work than non-Spectrum students). The chronometric analysis of classroom videotapes indicated that slightly less time was wasted in Spectrum classes ( $p < .10$ ). Conclusion: There appears to be more efficient use made of class time in Spectrum classes.

The data are inconclusive, tending negative, with respect to Hypothesis 4. In both 1975 and 1976 Spectrum pupils had less favorable attitudes toward how their classes were run than non-Spectrum students. In 1975 there were other trends on attitude questions unfavorable to the Spectrum as well. However, the tide turned the other way in 1976. Spectrum teachers were then regarded as more friendly and trustworthy than Control teachers. Conclusion: No consistent effect of the Spectrum on student attitude has been clearly demonstrated.

We are in no position to conclude that the Spectrum caused the benefits just enumerated; however, it is certainly associated with characteristics (with the possible exception of attitude) known to be desirable. We judge that the results over two years and three types of data are consistent enough and strong enough to warrant full dissemination of this program. The Spectrum appears to aid teachers in implementing procedures and strategies known to contribute to high student achievement.

C.O.T.'s COMMENT:

We are puzzled and concerned that the data did not support hypothesis 4. We have two thoughts on this matter.

1. The students responded to the Questionnaire while the teachers were still in training. This means that the students did not always see their teachers at their best.
2. Since the Spectrum requires more precise behavior from students and calls for more production and responsibility from them, is it possible many students prefer not to engage in such procedures? Is it a reflection of the current cultural climate?
3. Do you have any thoughts?

## References

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