NRC
G/T

THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

University of Connecticut
City University of New York, City College
Stanford University
University of Virginia
Yale University

Promoting Student Achievement and Exemplary Classroom Practices Through Cluster Grouping: A Research-Based Alternative to Heterogeneous Elementary Classrooms

Marcia Lynne Gentry

January 1999
RM99138

Promoting Student Achievement and Exemplary Classroom Practices Through Cluster Grouping: A Research-Based Alternative to Heterogeneous Elementary Classrooms

Marcia Lynne Gentry

January 1999
RM99138

THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

The National Research Center on the Gifted and Talented (NRC/GT) is funded under the Jacob K. Javits Gifted and Talented Students Education Act, Office of Educational Research and Improvement, United States Department of Education.

The Directorate of the NRC/GT serves as an administrative and a research unit and is located at the University of Connecticut.

The participating universities include the City University of New York, City College, Stanford University, University of Virginia, and Yale University, as well as a research unit at the University of Connecticut.

University of Connecticut
Dr. Joseph S. Renzulli, Director
Dr. E. Jean Gubbins, Associate Director

City University of New York, City College
Dr. Deborah L. Coates, Site Research Coordinator

Stanford University
Dr. Shirley Brice Heath, Site Research Coordinator

University of Virginia
Dr. Carolyn M. Callahan, Associate Director

Yale University
Dr. Robert J. Sternberg, Associate Director

Copies of this report are available from:
NRC/GT
University of Connecticut
362 Fairfield Road, U-7
Storrs, CT 06269-2007

The work reported herein was supported under the Educational Research and Development Centers Program, PR/Award Number R206R50001, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the National Institute on the Education of At-Risk Students, the Office of Educational Research and Improvement, or the U.S. Department of Education.

Note to Readers...

All papers by The National Research Center on the Gifted and Talented may be reproduced in their entirety or in sections. All reproductions, whether in part or whole, should include the following statement:

> **The work reported herein was supported under the Educational Research and Development Centers Program, PR/Award Number R206R50001, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the National Institute on the Education of At-Risk Students, the Office of Educational Research and Improvement, or the U.S. Department of Education.**
>
> **This document has been reproduced with the permission of The National Research Center on the Gifted and Talented.**

If sections of the papers are printed in other publications, please forward a copy to:

The National Research Center on the Gifted and Talented
University of Connecticut
362 Fairfield Road, U-7
Storrs, CT 06269-2007

Please Note: Papers may not be reproduced by means of electronic media.

Promoting Student Achievement and Exemplary Classroom Practices Through Cluster Grouping: A Research-Based Alternative to Heterogeneous Elementary Classrooms

Marcia Lynne Gentry

ABSTRACT

In this monograph, a causal-comparative, longitudinal study of cluster grouping at the elementary level is described and recommendations are made based on findings. This study employed both quantitative and qualitative methodologies. The primary purpose of this study was to examine the effects of an existing cluster grouping program on the achievement and identification of students who participated in the program from third through fifth grade and to compare achievement with similar students who were not involved in a cluster grouping program. Descriptive and inferential statistics were used to address these areas. A secondary purpose of this study was to investigate the practices of the teachers who taught in the school using cluster grouping to help provide insight into their classrooms and the school, which was done using qualitative follow-up methods.

Results included more students being identified as high achieving during the 3 program years, achievement scores increasing within the school using cluster grouping, and a significant interaction between the treatment and comparison school in favor of the treatment school. Additionally, qualitative findings indicated that teachers used flexible grouping, gifted education strategies, had high yet realistic expectations of their students, and were involved in professional development in gifted education.

Promoting Student Achievement and Exemplary Classroom Practices Through Cluster Grouping: A Research-Based Alternative to Heterogeneous Elementary Classrooms

Marcia Lynne Gentry

EXECUTIVE SUMMARY

Cluster grouping is commonly recommended as a programming option for gifted and talented students, although little empirical research exists regarding its impact on these students, and no prior research has examined the effects of cluster grouping on all students. To examine the effects of cluster grouping on student achievement and identification over time, two separate graduation classes of students were included in the study. The treatment program included five classrooms per grade level, beginning in grade 3 and continuing through grade 5. One classroom at each grade level was designated for placement of the cluster of high achieving students, and other classrooms had clusters of students identified at other achievement levels.

The treatment school implemented a total school cluster grouping program that integrated gifted education with general education, which was why it was selected for this ex post facto study. Identification, achievement, and classroom practices data from all student and all teachers were analyzed to determine if the benefits of such a program might extend to all students and all classrooms.

First, trends in identification were examined. Second, student achievement in the school using cluster grouping was compared to a similar school that did not use cluster grouping. Finally, interviews and document review were conducted to determine the factors in the classrooms and school that may have influenced student identification and achievement.

Analyses of data found that more students were identified as *high achieving* each subsequent year, while fewer students were identified as *low achieving*. The majority of the teachers believed that the cluster grouping arrangement was responsible for the identification of an increased number of students who achieved at higher levels and for the decreased numbers of students who achieved at low levels each year, and that cluster grouping made it easier for them to meet the individual needs of all students in their classrooms. Placing the highest achievers together in one classroom restricted the range of achievement levels that each teacher had to teach and provided the opportunity for other students to grow and achieve at higher levels than they might have in a completely heterogeneous classroom. Teachers indicated that their expectations facilitated student growth.

Quantitative findings indicated that treatment school students had, both statistically and practically, significant growth in achievement and outperformed

comparison school students in total battery achievement scores. Though students from the treatment school began with lower achievement than the students in the comparison school, after 3 years in a cluster grouping program, the treatment school students outperformed their comparison school counterparts.

Qualitative analyses produced three core categories that may help explain the increased numbers of students identified as high achievers and the differences in achievement: the use of grouping, the impact of teachers, and the general school environment. High teacher expectations, use of gifted education strategies, and use of grouping may have influenced student achievement in the treatment school.

A summary of implications based on the findings of this study follows:

1. Cluster grouping used in conjunction with challenging instruction and high teacher expectations may improve how teachers view their students with regard to ability and achievement.
2. Cluster grouping may positively influence the achievement of all students.
3. Flexible achievement grouping used in conjunction with appropriately challenging curriculum should be considered when designing educational programs.
4. The use of gifted education "know-how" has the potential to improve general education practices.
5. Contrary to suggestions by many reformers, elimination of grouping may not be beneficial to students and teachers.
6. Professional development in gifted education should not be restricted to just those teachers responsible for students identified as gifted.
7. Heterogeneous grouping may not be the best arrangement for student placement in classrooms.
8. A well developed cluster grouping program can offer gifted education services to high achieving students, while helping teachers better meet the needs of all students.
9. Placing high achievers in one classroom can increase the chance that their needs will be met while offering the opportunity for talent among other students to emerge in the other classrooms.
10. Restricting the range of achievement levels in elementary classrooms can help teachers better address the individual needs of all learners.

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

List of Tables

List of Figures

Promoting Student Achievement and Exemplary Classroom Practices Through Cluster Grouping: A Research-Based Alternative to Heterogeneous Elementary Classrooms

Marcia Lynne Gentry

CHAPTER 1: Introduction

Much has been written on the subject of ability grouping. Ability grouping has been touted as an effective means for promoting student achievement and an evil force contributing to the downfall of America' s schools. During this raging controversy, teachers are doing their best to meet students' individual needs within their classrooms. With the recent and emotional calls for full scale elimination of ability grouping, the advent of full inclusion, the addition of few resources, and increased class sizes, many teachers have found meeting individual needs in the regular classroom nearly impossible. Study after study, and analysis after analysis on the subject of ability grouping has yielded conflicting information on this complex topic.

One problem is that the issues and intricacies surrounding ability grouping have been continually relegated to one side of an ugly argument: Ability grouping is either "bad" or "good." Neither could be further from the truth, thus the conflicting results. Ability grouping is not an easily investigated topic, nor are answers easily found. This is due to the wide range of variables found in the school settings under which ability grouping should be studied. Most teachers know that what goes on within the ability grouping makes it "good" or "bad." The same can be said for whole group instruction, cooperative learning, or use of inclusion or resource rooms.

Research on tracking has shown that students in higher tracks benefited from this placement, but students in the lower tracks did not. Conclusions were then drawn that placing the students in higher tracks caused the poor achievement of students in lower tracks. Logically, one must question whether this is indeed possible. How could those not present *cause* anything? Might it have been other factors that "caused" the performance in both groups, such as the quality of the teachers, their expectations, or the curriculum? Even so, research regarding tracking has became generalized to include all forms of ability grouping, though tracking and ability grouping are not synonymous.

Schools, classrooms, teachers, and students are complex entities, therefore making their study challenging at best, and the results ambiguous and inconclusive. Yet, programs must be studied in their full context to provide insight and understanding into their workings and possible effects. It is from in-depth examination of real programs in real schools, that opportunities to learn are presented.

It is for these reasons that this study examined existing use of cluster grouping in a small, rural school district in the Midwest purposefully selected for its innovative use of cluster grouping with students of all achievement levels in all classrooms grades 3 through 5. In the school, district administrators and teachers observed that during the 3 years students were in the program, more students were identified by teachers and achievement tests as *high achieving* or *above average*, and fewer students were identified as *low* or *low average*. This trend was actually observed since the implementation of cluster grouping in 1988. The sample of the study included two entire graduation classes of students as they progressed from second through fifth grade from the cluster grouping school and from a similar school that did not use cluster grouping nor a gifted program. Student identification and achievement were investigated as were teachers' classroom practices.

This study addressed the problem that, although cluster grouping is commonly recommended as a programming option for gifted and talented students, little empirical research exists regarding its effects on these students and their teachers. Furthermore, the limited extant research on cluster grouping examines the effect of cluster grouping on gifted and talented students, but not on the achievement of other students. Finally, a recent review of literature on effects of gifted programs revealed that in the past 20 years, only 10 studies have been published describing the effects of a gifted program over time (Cornell, Delcourt, Bland, & Goldberg, 1990).

Definitions

Because terms surrounding grouping are often attributed with different, conflicting definitions, and definitions that overlap or carry emotional weight, the following definitions are provided to clarify terms both as found in the literature and as used in this study.

Cluster Grouping, in General

Cluster grouping has a variety of definitions based on how it is implemented, but can generally be defined as placing several high achieving, high ability, or gifted students in a regular classroom with other students and a teacher who has received training or has a desire to differentiate curriculum and instruction for these "target" students (Gentry, 1996).

Cluster Grouping, as Applied by the School in This Study

Cluster grouping placed special needs students (high achieving, or those receiving special education or Chapter I assistance) in regular classrooms, in such a manner that the range of achievement levels all teachers must teach was reduced. Additionally, the classroom where the cluster of high achieving students was placed included no students who were above average in achievement. Clusters of above average students were placed in the other classrooms to ensure that each classroom had a group of students who were achieving at levels above average. All teachers had received inservice in gifted education strategies, and the teacher whose class had the high achieving cluster was selected by his/her colleagues and provided differentiated instruction and curriculum to these students as needed to meet their educational needs. Finally, both within and between these classes a variety of flexible grouping strategies were employed by the teachers.

Ability Grouping

Students of similar ability are placed together in groups for the purpose of modification of pace, instruction, and curriculum to address the needs of individuals who have different abilities in different curricular areas. Kulik (1992) warned that "benefits are slight from programs that group children by ability but prescribe common curricular experiences for all ability groups" (p. 21). Ability grouping can be done by subject, within classes or between classes, and for part of the day or throughout the day. In some applications of ability grouping composition of the groups changes while in others it does not.

Achievement Grouping

Similar to ability grouping, achievement grouping focuses on demonstrated levels of achievement by students. Achievement is viewed as something dynamic and changing. Like ability grouping, achievement or skill level grouping can be done by subject, within or between classes, part of the day, or all day. It very often takes place in a flexible manner as performance and achievement levels of students change (Renzulli & Reis, 1997).

Between Class Grouping

This occurs when students are regrouped for a subject area (usually within an elementary grade level) based on ability or achievement. Teachers instruct students working at similar levels with appropriately challenging curricula, at an appropriate pace, and with methods most suited to facilitate academic gain. For example, in mathematics one teacher may be teaching algebra to advanced students, while a colleague teaches pre-algebra to students not so advanced, and yet another teacher works with students for whom math is a struggle, employing strategies to enhance their success and understanding.

Within Class Grouping

Within class grouping refers to different arrangements teachers use within their classes. Groups may be created by interest, skill, achievement, job, ability, self-selection—either heterogeneous or homogeneous—and can include various forms of cooperative learning grouping arrangements. Flexible arrangements for within class grouping are the goal.

Tracking

Tracking is full-time placement of students into ability groups for instruction—usually by class and at the secondary level. In a tracked system, there is very little opportunity to move between the various tracks. Although tracking is not synonymous with ability grouping (Slavin, 1987a, 1990), tracking is often used interchangeably with ability grouping—even when ability grouping is done for only 1 or 2 subjects, within a class, at the elementary level, or is flexible. "[Tracking is] the practice of grouping students according to their perceived abilities . . . most noticeable or more commonly found in junior and senior high schools . . . the groups are sometimes labeled college bound, academic, vocational, general, and remedial" (McBrien & Brandt, 1997, pp. 97-98).

Flexible Grouping

Flexible grouping calls for use of various forms of grouping for instruction, pacing, and curriculum in such a manner to allow for movement of students between and among groups based on their progress and needs. Flexible grouping takes place when (a) there is more than one form of grouping used (e.g., interest-based, achievement, cooperative, within class, project, job, skill, heterogeneous, homogeneous) and (b) group membership in some or all of these groups changes according to the form of grouping used. When achievement grouping is used, it is especially important that changes are based on the academic needs of the students. Both critics and supporters of grouping agree that grouping should be flexible (George, 1995; Renzulli, 1994; Renzulli & Reis, 1997; Slavin, 1987b).

CHAPTER 2: Background of the Study

The background of this study will be presented in two sections. In the first section, a specific review of cluster grouping will be discussed and include the general background of cluster grouping, a review of research regarding cluster grouping, and the rationale supported by the literature for using cluster grouping as a total school program in elementary schools.

In the second section, a general overview of gifted education and its potential impact on general education will be provided. This is relevant because cluster grouping may be considered a separate program for gifted, but may affect the climate of the entire school.

General Background of Cluster Grouping

Cluster grouping is a widely recommended and often used strategy for meeting the needs of high achieving/gifted/high ability students in the regular classroom (Balzer & Siewert, 1990; Brown, Archambault, Zhang, & Westberg, 1994; Coleman, 1995; Davis & Rimm, 1985; Hoover, Sayler, & Feldhusen, 1993; Juntune, 1981; Kaplan, 1974; Kulik & Kulik, 1991; LaRose, 1986; Renzulli, 1994; Rogers, 1991; Winebrenner, 1992). It has gained popularity in recent years due to heterogeneous grouping policies and financial cutbacks that have eliminated special programs for gifted and talented students (Purcell, 1994).

Gentry (1996) noted many variations in definitions and applications of cluster grouping but found three common themes. First, groups of students (varying in number from 3 to more than 10) identified as gifted, high achieving, or high ability are placed in classrooms with students of other achievement levels. Second, cluster grouping differentiates curriculum for these students. Third, the teacher of the high ability cluster needs a background in working with gifted students. What is not found in the literature is the configuration of the "non-cluster" classrooms or how cluster grouping gifted students may affect the rest of the school population.

Cluster Grouping and Ability Grouping

Cluster grouping should be discussed in the broader context of ability grouping. Hundreds of studies regarding the positive and negative effects of ability grouping exist, and as many as 13 meta-analyses have been completed to interpret the varied findings of these studies (Rogers, 1991). Conflicting results, conclusions, and opinions exist regarding ability grouping. One only has to examine the recent journals and the number of special issues dealing with this topic (e.g., *Educational Leadership, Elementary Journal, Equity and Excellence, Gifted Child Quarterly, Journal for the Education of the Gifted, Kappan, Middle School Journal, Roeper Review*) to understand the emotion and controversy behind the issue of ability grouping. Opinions range from the belief that tracking is the cause of the downfall of America's schools (Oakes, 1985) to Kulik's (1992) conclusions that, without ability grouping, both high and low ability students would be harmed. Renzulli and Reis (1991) explained an important delineation between tracking and ability grouping when they described tracking "as the general and usually permanent assignment of students to classes taught at a certain level," and ability grouping as "a more flexible arrangement that takes into account factors *in addition* to ability, and sometimes in place of ability" (p. 31). Unfortunately, however, tracking and ability grouping are often used interchangeably in the literature when, in fact, they have different meanings and applications. A discussion of grouping is beyond the scope of this monograph, so the following section will address ability grouping as it relates to cluster grouping within the elementary schools. The intent is to provide a conceptual basis of cluster grouping within the context of a much larger discourse.

Cluster grouping is one form of within-class ability grouping as defined by Slavin (1987a), Rogers (1991), Kulik & Kulik (1987; 1991; 1992), and Kulik (1992). Ability grouping is not synonymous with tracking (Slavin, 1987a) and may take many forms beneficial to gifted learners, including cluster grouping (Kulik & Kulik, 1991). Additionally, schools employing a cluster grouping program may use between-class grouping in conjunction with within-class cluster grouping. An example of between-class grouping occurs when students are regrouped for instruction by demonstrated ability or achievement in math or reading. Slavin (1987b) listed three important advantages of regrouping for selected subjects over homogeneous ability grouped class assignments: (a) identification with students in the setting for most of the day reduces labeling effects, (b) achievement in reading or math determines group placement—not ability level, and (c) regrouping plans tend to be flexible. In their meta-analyses, Kulik & Kulik (1987) reported that within-class programs specifically designed to benefit gifted and talented students raised the achievement scores of these students. Slavin (1987a) reported that within-class ability grouping had a positive effect (.34 standard deviations) on the mathematics achievement of all students, with the most positive effect for students who achieved at low levels. He also stated that the within-class use of grouping for reading instruction may be necessary. After reviewing the effects of 13 different research syntheses on grouping, Rogers (1991) concluded that grouping students on the basis of academic ability and on the basis of general intellectual ability has "produced marked academic achievement gains as well as moderate increases in attitude toward the subjects in which these students are grouped" (p. xii). Despite many arguments for and against ability grouping, it appears from reviews of the research that grouping can help to improve the academic performance of students of all achievement levels if implemented with appropriate instruction and expectations.

For grouping to positively affect the academic achievement of students, more than a simple administrative grouping plan must exist. As demonstrated by the varied results from the meta-analyses studies on grouping, there is more to grouping than simply assigning students to groups on the basis of their ability or achievement levels. The studies that reported the largest effects were of programs that provided differentiation within ability groups (Kulik, 1992; Rogers, 1991). Rogers (1991) suggested it was unlikely grouping itself caused academic gains; rather, it was what happened within the groups causing the gains. Kulik (1992) found that bright, average, and slow youngsters benefited from grouping programs if the curriculum was appropriately adjusted to the aptitude levels of the groups. Accordingly, he recommended schools use various forms of flexible ability grouping. In discussing their meta-analytic findings on grouping practices, Kulik and Kulik (1992) concluded:

> If schools eliminated grouping programs with differentiated curricula, the damage to student achievement would be great, and it would be felt broadly. Both higher and lower aptitude students would suffer academically from elimination of such programs. The damage would be truly great if, in the name of de-tracking, schools eliminated enriched and accelerated classes for their brightest learners. The achievement level of such students would fall dramatically if they were required to move at the common pace. No one can be certain that there would be a way to repair the harm that would be done. (p. 73)

Research Regarding Cluster Grouping

Several analyses of studies regarding ability grouping in elementary schools have been completed (Kulik, 1992; Kulik & Kulik, 1984, 1985, 1992; Lou, Abrami, Spence, Poulsen, Chambers, & d' Apollonia, 1996; Rogers, 1991; Slavin, 1987a); however, only eight published studies could be found that examined the effects of ability grouping on gifted students in schools where a cluster grouping model was used (Delcourt & Evans, 1994; Delcourt, Loyd, Cornell, & Goldberg, 1994; Hoover et al., 1993; Ivey, 1965; LaRose, 1986; Long, 1957; Simpson & Martinson, 1961; Ziehl, 1962). Each of these studies was concerned with the effects of cluster grouping on gifted students, and none examined effects on students of other achievement levels. Although cluster grouping is commonly suggested as a programming option for gifted students, little evidence exists regarding its effects on these students, and no existing research examines the impact of cluster grouping on all students (Hoover et al., 1993), or on teachers' perceptions of other students' performance.

A review of the literature conducted by Kulik and Kulik (1991), identified four older studies that examined cluster grouping with respect to student achievement (Ivey, 1965; Long, 1957; Simpson & Martinson, 1961; Ziehl, 1962). Kulik and Kulik (1991) reported that the average effect size on the achievement of the students in cluster groups in these four studies was .62 standard deviations, and they concluded that this provided good evidence that gifted students who were given enriched instruction within otherwise conventional classes benefited from this arrangement. However, each of these studies is over 30 years old and may not apply to current educational settings. Clearly, a need exists for additional, current research in the area of cluster grouping.

Recent studies examining cluster grouping included survey research conducted by Hoover et al. (1993), a longitudinal description reported by LaRose (1986), an investigation of the effects of programming arrangements on student learning outcomes (Delcourt et al., 1994), and a qualitative extension of the Delcourt et al. study (Delcourt

& Evans, 1994). Hoover et al. completed a survey assessing perceptions of elementary teachers who were teaching cluster grouped classrooms about their implementation of cluster grouping, types of activities used with cluster students, and the effectiveness of cluster grouping. With a response rate of 48% (*N* = 22 districts and 96 teachers), Hoover et al. reported that, although cluster grouping was relatively new, teachers indicated they differentiated curriculum, used small group and project work, stressed thinking skills, and believed that cluster grouping was academically effective for gifted students. Additionally, Hoover et al. found that teachers believed cluster grouping benefited both gifted and non-gifted students.

LaRose (1986) described a cluster grouping program called the Lighthouse Program which employed a quota system for identification to ensure appropriate proportional representation of ethnic and socioeconomic groups of the students identified for the high ability cluster. Approximately 5% of incoming kindergarten students were identified, of which approximately half chose to enter the new Lighthouse Program. The other half remained in their home schools. Preliminary results compared "Lighthouse" seventh graders with "accelerated" seventh graders on a test of verbal creativity and found that the Lighthouse students outperformed the accelerated students at a statistically significant level. An additional comparison between ninth grade gifted minority students who participated in the Lighthouse Program and those who did not yielded differences in grade point averages in favor of the Lighthouse participants. LaRose found the results of cluster grouping were favorable for gifted students and indicated that cluster grouping provided a "happy compromise between self-contained, isolated gifted programs, and randomly placed, isolated gifted children" (p. 231).

Two related studies examined the effectiveness of various types of programming on the learning outcomes of gifted students. Delcourt et al. (1994) examined four programming arrangements for gifted students including Special Schools, Separate Classes, Pull-Out programs, and Within-Class programs and their effects on achievement and affective outcomes. This study examined 83 schools from 11 districts, and included one district that used cluster grouping, which was classified as a Within-Class program. This district and three others that did not use cluster grouping comprised the Within-Class program sample, which precluded the results from being generalized directly to cluster grouping. However, across all programs, gifted students from Within-Class programs received the lowest scores in all areas of achievement when compared to their gifted peers in the other programming options. Delcourt et al. concluded that "since Within-Class programs are a popular model in gifted education, their curricular and instructional provisions for the gifted must be carefully maintained lest they disintegrate into a no program format" (p. 77). This is a strong reason for maintaining teacher training coupled with appropriate instructional and curricular differentiation for the students in the high achievement cluster.

A follow-up study (Delcourt & Evans, 1994) examined exemplary elementary programs in gifted education from the four above mentioned programming arrangements. The district selected to represent the Within-Class program used cluster grouping in which students identified as gifted and talented were clustered into two classes per grade level in otherwise heterogeneous class arrangements. It was noteworthy that the only district using cluster grouping was selected as the best example of a Within-Class program for gifted students. The key variables identified in the exemplary programs were: Leadership, Atmosphere and Environment, Communication, Curriculum and Instruction, and Attention to Student Needs. In addition, the exemplary programs were found to influence student achievement and motivation through exposure to challenge and choices. The extent to which these themes are evident within a cluster grouping program may help explain both its success and its impact on student achievement.

Although there is some support from these limited studies that cluster grouping may be beneficial to high achieving students who are clustered together in a regular classroom, clearly, a need exists for quality investigations of cluster grouping that could estimate the degree to which cluster grouping meets the needs of gifted students as well as determine its effects on other students in the school.

Rationale for Cluster Grouping

It is surprising that so many professionals advocate the use of cluster grouping, but little research actually exists regarding its effectiveness. Perhaps cluster grouping is recommended in the absence of research specific to cluster grouping because the practice makes sense. Specific rationale upon which a quality cluster grouping program might be based is supported by the literature. If applied in a manner consistent with good practices described in the literature, cluster grouping is logical from a practical programming point of view. The following points provide rationale upon which any thoughtful implementation of cluster grouping might be based.

1. Students are clustered with their intellectual peers as well as their age peers (Bryant, 1987; Delcourt & Evans, 1994; Hoover et al., 1993; Rogers, 1991; McInerney, 1983; Oakes, 1985; Slavin, 1987b; Winebrenner, 1992).
2. It is more efficient for one teacher to plan for a group of five or more students than for five teachers to each plan for one student (Bryant, 1987; Kennedy, 1995; Winebrenner, 1992).
3. Cluster grouping allows full time services to be provided for gifted students without additional cost to the school district (Hoover et al., 1993; LaRose, 1986; Rogers, 1991; Winebrenner & Devlin, 1994).
4. The highest achieving students are removed from other classrooms, thereby allowing new achievers to emerge (Kennedy, 1989; Winebrenner, 1992).
5. High achieving students are placed with teachers who have expertise, training, and a desire to differentiate curriculum and instruction to meet their needs (Hansen & Feldhusen, 1994; Hoover et al., 1993; Kennedy, 1995; Kulik, 1992; Renzulli & Reis, 1985; Rogers, 1991; Winebrenner, 1992).

6. The range of achievement levels to be addressed within the classrooms of all teachers is reduced (Coleman, 1995; Delcourt & Evans, 1994; Rogers, 1993).
7. All staff benefit from the professional development and methods used with the high achieving cluster (McInerney, 1983; Winebrenner, 1992).
8. More efficient use of special education and Chapter 1 personnel is achieved by creating clusters of these students in one or two rooms instead of spreading them across five rooms (Schunk, 1987; Hallinan, 1988).
9. A high achieving or above average group of students can exist in every classroom (Gentry, 1996; Kennedy, 1989; Winebrenner, 1992).
10. High expectations for all students are maintained across all classrooms (Alderman, 1990; Brophy & Good, 1970; Fuchs, Fuchs, & Phillips, 1994; Good, 1981; Rosenthal, 1994; Rosenthal & Jacobson, 1968; Smith, 1980).

Concerns Regarding Cluster Grouping

Researchers from the field of gifted education as well as critics of gifted education such as Jeannie Oakes, Robert Slavin, and Paul George have expressed concerns regarding the general use of ability grouping, and more specifically regarding the use of cluster grouping. Concerns about the use of cluster grouping parallel those concerns about the use of ability grouping in general and include:

1. What effect does the loss of the brightest students from other classrooms have on the teacher and students in these classrooms (Hoover et al., 1993; Oakes, 1985; Slavin, 1987a)?
2. How are teachers selected for the cluster classrooms (Oakes, 1985; Slavin, 1987b)?
3. What effect does cluster grouping have on other students who may or may not be in the "cluster class" with regard to achievement, self esteem, and teacher expectations (George, 1988; Oakes, 1985, Slavin, 1987a)?
4. Does cluster grouping provide appropriate differentiation for gifted students (Delcourt & Evans, 1994; McInerney, 1983; Rogers, 1991; VanTassel-Baska, 1987; Westberg, Archambault, Dobyns, & Salvin, 1993)?

Use of Gifted Education Pedagogy to Improve General Education

Many researchers, policy-makers, and educators have called for the use of gifted education "know-how" with all students as a means of improving general education (Bloom, 1985; Goodlad, 1984; Hopfenberg & Levin, 1993; Renzulli, 1994; Renzulli & Reis, 1985; Schlichter, 1986; Tomlinson & Callahan, 1992; U.S. Department of Education, 1993; Williams, 1986). Renzulli (l993) believes two reasons explain why practices that have been a mainstay of gifted programs are being absorbed into general education to upgrade the performance of all students. The first reason concerns the limited success of remedial-oriented compensatory education programs and practices, and the second reason is the success of practices developed in gifted programs and the need for these practices in the regular curriculum. Gifted programs have developed an impressive menu of curricular adaptations, independent study, and thinking skill strategies that can be used to improve education for all students (Renzulli, l993; Renzulli & Reis, l991; Tomlinson & Callahan, l992; U.S. Department of Education, l993). These innovative strategies are often the basis of gifted education pedagogy and good enrichment teaching. The implementation of a cluster grouping program in which all staff members receive training in gifted education is a means by which gifted education pedagogy can be extended to the entire student population.

The federal report, *National Excellence: A Case for Developing America's Talent* (U.S. Department of Education, 1993) included the following goals: provide more challenging opportunities to learn, increase learning opportunities for disadvantaged and minority children with outstanding talents, broaden the definition of gifted, and emphasize teacher development. This report also emphasized the role gifted education programs have had on general education:

> Over the past 20 years, while the regular school program focused on basic skills and minimum standards, programs for gifted and talented students served as laboratories for innovative and experimental approaches to teaching and learning. A variety of educational options were developed in programming and scheduling. Many new programs focused on complex thinking strategies and problem solving and used sophisticated teaching strategies . . . developed alternative teaching strategies and interesting curriculum approaches . . . . Now many educators believe that the knowledge and experience that gifted education has gained . . . can be used to upgrade all of education and are calling for this to be done. (p. 23)

The report further called for the improvement of education for *all* of America's students and stated that schools must:

- Expand effective education programs and incorporate more advanced materials into the regular school program;
- Provide all students with opportunities to solve problems, analyze materials and situations, and learn form real-life experiences;
- Serve students identified as having outstanding talent in many places—the regular classroom, a special class, the community, at a university or a museum, in front of a computer, or anywhere the opportunity meets the need;
- Create flexible schools that enable all students, including the most able, to be grouped and regrouped according to their needs and interests. (p. 14)

Cluster grouping can meet these challenges and positively affect general education if designed in a manner that takes into account the learning of all students, not just the students identified and placed into the high achievement cluster. A cluster grouping program that places students into classrooms on the basis of achievement, and flexibly groups and regroups the students as needed for instruction (based on interests and needs) can provide appropriately challenging learning experiences for all students.

Teaching and Learning Reforms Suggested by General Education

Educational reform has called for changes in teaching and learning for some time, yet evidence exists that very little has changed for students in school. Despite frequent criticism and cries for reform, whole-class instruction with recitation and seat work has been the dominant approach to public school instruction since it first became established (Cuban, 1984, Good & Brophy, 1987; Goodlad, 1984; Grinder & Nelson, 1985). In his national study of schools, Goodlad (1984) reported a limited variety in pedagogy and further asserted that good pedagogy was seldom used. He found a narrow range of classroom activities that included listening to the teacher, writing answers, working at desks, and taking tests and quizzes. He stated:

> Only rarely did we find evidence to suggest instruction likely to go much beyond mere possession of information to a level of understanding its implications and either applying it or exploring its possible applications. Nor did we see activities likely to arouse students' curiosity or to involve them in seeking solutions to some problem not already laid bare by teacher or textbook. (p. 236)

Individualizing curriculum and instruction is often suggested in the literature, but is seldom found to occur. In their research, Grinder and Nelson (1985) found that adapting instruction to individual differences occurs infrequently due to pressures such as class size, age differences, availability of curricular materials and cost efficiency. Instead students are moved through an inflexible, lock-step curriculum—at the same pace, using the same materials, and the same whole group instruction. Archambault et al. (1993) investigated the classroom practices of a national sample of 1018 public school elementary teachers. Teachers responded to a survey and reported activities that occurred in their classrooms; providing insights into what teachers say they do in their classrooms. Little differentiation occurred for gifted students, but what the teachers reported they did for average students is of particular interest, which included providing these students with challenges and choices less than "a few times a month." A follow-up observation study (Westberg et al., 1993) corroborated these findings, and as in Goodlad's (1984) findings, this study found the major pedagogical strategies used by teachers to be lecture/explain, review, written assignments, and reading. Both Goodlad (1984) and Westberg et al. (1993) noted discrepancies between desired pedagogy and actual pedagogical practices in schools.

The national report, *A Nation at Risk* (National Commission on Excellence in Education, 1983) alerted the United States to the poor performance of American students when compared with students from other developed countries. Ten years later, the *National Excellence: A Case for Developing America's Talent* (U.S. Department of Education, 1993) reported that the highest achieving American students fare poorly when compared with similar students in other nations and only a small percentage of United States students are prepared for challenging college-level work. In a national study on curriculum compacting (Reis et al., 1993), no differences were found between treatment and control groups with respect to achievement when the treatment group had an average of over 40% of their curriculum eliminated across five subject areas. Further, in some curricular areas, students whose curriculum was compacted outperformed comparison students who received no compacting. Good and Brophy (1987) suggested that brighter students who master the curriculum more quickly should receive more enrichment or accelerated pacing, and slower students should be given extra instruction. They recommend that "all students should have the opportunity to explore strengths and interests and experience success" (p. 353). The United States Department of Education report, *National Excellence* (1993) cited two major implications of unchallenging standards in American education:

> We know that high expectations produce higher achievement. Yet our expectations for most American students remain at minimum levels of academic competency. We fail to provide opportunities for student to perform at high levels and then lament that few of our youngsters excel . . . .
>
> Only a challenging educational environment that elevates standards for everyone can create the schools our students need to take their places in tomorrow's world raising the ceiling of expectations for all students, providing challenging opportunities for students with outstanding talent—herein lies the key to better schools. (p. 14)

It is clear that a discrepancy exists between what takes place in schools for students with regard to challenge and instructional strategies and what should take place if American students are to compete in a global market place. Renzulli (1994) stated, "We know that all learning improves when schools are perceived as being enjoyable, relevant, friendly places where students have some role . . . deciding what they will learn, and how they will pursue topics in which they may have a special interest" (pp. 20-21). A gifted program, such as cluster grouping, that infuses challenges, choices, and students' interests into the curriculum and school day might affect the practices of the teachers and the achievement of the students.

Summary

Cluster grouping is one programming practice recommended by educators of gifted and talented students. When viewed in the larger context of school reform and expanding the services in gifted programs to all students, cluster grouping has benefits that may reach teachers and students beyond those in a traditional gifted program. In a school that uses cluster grouping, all teachers may be affected through staff development opportunities that may have previously been limited to just those responsible for educating gifted students in a special program. Since cluster grouping involves more general education staff members and may involve rotating teachers responsible for the high achievement clusters, the training of all teachers in curricular and instructional differentiation techniques is important. This training might "spill over" into practices with all students, and in turn positively influence the achievement of various groups of students.

Because cluster grouping places the highest achieving students in one classroom and affects the composition of all other classrooms, it affects all students and teachers in a school. Therefore, cluster grouping should not be viewed as only a program for gifted students, but as a total school program. Through staff development, flexible placement, and grouping integrated with the regular school structure, cluster grouping offers a means by which instruction and achievement may be improved. Considering the widespread practice of cluster grouping, the small research base supporting its use, and its possible implications for school reform and student achievement, further investigation of the effects of cluster grouping programs is warranted. With the study of cluster grouping, its effects on student achievement and teacher practices can be better understood.

CHAPTER 3: Methodology

In this section, methods and procedures employed in this study of cluster grouping are described, including the research questions, research design, sample, instrumentation, treatment, which includes an overview of how the treatment site implemented cluster grouping, and the procedures used for collecting and analyzing both the quantitative and qualitative data.

Research Questions

In 1988 the total school cluster grouping model was implemented in the treatment school selected for this study. Since that time, a trend regarding the identification of students was observed by the program coordinator, district administrators, and teachers. Specifically, during the 3 years students spent in the total school cluster grouping program, more students were identified by teachers as *high achieving* or *above average* and fewer students were identified as *low* or *low average*. This observed trend, together with the paucity of research on cluster grouping, lead to the following research questions:

1. Is cluster grouping related to teacher perceptions of student achievement as measured by teacher identification categories?
2. How do students in the school using cluster grouping compare with students from a similar school who are not involved in cluster grouping after adjustment for initial differences with regard to achievement?
3. What factors exist within the classrooms and the school using cluster grouping that may influence student achievement?

Research Design

This longitudinal study used a causal-comparative design and employed both quantitative and qualitative methodologies applied to two data sets: students from the Class of 2000 and the Class of 2001 from small, rural school districts. The first two research questions were addressed with an ex-post facto, quasi-experimental, non-equivalent comparison group design (Borg & Gall, 1989). The third research question was addressed using qualitative methods (Strauss, 1987; Strauss & Corbin, 1990).

Sample

The sample is discussed in the three following sections. Students from the treatment and comparison districts are described, as well as the districts and the rationale for their selection. Finally, the teachers and administrators from the treatment school who where involved in the qualitative follow-up interviews are discussed.

Students

Purposive sampling was used in this study. The treatment sample included all students from a rural district who attended the school and participated in cluster grouping from grades 2 through 5 during the years 1989 through 1993 (97 students from the Class of 2000 and 101 students from Class of 2001). The comparison sample included all students from a similar school district that did not have a program for gifted students and had never used cluster grouping. Like the treatment school students, these students attended grades 2 through 5 in 1989 through 1993 (68 students from the Class of 2000 and 69 students from the class of 2001). Students from both treatment and comparison schools for whom achievement data were not available for grades 2, 3, 4 and 5 were eliminated from the analyses.

Districts

The treatment site was selected because the students were involved in an innovative application of cluster grouping for a period of 3 years, which enabled an examination of the effects of the program over time. The program was innovative in that it considered the achievement levels of all students and had been designed to include all students. Additionally the program had been operating successfully (as defined by the district) in this school since 1988, thereby allowing the investigation of a successful program in a real school setting.

The comparison school in another school district was purposively selected based on its similarity to the treatment school with regard to the following demographic factors: geographic region, socioeconomic status, ethnicity, school configuration, and size (see Table 1 for demographic factors). In addition, the comparison district did not have a program for gifted students, had never used cluster grouping, but had achievement data for students from the Class of 2000 and the Class of 2001 when they were in grades 2 through 5 (1989 through 1993) that was made available for this research.

The Classes of 2000 and 2001 were selected because data could be obtained from both the treatment site and comparison site to compare the students' academic achievement. Other districts though willing to make achievement data available, had changed tests, used non-comparable measures of achievement, or had not measured achievement on a yearly basis. Direct comparison between students over the period of 4 years in these districts was impossible.

Teachers and Administrators

The sample also included teachers and administrators from the treatment site who were involved in the program. Follow-up interviews were conducted with 14 of the original 15 grade 3-5 teachers and with 3 of the original 5 administrators involved with the program.

Table 1

Demographic Factors Upon Which Treatment and Comparison Schools Were Matched

Factor	Treatment School	Comparison School
Geographic Region	Rural Midwest	Rural Midwest
Ethnic Composition	White, <1% minority	White, <1% minority
Student Population*	1499	1202
Socioeconomic Status*	Low	Low
School Configuration	1 elementary school K-5 5 classes/grade level	1 elementary school K-6 4 classes/grade level
Pupil to Teacher Ratio*	20:1	21:1
Milage Rate* (mils levied for school taxes)	30.28	34
Per Pupil Revenue*	$3704	$4071
Total General Fund expenditures per pupil*	$3762	$4119
Rank in State for Spending on basic needs programs* (out of 524 districts)	503rd	491st

*Source: 1992-93 Bulletin 1014 (Michigan Department of Education, 1994).

Instrumentation

Student achievement in the treatment school was measured on a yearly basis using the *Iowa Tests of Basic Skills* (*ITBS*), Form G, Spring 1985 norms (Hieronymus, Hoover, & Lindquist, 1984). The *ITBS* is a nationally recognized achievement assessment of the highest quality. For Form G, the internal consistency and reliability coefficients are in the expected range of mid .80s to low .90s, and the stability reliabilities with a 1 year interval range between .70 to .90 (Willson, 1989). Willson reported that evidence of criterion-related validity was supported by reports of correlations between the *ITBS* and the *Cognitive Abilities Test* (Thorndike & Hagen, 1986). For the present study, normal curve equivalent (NCE) scores were gathered for each student in total battery from grades 2 through 5.

The comparison school measured student achievement on an annual basis using the *California Achievement Test* (*CAT*), Form E, 1984-85 norms (CTB/McGraw-Hill, 1984). The NCE scores for each student were collected in total battery from grade 2 through grade 5. The *CAT* is also considered to be a high quality achievement test. Airasian (1989) reported internal consistency reliabilities for Form E in the high .80s and low .90s with the standard error indicating reliable score levels above grade 1. He reported stability reliabilities for the *CAT* in the .80 to .95 range, and stated that the *CAT* "compares very favorably to other achievement batteries of its genre such as . . . the *Iowa Tests of Basic Skills*" (p. 128). Thus, while the content of these two standardized tests is not identical, the NCE scores provided an achievement standing relative to the respective test's norm in a group. These data provided sufficient achievement information to control for initial differences between the groups prior to the beginning of the intervention.

Due to the ex post facto nature of this study, available instrumentation was used. Obtaining a comparison school was difficult for many reasons. First, the comparison school must have had standardized achievement data that was measured yearly using the same nationally normed, standardized measure. Second, the district had to be willing to provide these data to the researcher. Finally, the school had to be similar to the treatment school, but not have had special programming for gifted or have used cluster grouping. Finding a comparison school that administered the same measures of student achievement was impossible. Therefore NCE scores across the two tests, the *ITBS* and the *CAT*, were used for comparisons. Initial differences were controlled for by using the grade 2 scores as a covariate to statistically equate the groups. Given that both the *ITBS* and *CAT* are nationally normed and reliable, changes in mean achievement were observed and compared on the basis of NCE scores. Although not optimal, the relative large number of students in the study, the use of ANCOVA, and the use of NCE scores allowed for comparison of student achievement as measured on the *ITBS* and the *CAT*.

The semi-structured interview protocol used in the study was based on the themes identified by Delcourt and Evans (1994) (Leadership; Atmosphere and Environment; Communication; Curriculum and Instruction; Attention to Student Needs) and the factors identified by Archambault et al. (1993) (Questioning and Thinking; Providing Challenges and Choices; Reading and Written Assignments; Curriculum Modifications; Enrichment Centers; Seatwork) that addressed the classroom practices and school environment of successful programs for gifted students. Coupled with document review, these interviews enabled triangulation of data, a technique that provides checks for both reliability and validity of data through the comparison of multiple sources (teachers, administrators, non-human) and data collection methods (documents, surveys, and interviews) (Mitchell, 1986; Smith, 1975).

The Treatment: What Took Place in the School Using Cluster Grouping

The background of the treatment program is discussed in two phases. First, the actual process of identifying and placing the students into classrooms is described, followed by a general overview of the philosophical approach of the program concerning the education of the students. Cluster grouping in the treatment district began in 1988 after one year of planning. The students in this study were involved in the cluster grouping program between the 1989-90 and 1993-94 school years.

Identification, Placement, and Classroom Configurations

The cluster grouping program, based upon the rationale found in the literature, has been in existence since 1988 and continues today with the original faculty, curriculum, and identification procedures. This application of cluster grouping was designed to meet the needs of the high achieving students, to improve the educational experiences of all students, and to organize the teachers' classrooms by placing students in their classes in a manner that might help them to meet diverse student needs. In this program, not only were high achieving students identified and clustered in one classroom with a teacher who had received professional development to meet their needs, but so were special needs students. Clusters of Chapter 1 students and special education students were placed in classrooms with teachers who had received professional development to work with these students and who were provided with assistance for meeting individual needs. Additionally, clusters of above average students were intentionally placed in classrooms that did not have the high achieving cluster of students; *therefore a group of students achieving at above average levels existed in every teacher's classroom.* Flexible grouping occurred both between and within classes. This program included flexible identification, placement of students conducted on a yearly basis, plus flexible grouping and regrouping of students for instruction once they were placed in the classrooms.

Near the end of each school year, prior to the administration of the *Iowa Tests of Basic Skills* (*ITBS)*, second, third, and fourth grade teachers participated in the following identification and placement process:

1. Teachers rated their students' academic performance as *high achieving, above average, average, low average,* or *low.*
2. Teachers indicated the students identified for special education services and those identified for Chapter 1 assistance in math or reading.
3. Teachers also noted students believed to pose behavior problems.
4. Student scores on the *ITBS* were compared with teachers' ratings, and the discrepancies were discussed.

By using both teacher ratings and achievement scores, a system of checks and balances was developed. It was possible for a student who didn't test well to be identified as *high achieving* or *above average* on the basis of his/her classroom performance, or conversely, a student whose classroom performance did not reflect his/her ability could be identified as *high achieving* or *above average* on the basis of achievement scores. There were no cut-off scores used in this identification process.

At the end of grade 2, a brochure was sent home to all parents describing the cluster grouping program and asking for parent nominations of academically advanced students who should be considered for placement in the *high achieving* cluster. A nomination form based on the *Scales for Rating the Behavioral Characteristics of*

Superior Students (Renzulli, Smith, Callahan, White, & Hartman, 1977) was included with the brochure. Additionally, although parents were allowed to request specific teachers for their students, it was understood that requests might not be honored for the three teachers who taught the classrooms with the *high achieving* cluster due to placement constraints. Information from teachers, the *ITBS*, and parents were considered as the coordinator drafted the class lists. In developing the class lists, the goals were to:

1. reduce the number of achievement groups that each teacher had in his/her classroom while maintaining somewhat heterogeneous classes,
2. place a group of above average students in every teacher's classroom,
3. cluster the high achieving students in one classroom,
4. cluster the students needing special services in classrooms with resource personnel assistance,
5. honor parental requests for specific teachers,
6. evenly distribute behavior problems among all classrooms,
7. involve the teachers in developing the class lists.

With these goals in mind, the coordinator—with the help of the building principal—developed a draft list of students in five classrooms per grade level. This draft included student names, identification categories, and special designations such as "behavior problem" or "parent request." A meeting was then scheduled with current teachers to review the draft of next year's class lists. The principal, counselor, coordinator, and current teachers who had identified the students according to above mentioned categories attended the meeting. The teachers had the opportunity to review draft placements and make changes according to what they thought would be the best placement for the students. The personalities of students and teachers were taken into account, as were learning and teaching styles and behavioral and discipline issues. Drafts of classroom placements were changed based on teacher input, and a meeting was arranged to approve the final draft. An asterisk was placed by the names of students who were placed into a classroom because of a behavior problem, a teacher recommendation, an individualized educational plan (IEP), a parent request, or who were placed in special clusters such as the *high achieving*, *special education*, or Chapter 1 clusters. This designation indicated that the placement was permanent and any changes in classes made during the summer could not involve this student. Any future changes were made between parallel achievement levels. For example, an *average* student could be exchanged with an *average* student, but not with an *above average* student. This system helped to prevent changes that might unfairly load a teacher's classroom with students with behavior problems or students who achieve at below average levels.

Within this system of identification and placement, there were no cut-off scores or specific numbers of students in each achievement identification category. The students were simply identified and placed into classes by the people who knew them best and who had their best interests in mind. Consequently, there was variation from year to year and class to class in the number of students identified in all achievement levels. The identification categories were used primarily for placement and were not designed for instructional purposes, nor were they permanent. However, the students identified as *high achieving* and clustered together were provided with curricular differentiation by the teacher responsible for this class. This was also true for students who received Chapter 1 assistance or special education services. Thus, in effect, these special needs students were targeted for services.

Actual classroom configurations were arranged in a particular manner. Table 2 depicts an example of how five classes might have looked in a typical third grade placement year. With five classrooms per grade level and an average class size of approximately 24 students, the first class would have about 8 *high achieving* students, 8 *average* students, and 8 *low* or *low average* students. Deliberately, there were no *above average* students placed in this class, which allowed the *above average* students to be the highest achievers in the other four classrooms, thereby encouraging them to achieve. The second and third classes would include about 6 *above average* students, 10 *average* students, and 8 *low* or *low average* students. The fourth class would include about 6 *above average* students, 10 *average* students, and a cluster of *special education* students with the remainder made up of *low* or *low average* students. The teacher for this class would have the assistance of a special education teacher-consultant most of the day. The fifth class would include about 6 *above average* students, 10 *average* students, and a cluster of 8 *Chapter 1* students who would receive assistance from instructional aides for the majority of the day within the regular classroom setting. This example illustrates how the students were placed into classes by identification categories, although actual placement and numbers of students varied from year to year depending on the students' needs and achievement levels.

Table 2

Sample Third Grade Classroom Configuration Using Cluster Grouping Placement

	Classroom 1	Classroom 2	Classroom 3	Classroom 4	Classroom 5	Total
High Achieving	8	0	0	0	0	8
Above Average	0	6	6	6	6	24
Average	8	10	10	10	10	48
Low Average	8	8	0	2	0	18
Low	0	0	8	0	8*	16
Special Education	0	0	0	6	0	6

*Cluster of Chapter 1 Students.

By using these procedures for placing students into classrooms each year, the goals for developing the classes were met. There was a reduction in achievement ranges within the classrooms, the highest achievers were placed together in one classroom, each classroom had a group of above average students, special needs students were placed together in classroom with instructional assistance provided for the classroom teachers, parental requests were honored, and behavior problems were evenly distributed among the classroom. In addition, to create ownership of the cluster program, teachers were involved in the initial and final placement decisions.

Program Philosophy, Practices, and Professional Development

All teachers involved in the cluster grouping program were provided with a general overview of gifted education and talent development based on the three-ring conception of giftedness (Renzulli, 1978) and the Enrichment Triad Model (Renzulli, 1977; Renzulli & Reis, 1985). The three-ring conception of giftedness views giftedness as a behavior that results from the interaction of three traits: above average ability, task commitment, and creativity. When the three traits interact and are brought to bear upon a specific human endeavor, gifted behavior occurs. Renzulli believes that gifted behaviors can be developed in students who are given appropriate opportunities to develop their strengths and interests. He proposed the Enrichment Triad Model as a means for developing talent in more students. In this model, three types of enrichment activities are provided for students, and there is an interaction among these types of enrichment. Type I Enrichment consists of general exploratory activities designed to expose students to a variety of topics and areas of study not ordinarily covered in the regular curriculum. Type II Enrichment consists of group training in thinking and feeling processes; learning-how-to-learn skills; research and reference skills; and written, oral, and visual communication skills. Type III Enrichment consists of first-hand investigations of real problems. The Enrichment Triad Model is based on ways in which people learn in a natural environment, rather than the artificially structured environment that characterizes most classrooms.

When the cluster grouping program was adopted, all teachers were involved in two, half-day inservice training sessions regarding the approach to cluster grouping described above that had been developed by Bessie Duncan and used successfully in Detroit Public Schools. After these inservices, seven interested teachers made visitations to the Detroit site. Annual inservices in gifted education were also provided to teachers including curriculum compacting, curricular and instructional differentiation, enrichment, and thinking skills. Opportunities to attend regional, state, and national conferences on gifted education were made available to all teachers, and 10 of the 15 teachers attended at least one of these conferences. Finally, there was collaboration between the teachers of the *high achieving* cluster and their colleagues.

The teachers who would be responsible for teaching the *high achieving* cluster were selected by the staff and administration. Teachers who wanted to teach these classes volunteered. One teacher had been involved with gifted education for many years and had taught a self-contained room of fourth and fifth grade gifted students for 5 years prior to the districts' adoption of the cluster grouping program. The second and third teachers who volunteered had been involved in many of the gifted and talented workshops, and one was the parent of two gifted daughters. Parents of academically advanced students often requested placement of their children in these teachers' classrooms because of the willingness to develop activities to challenge and stimulate these students. Three teachers volunteered and none of the other faculty members wanted to teach the *high achieving* cluster students. Each of these teachers took classes in gifted education and attended countless workshops to improve methods for working with high achieving students. These assignments were reconsidered on a yearly basis with the understanding that anyone who was interested would be given the opportunity to teach this class if they would be willing to attend workshops or classes related to meeting the needs of high achieving students. Each year there was consensus among the staff that the teaching assignments should remain as they were. There had been one new teacher of the *high achieving* cluster, as of the 1994-95 school year, when the previous cluster teacher took a position in the district's middle school.

CHAPTER 4: Analyses and Results

In this section, the results and the analyses of the data collected in this study of cluster grouping are described. This study consisted of two phases. In the first phase, data on the identification, placement, and achievement of students from the treatment school and on achievement of students from the comparison school were collected and analyzed. In the second phase, the researcher collected and analyzed qualitative data through interview and document review to provide insights into the quantitative findings.

Phase One: Quantitative Analyses and Results

For the quantitative analyses, BMDP and SPSS statistical software packages were used. An initial screening of the data was done, and results of evaluation of normality, homogeneity of variance, skewness, and appropriateness of the covariate were satisfactory. The assumptions of equal regression slopes and linearity were also investigated and found to be met.

Research Question One: Is Cluster Grouping Related to Teacher Perceptions of Student Achievement as Measured by Teacher Identification Categories?

To address research question one, data were collected on student identification categories for placement in the cluster grouping program. As described previously, each year students were identified as *high achieving, above average, average, low average, low,* or *special education,* and placed into classrooms accordingly. Student identification was documented yearly at placement meetings and was collected for their third, fourth, and fifth grade years. Tables 3 and 4 include frequencies of student placements by grade level for the Class of 2000 and the Class of 2001. As shown in these tables, the number of students identified as *high achieving* increased from 10 to 23 for the Class of 2000, and from 13 to 24 for the Class of 2001 from grade 3 through grade 5. By grade 5, the classroom with the *high achieving* cluster was comprised solely of students identified as *high achieving*, whereas the remaining four rooms still contained students of mixed achievement levels, and each had a group of *average* and *above average* students. For the Class of 2000, the number of students identified as *above average* or *high achieving* increased from 26 students in grade 3 to 43 students in grade 4 to 48 students in grade 5. For the class of 2001, the number of students identified as *above average* or *high achieving* increased from 41 in grade 3 to 45 in grade 4 to 49 in grade 5. Clearly, the number of students who were identified as belonging to categories that were above average increased during the 3 program years. Figure 1 depicts the changes in the number of students identified as *high achieving* for both data sets during the 3 program years.

Table 3

Class of 2000: Frequencies of Students Assigned to Classrooms According to Achievement Levels

ID Category	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade Total
	3A	**3B**	**3C**	**3D**	**3E**	**3**
High Achieving	10	0	0	0	0	10
Above Average	0	4	4	3	5	16
Average	9	8	7	7	4	35
Low Average	3	2	4	7	4	20
Low	0	4	2	2	0	8
Special Education	0	3	1	2	2	8
Total	22	21	18	21	15	97
	4A	**4B**	**4C**	**4D**	**4E**	**4**
High Achieving	13	0	0	0	0	13
Above Average	0	8	9	8	5	30
Average	6	6	5	10	8	35
Low Average	0	1	2	0	1	4
Low	0	1	3	0	2	6
Special Education	1	2	4	2	0	9
Total	20	18	23	20	16	97
	5A	**5B**	**5C**	**5D**	**5E**	**5**
High Achieving	23	0	0	0	0	23
Above Average	0	7	7	5	6	25
Average	0	6	10	5	2	23
Low Average	0	3	2	4	7	16
Low	0	0	0	0	0	0
Special Education	0	5	1	3	1	10
Total	23	21	20	17	16	97

Note. The total numbers reflect only the students who attended school for the 3 full years of the program. The actual class size averaged 25 students.

Table 4

Class of 2001: Frequencies of Students Assigned to Classrooms According to Achievement Levels

ID Category	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade/ Classroom	Grade Total
	3A	**3B**	**3C**	**3D**	**3E**	**3**
High Achieving	15	0	0	0	0	15
Above Average	0	7	9	6	4	26
Average	4	4	6	9	4	28
Low Average	0	1	1	0	0	2
Low	1	4	9	5	5	24
Special Education	0	4	0	1	0	5
Total	20	20	25	21	14	100
	4A	**4B**	**4C**	**4D**	**4E**	**4**
High Achieving	15	0	0	0	0	15
Above Average	1	9	7	6	7	30
Average	7	3	6	6	5	27
Low Average	0	5	3	6	6	20
Low	0	0	0	2	0	2
Special Education	0	2	4	0	0	6
Total	23	19	20	20	18	100
	5A	**5B**	**5C**	**5D**	**5E**	**5**
High Achieving	23	0	0	0	1	24
Above Average	0	7	7	5	6	25
Average	0	4	5	8	4	21
Low Average	0	3	5	5	5	18
Low	0	2	2	2	1	7
Special Education	0	3	0	2	0	5
Total	23	19	19	22	17	100

Note. The total numbers reflect only the students who attended school for the 3 full years of the program. The actual class size averaged 25 students.

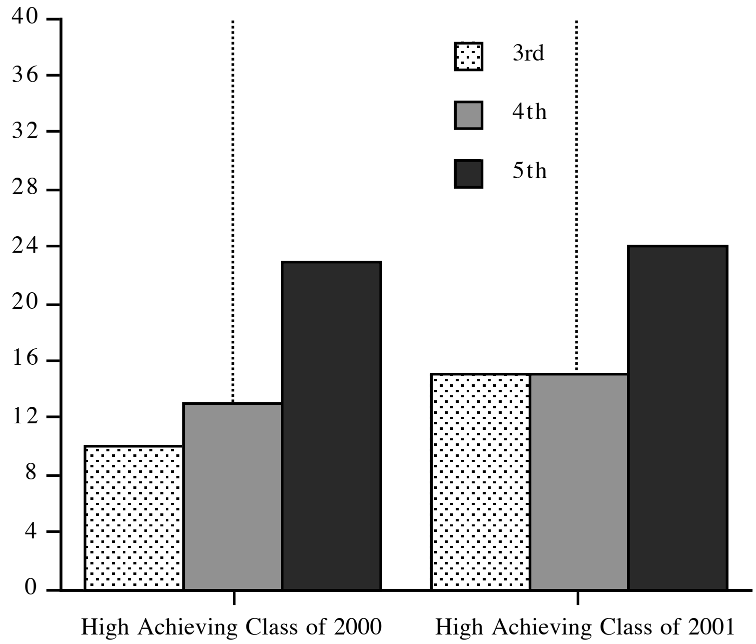

Figure 1. Changes in high achievement identification from grade 3 to grade 5 for students in the class of 2000 and the class of 2001.

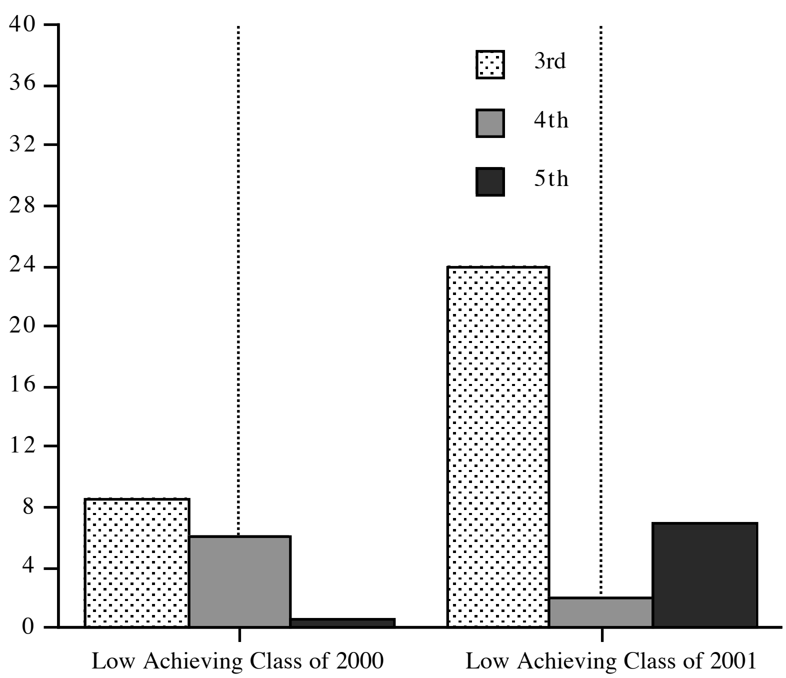

Figure 2. Changes in low achievement identification from grade 3 to grade 5 for students in the class of 2000 and the class of 2001.

It is interesting to notice that although the number of students identified as *high achieving* increased during the 3 program years for both classes of students, the number of students identified as *low achieving* decreased during the same time period. The Class of 2000 had 8 students identified as *low achieving* in grade 3, but none were identified as *low achieving* by fifth grade. Similarly, for the Class of 2001, 24 students were identified as *low achieving* in grade 3, and only 7 students were identified as *low achieving* in grade 5. Figure 2 depicts changes in the frequencies of students identified as *low achieving* during the 3 program years.

With regard to individual students' identification categories and how they changed during the 3 program years, the number of students whose identification category increased, decreased, did not change, or varied were tabulated for each of the two data sets. An increase in identification category was defined as moving up, for example, from *average* to *above average*, during the course of the 3 program years. A decrease was defined as moving down, for example, from *high achieving* to *above average* during the course of 3 years. "No change" was used to describe those students whose identification category remained constant for each of the 3 program years. Students whose identification category changed, but did not increase or decrease as described above, were counted as "varied" with respect to identification changes. These students included those who, for example, might have been identified as *low average* in grade 3, *average* in grade 4, and *low average* again in grade 5.

As indicated in Table 5 a large percentage of students in both classes either increased or remained the same with regard to their identification categories. For the Class of 2000, 47% of the students' identification categories increased, and for the Class of 2001, 34% of the students' identification categories increased, whereas, only 3% and 9%, respectively, of these students' identification categories decreased during the 3 program years.

Table 5

Percentages of Changes in Identification Categories Over 3 Program Years for the Classes of 2000 and 2001

	Class of 2000*	Class of 2001**
Increased	47	34
Decreased	3	9
No Change	40	45
Varied	9	12

*N = 97. **N = 100.

In summary, it is evident that the identification categories changed during the time the students were involved in the program, with more students being identified as *high achieving*, and fewer students identified as *low achieving*. In addition, a large percentage of students had their identification categories increase as compared with a small number of students whose identification categories decreased.

Research Question Two: How Do Students in the Cluster Grouping School Compare With Students From a Similar School Who Are Not Involved in Cluster Grouping After Adjustment for Initial Differences With Regard to Achievement?

Repeated Measures Analyses

A between-subjects repeated measures analysis of covariance was performed on the dependent variables of total battery student achievement for grades 3, 4, and 5, as measured by NCE scores on the *ITBS* and the *CAT* for the treatment and comparison schools. The independent variable was school (treatment or comparison). Second grade total battery achievement scores were used as the covariates because these scores measured student achievement prior to the beginning of the cluster grouping intervention.

The covariates (significant at $p<.05$) were used to account for initial differences between the groups, because purposive sampling made randomization impossible. The relationship between the each independent variable and the covariate was explored using a correlation for each data set (Class of 2000 r = -.20 {4% of the variance} and Class of 2001 r = -.04 {.16% of the variance}). Cohen (1988) defined both of these variance measures as small effect sizes. These results indicate that the covariates are not highly correlated with the grouping variable, and that the likelihood of Type II error is small, but still exists because the covariates explain 4% or .16% of variance in the independent variable that might otherwise be explained by the dependent variable.

Greenhouse-Geisser adjustments were used to address the issue of homogeneity of covariance associated with repeated measures designs. Violations of this assumption were small, as indicated by small Greenhouse-Geisser adjustments to degrees of freedom and alpha levels.

The Class of 2000 data set (N = 165) had 10 students from the treatment site who were missing scores during the 4 years, while no students from the comparison site had missing scores. The Class of 2001 data set (N = 170) had no students with missing data. In developing the data sets, only data from students who attended the schools for the period of 4 years between second and fifth grade were included because the effects of the program over the entire time of the program were being examined. The students with missing scores had attended the school for 4 years and were missing scores from one or more testing occasions.

The NCE scores for each student on the total battery (*ITBS*: treatment; *CAT*: comparison) were used in two repeated measures analyses of covariance, one for the Class of 2000 and one for the Class of 2001. Students were statistically equated on achievement using the grade 2 scores as the covariate (significant covariate at $p<.05$). For each significant finding, effect sizes in the form r^2 were calculated and evaluated to determine practical significance according to Cohen (1988). After adjustment by the covariate, for the Class of 2000, there was a significant difference between schools on total battery scores ($F = 18.05$, df = 1,152, $p<.0001$; E.S. $r^2 = .037$ {small} and a significant interaction between school total battery scores and time ($F = 23.11$, df = 2, 306, $p<.0001$; E.S. $r^2 = .13${large}). Time was not a significant main effect. For the Class of 2001 the main effects of school and time were not significant and the interaction between schools on total scores over time was significant ($F = 22.24$, df = 2, 336, $p<.0001$; ; E.S. $r^2 = .12$ {large}). Interaction plots of adjusted means are depicted in Figures 3 and 4.

To explain the findings a-priori contrasts were planned. First, the differences between the schools were investigated by comparing adjusted means as students progressed from grade 3 to grade five. Second, the changes in student scores over time (between grades 3, 4, and 5) within both the treatment and comparison schools were investigated. These contrasts were done for both data sets and the results are explained in the following sections.

Contrasts: Between Schools

The first set of contrasts compared the achievement of students in total battery NCE scores by grade level between schools. In each case, the total battery score was the dependent variable, school was the independent variable, and the grade 2 total battery score was the covariate. Therefore, for each data set, three contrasts were performed.

Table 6 includes the results of these contrasts for both the Class of 2000 and the Class of 2001. As indicated in Table 6, after adjustment for initial differences, on average, there was no significant difference between comparison and treatment school students' scores in grade 3 (*M*(comparison) = 50.63, *M*(treatment) = 53.00), yet in grades 4 and 5 treatment school students scores were significantly higher than comparison school students (Grade 4: *M*(comparison) = 48.55, *M*(treatment) = 54.72; Grade 5: *M*(comparison) = 44.27, *M*(treatment) = 57.44). The effect sizes for the differences were medium in grade 4 ($r^2 = .068$) and large in grade 5 ($r^2 = .211$), thus indicating that these differences were practically significant (Cohen, 1988). Figure 3 depicts this interaction of total battery achievement by school for the repeated measures.

Table 6

Classes of 2000 and 2001 Planned Contrasts: Means, Standard Deviations, Adjusted Means, and *F*-values for Total Battery Achievement Measures in Grades 2, 3, 4, and 5

	Treatment School		Comparison School			
Achievement measure	Mean (SD)	Adjusted mean	Mean (SD)	Adjusted mean	*F*-value	E.S.
Class of 2000						
(Covariate) Total Battery Grade 2	49.32 (17.41)		56.94 (18.87)			
Total Battery Grade 3	49.89 (18.61)	53.00	53.55 (16.65)	50.63	1.68	$r^2 = .011$
Total Battery Grade 4	51.68 (17.96)	54.72	51.37 (17.12)	48.55	11.28*	$r^2 = .068$
Total Battery Grade 5	54.26 (20.56)	57.44	47.38 (18.02)	44.27	40.93*	$r^2 = .211$
Class of 2001						
(Covariate) Total Battery Grade 2	53.43 (17.72)		54.86 (15.92)			
Total Battery Grade 3	46.38 (19.67)	46.99	52.86 (15.38)	52.25	9.56*	$r^2 = .054$
Total Battery Grade 4	50.36 (17.34)	50.44	50.87 (14.21)	51.14	.15	$r^2 = .001$
Total Battery Grade 5	52.55 (16.35)	53.07	49.30 (15.31)	48.78	7.93*	$r^2 = .045$

Note. Class of 2000: $N = 155$; Class of 2001: $N = 170$.
*$p<.001$.

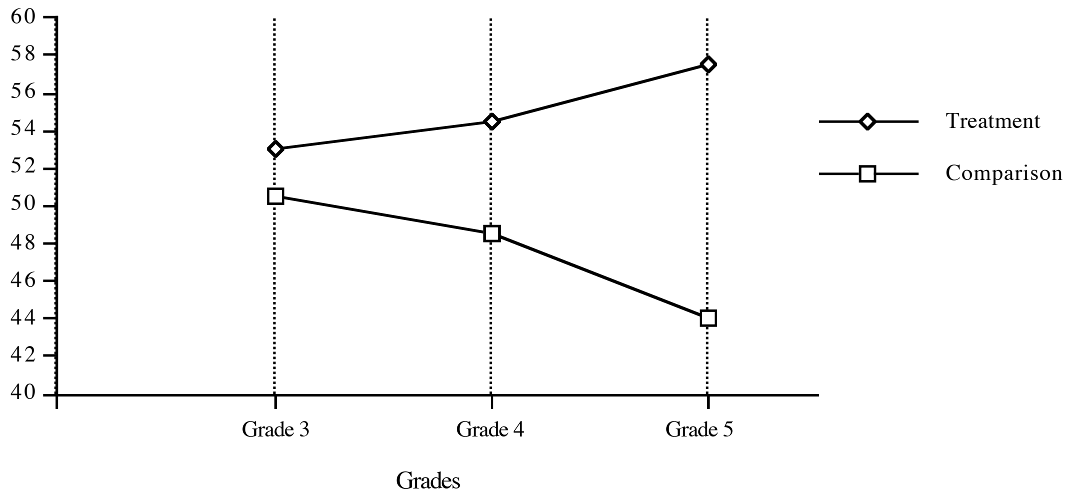

Figure 3. Adjusted NCE total battery means for treatment and comparison school students class of 2000.

For the Class of 2001, after adjustment for initial differences by the covariate, comparison school students scored significantly higher than treatment school students in grade 3 (*M*(comparison) = 52.25, *M*(treatment) = 46.99), with no difference in grade 4, but by grade 5 treatment school students scored significantly higher than the comparison school students (*M*(comparison) = 48.78, *M*(treatment) = 53.07). For both differences the effect sizes were practically significant and medium in size (Grade 3 r^2 = .054; Grade 5 r^2 = .045) (Cohen, 1988). Figure 4 depicts this interaction of total battery achievement by school for the repeated measures.

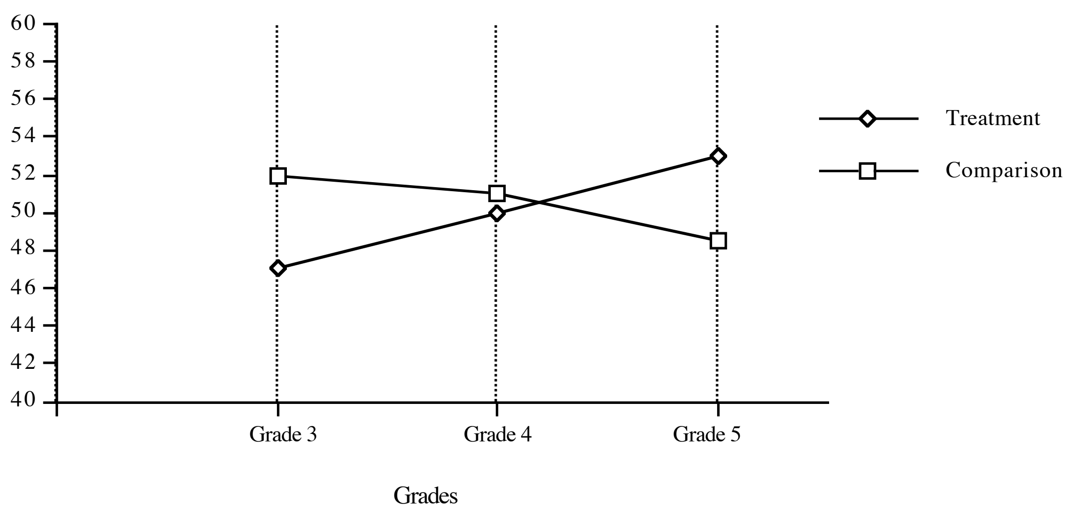

Figure 4. Adjusted NCE total battery means for treatment and comparison school students class of 2001.

The first set of contrasts performed on the data sets provided insight into how the students in each school differed from each other with respect to total battery achievement at each of three grade levels after adjusting for initial differences. The Class of 2000 treatment school students' scores were essentially the same as the comparison students in grade 3, but by grade 5 the treatment students were averaging significantly higher than the comparison students. The Class of 2001 had similar results except that in grade 3 of the treatment school, students averaged significantly lower than the comparison students. By grade 5 these same students averaged significantly higher than the comparison students.

Contrasts: Within Schools

The second set of planned contrasts compared student achievement total battery by the repeated measure of time. Within each school, scores were contrasted between grades 3 and 4; grades 4 and 5; and grades 3 and 5 to determine when significant changes occurred. These scores were contrasted for each data set, and since these contrasts were performed within the individual school data sets, no covariates were used.

For the Class of 2000, the results of the contrasts for both the treatment and comparison schools in total battery NCE scores are displayed in Table 7 and Figure 5. For the treatment school, significant differences were found in mean reading achievement score between grades 3 and 4 (49.89 vs. 51.68), grades 4 and 5 (51.68 vs. 54.26), and grades 3 and 5 (49.89 vs. 54.26). The gain in mean achievement between grades 3 and 5 had a large, practically significant effect size of $r^2 = .120$, that accounted for 12% of the variance between the grades (Cohen, 1988). The comparison school from the class of 2000 saw significant declines in mean student achievement between grades 3 (M = 53.55), 4 (M = 51.37), and 5(M = 47.38), with the drops in mean achievement between grades 3 and 4 and 3 and 5 having large practically significant effect sizes of $r^2 = .152$ and $r^2 = .298$, respectively (Cohen, 1988).

Results for the Class of 2001 were similar to those from the Class of 2000 regarding changes in total battery achievement between grades 3 and 5 for both treatment and comparison school students. Treatment school student scores increased significantly between grades 3 (M = 46.38), 4 (M = 50.36), and 5 (M = 52.55), with a large, practically significant gain between grades 3 and 5 of $r^2 = .259$, accounting for 25.9% of the variation between grades. Conversely the comparison school student scores decreased significantly between grades 3 (M = 52.86), and 5 (M = 49.30), with a medium effect size of $r^2 = .112$. These results are displayed in Table 8 and Figure 6.

Table 7

Class of 2000: One-Way ANOVA Contrasts for Total Battery NCE Scores

Contrast	SS	df	MS	*F*	*p*	E.S.
			Treatment School			
Grades 3-4	139.86	1	139.86	4.15	.0447*	$r^2 = .071$
Grades 4-5	290.94	1	290.94	6.57	.0121*	$r^2 = .046$
Grades 3-5	834.25	1	834.25	11.73	.0009*	$r^2 = .120$
			Comparison School			
Grades 3-4	163.24	1	163.24	4.13	.0461*	$r^2 = .058$
Grades 4-5	540.01	1	540.01	2.84	.0009*	$r^2 = .152$
Grades 3-5	1297.06	1	1297.06	28.38	.0000*	$r^2 = .298$

Note. Treatment School $N = 97$; Comparison School $N = 68$.
*p<.05.

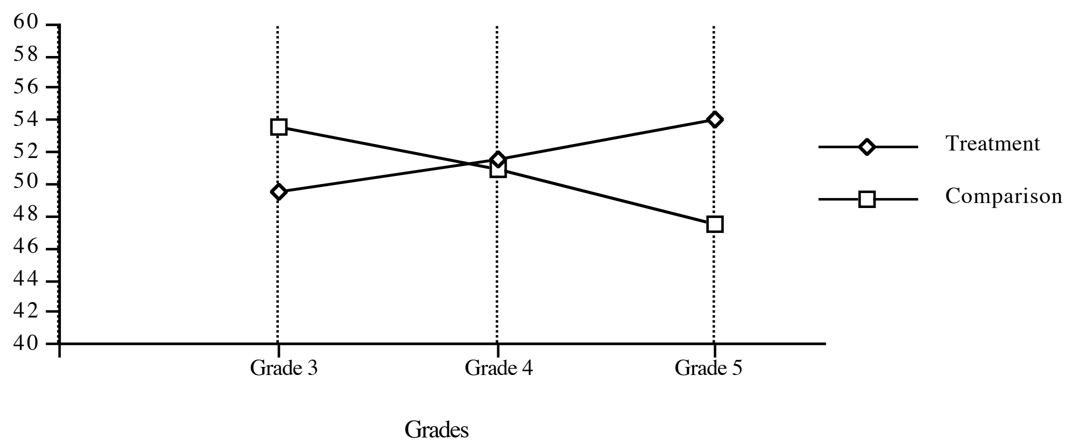

Figure 5. Class of 2000 treatment and comparison school total battery means.

Table 8

Class of 2001: One-Way ANOVA Contrasts for Total Battery NCE Scores

Contrast	SS	df	MS	*F*	*p*	E.S.
			Treatment School			
Grades 3-4	609.01	1	609.01	19.87	.0000*	$r^2 = .167$
Grades 4-5	224.72	1	224.72	9.37	.0028*	$r^2 = .086$
Grades 3-5	1573.61	1	1573.61	34.55	.0000*	$r^2 = .259$
			Comparison School			
Grades 3-4	136.01	1	136.01	2.61	.1106	
Grades 4-5	84.52	1	884.52	2.16	.1460	
Grades 3-5	434.96	1	434.96	8.59	.0046*	$r^2 = .112$

Note. Treatment School $N = 100$; Comparison School $N = 69$.
*p<.05.

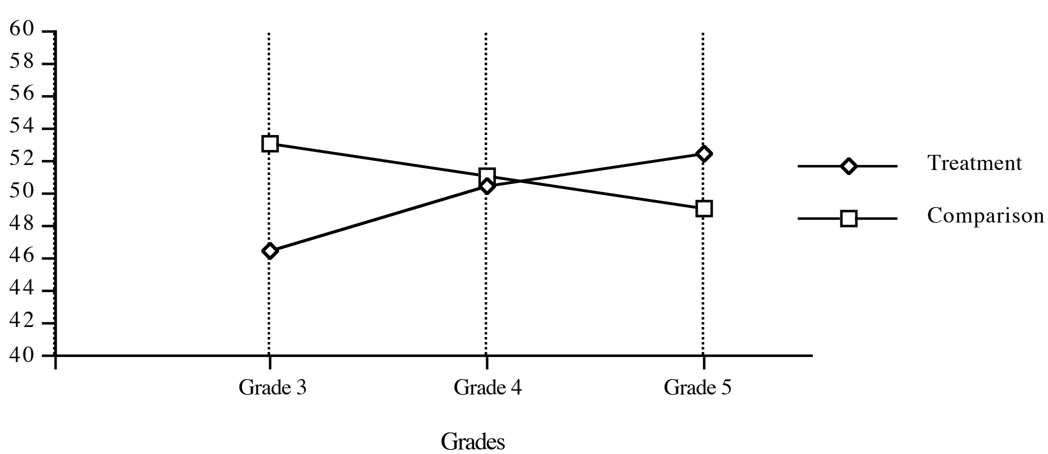

Figure 6. Class of 2001 treatment and comparison school total battery means.

Phase Two: Qualitative Analyses and Results

Research Question Three: What Factors Exist Within the Classrooms and the School Using Cluster Grouping That May Influence Student Achievement?

To address research question three, data from interviews with teachers and administrators (*N* = 17), as well as from documents, were gathered and analyzed. Interviews were conducted during November and December 1995 and January 1996 over a period of six days. Each interview lasted approximately 45 minutes and was taped and transcribed. Additionally, the researcher reviewed evaluation reports and board of education reports regarding the program; records of the program; and administrative notebooks that contained information regarding the philosophy and implementation of the program. The findings discussed in this section emerged as core categories after open, axial, and selective coding had been applied to the data as recommended by Strauss and Corbin (1990). This coding yielded three core categories: use of grouping, impact of the teachers, and general school environment.

The following techniques were used to establish the trustworthiness of this analysis: a "devil's advocate" to challenge the researcher's analysis, checking and re-checking the data, value-free note taking, asking questions of the data, triangulation of the data, and a researcher's journal (Marshall & Rossman, 1989). A discussion of each of the core categories follows.

Use of Grouping

Because cluster grouping implies ability grouping, both the program documents and the teacher interviews focused on the use of various forms of grouping in the program between grades 3 and 5. It was determined that grouping occurred both within classrooms and between classrooms and, in both cases, the grouping was flexible. Like the identification procedures used to place students into classrooms, grouping was employed in a variety of ways, and students were not locked into specific groups for the duration of the day. Additionally, many teachers reported that cluster grouping was directly related to the increase in the number of *high achieving* students identified during the 3 program years. Still others reported that the cluster grouping program helped them better meet the needs of the individual students within their classrooms.

Between-Class Groups

It became evident after the first few interviews that cluster grouping was used for placing students in classrooms, and in addition, students were regrouped by achievement for reading and math instruction in grades 3, 4, and 5. This meant that within each grade level, teachers regrouped students for reading and math instruction by achievement levels, and different teachers instructed classrooms of students who were not the students from their regular class. This happened for the Class of 2000 for reading in grades 3 through 5 and for math in grades 4 and 5. The Class of 2001 was regrouped for instruction for reading and math in grades 3 through 5. The between class grouping accounted for 2 hours of instructional time each day. The rest of the day students remained in their cluster grouped homeroom (except when they went to specials such as physical education). Teachers at each grade level chose to do this to better meet the needs of students. One teacher would take students who were struggling, another would take the advanced students, and the remaining three teachers would have students performing near average in reading and math. The teacher of the *high achieving* cluster did not necessarily teach these students for reading and math. Therefore, other teachers had the opportunity to work with the most advanced students. The teachers explained that more students than just those in the *high achieving* cluster were placed in the advanced reading or advanced math sections, and that these sections did not necessarily include the same students. Therefore, the high achieving cluster students worked with other students who were strong in reading and math, further integrating those content areas. As teacher 3A explained:

> We had so many high math students who weren't in the high cluster, we thought to really meet the needs of the grade level, we would have a cluster group strictly for math. We also had the high cluster reading group to meet the needs of other children who may not have been identified or who had strengths that weren't evident across the board. We were able to target more children for high reading by regrouping within the grade level for reading.

Teacher 3B who taught the low math class explained:

> I teach the low math group which includes the learning disabled students and those identified for Chapter 1 assistance. With these students, I am able to teach in different ways and go at a slower pace, but they think that they are great at math because the better students are not in the room to make them feel slow. We do a lot of hands-on things like base-10 blocks, patterning, touch math, because many of them can't get it in the traditional ways. We do a lot of problem solving, mental math . . . I challenge them at grade level . . . I don't dumb down the curriculum, I just teach it differently so that they can be successful, too.

This same teacher taught the advanced reading section where she used a literature based curriculum and students worked beyond grade level, had their curriculum compacted, and were involved in many different writing activities. When teaching the low achieving students who had been regrouped for math, she had the assistance of a teacher consultant and a Chapter 1 aide.

In addition to using between-class grouping by achievement for math and reading, the three *high achieving* cluster teachers indicated that they used *between grade grouping* when it was needed to meet the needs of individual students. For example, teacher 5A explained:

> Some students went to sixth grade to take math in the middle school, because they were even beyond where I was with the advanced math group. After math in the middle school, they would return for the rest of the day in fifth grade.

Within-Class Groups

The types of within-class grouping reported included interest grouping ($N = 8$), cooperative grouping ($N = 7$), peer tutoring ($N = 4$), and ability grouping other than for math and reading ($N = 3$). Six teachers explained that they used flexible grouping, and depending on the lesson, students often chose their groups or partners. Teacher 4D described her use of grouping in the following way:

> I do all those things, cooperative learning, interest groups, peer teaching, whole group instruction. We're driven . . . to do what works for children and use a variety of methods. So anything that we feel we can use in our classrooms to facilitate whatever the needs are, we do that.

Flexible Groups

Flexibility emerged as a key component of both the within-class grouping and the between-class grouping. Seven teachers explained that the grouping between classes was always flexible, and that if a student needed to be in another section, that cooperation and flexibility existed within each grade level to move students around as needed. With the exception of four teachers who said that their primary mode of instruction was whole group instruction, it was evident that the use of grouping within the classrooms varied and was flexible in nature. For example, teacher 4C explained:

> The types of groups that I use in my class depend on the activity; sometimes I use cooperative learning, or peer tutoring, other times I use interest grouping, or I group students by ability. The main thing with my use of grouping is that it is flexible.

Even though students were identified in various achievement levels for placement into classrooms, it was clear that these identification categories were not fixed, nor were they used consistently to group students for instruction. Rather, students were grouped and regrouped in many flexible ways designed by the teachers to help them be successful.

Cluster Grouping and Identification of Students

Thirteen teachers (93%) believed that the cluster grouping program had led to more students being identified as *high achieving*. They reported that by placing the highest achievers together in one classroom there was a positive influence on the achievement of the students who remained in the other classrooms. All three administrators concurred with the teachers and indicated that cluster grouping directly affected the increase in the number of students identified as *high achieving*. Evaluation reports submitted by the program coordinator to the Board of Education for the years 1989-1994 indicated a steady increase in the number of students identified as *high achieving* during each of the 3 program years. Typical comments by teachers included:

> The high students were all with [Teacher 5A], and we expected more [from the students] we had. By removing some of the higher kids it may have influenced the others to work harder . . . and maybe teachers expected more because we

> didn't have the higher students and treated it as a regular classroom and expected the average students to rise to the occasion. (Teacher 5C)

> I think the low and average children really benefited because we only spent as much time on things as they needed to and then we moved on. Even if they moved at a slower pace, they were feeling successful. I feel even the low students had good self-esteem because they were constantly successful. I think that's why we also had fewer low students There's a fine line between high average and high achieving, and I think a child who is in a classroom where there are not other children taking front stage, has that opportunity and starts to shine. Their confidence builds and I think that turns a high average child into a high achieving child. (Teacher 3A)

> I think that the high average kids, when the very top kids are gone, they tend to excel—they emerge into the leadership roles—they have more self-confidence, their self-esteem starts to grow and they start looking at themselves as really bright. I think the low kids have more of an opportunity to get strategies and to build their confidence. So, their [achievement] levels go up because they don't see as much as of a discrepancy between themselves and others as they have before. (Teacher 3B)

> I also see some of my kids who were never the high kids before, they are identified as high average—they got to shine. They never had that when you had the 3 or 4 that always knew the answer in the cluster group. By removing the really top kids—it let the other ones rise and gave them self-confidence. (Teacher 3D)

The importance of having a group of students who achieve at above average levels was also stressed by nine teachers (64%). For example, teacher 4B explained, "Having higher achieving students in the classroom brings up the achievement of the lower, and average group. It is important that each classroom has a high achieving group of students."

<u>Cluster Grouping and Meeting Students' Needs</u>

Eleven teachers (79%) expressed that cluster grouping placement strategies made it easier for them to meet the needs of individual students in their classrooms. The superintendent and the assistant principal agreed with this assessment. Eight teachers (57%) said that cluster grouping allowed more time to work with lower achieving students at a level appropriate for these students. In the 1990 program evaluation report submitted to the Board of Education, four teachers explained how cluster grouping had helped them in their efforts to better address individual student needs in their classrooms.

Teachers of high achieving clusters said that it was beneficial for the high achievers to be clustered together because as Teacher 4A explained, "They [high achieving students] challenge and motivate each other, and with just one or two kids, I don't think that would happen."

Nine teachers (64%) indicated that the restricted range of achievement levels created by cluster grouping placements made meeting individual needs easier for them.

> Definitely—I always thought when I had the normal classroom, very low to the very high, to really meet all the needs I was really juggling. I felt I did a decent job with all the children, but didn't feel like I was doing an excellent job with any of them. But lowering that spectrum convinced me. I find that I really think I'm doing a much better job with the children . . . . (Teacher 3A)

> Yes. That's one thing teaching for the first 10 years, I always felt guilty, like I always felt I wasn't giving enough time to the low kids and I also felt like I wasn't challenging the high kids enough. Because I think the gap is narrower so I can zero in on their needs. I can spend more time with the low kids . . . . Some kids may be good in capitalization and they're LD, so they don't have to do the capitalization unit and I'll have them work on some kind of project. It just depends on what their needs are. (Teacher 3B)

> The kids were more deliberately placed, so we didn't have as broad of a range and didn't have to deal with the extremes. I also had an aide and a teacher consultant, which helped to meet the needs of the students who were struggling. (Teacher 4B)

The majority of the teachers agreed that cluster grouping assisted them in meeting the needs of individual students in their classrooms. This was due to a restricted range of achievement levels, which created more time for the teachers to work with the students in their classrooms. Additionally, the teachers reported that cluster grouping was beneficial to students because it allowed students of like achievement levels to work together and to challenge each other.

Impact of Teachers

<u>Positive Classroom Environments</u>

Teachers and administrators reported that the classrooms were positive and that school was a place where students wanted to be. This finding was confirmed by school climate surveys completed in 1990 and 1991 as part of school improvement planning, in which students in the upper elementary school indicated that they were, on average, happy with their classrooms and felt that school was friendly and safe. Parent satisfaction surveys were high each year, as reported in the annual reports to the Board of Education and to the State Department of Education. During the semi-structured interviews, teachers were asked to describe the atmosphere of their classrooms. Representative responses included:

> Excited. The kids don't want to miss school, even when they're sick. I never have a motivation problem, because they like what they are doing and are challenged and feeling successful. (Teacher 3A)

> Relaxed, yet with high standards. They like to come to school, and feel bad when I'm not there. I am respectful of the students and they of me. (Teacher 4C)

> I think it's safe for them to be who they are, to be different, and to disagree with me. If they offer suggestions on my teaching, I listen to them. I think that they understand that I really care but that there are high expectations for learning. (Teacher 5A)

Both teachers and administrators discussed how the teaching strategies and the curriculum modifications were used to benefit the students. Many teachers (*n* = 12) discussed adjusting assignments, helping students to feel successful, and developing their classrooms into places that students wanted to be. A theme of concern and caring was continuously discussed by teachers, supporting the idea about positive classroom environments in this school.

<u>High, Yet Realistic Teacher Expectations</u>

All of the teachers explained that their expectations for students were high. Two expected more than one year's growth from their students. Two more teachers stated that their expectations were the same as when the high achieving students had been in their classrooms. Fifth grade teachers spoke about preparing their students for success in middle school. The general tone of the interviews indicated that teachers believed in the need to challenge, but at the same time, help students experience success. Three teachers indicated that they had been accused of having standards that were "too high." None of the teachers said that removing the high achieving students from their classrooms influenced their expectations. Comments from teachers regarding their expectations included:

> I don't believe because a child has an LD or EMI label means that they are low. I think that's a problem with education—just because a child is identified with a disability or something that some people tend to think—well, they're low. I expect a lot from them. I think they can do just as many things as gifted kids, maybe not to the full extent—but in some things they can go beyond. If it's their interest—they can excel just as much as anybody else can. (Teacher 3B)

> My expectations are pretty high . . . at conferences the parents say, "these kids have a lot of work." And I say, "yes they do—but they are capable of it." We need to keep raising our expectations, but set it up so, indeed, students can succeed, they can get it done, they know how to do it. (Teacher 4A)

> I truly expected all students to achieve . . . regardless of where they are or who they are. I want to meet the needs of students and feel my standards or expectations are high. (Teacher 5E)

Teachers developed many ways to challenge students to meet their expectations which are described in the next section. As the quantitative analyses of the identification categories and achievement data indicated, students seemed to be successful in these classrooms.

Challenging and Meeting Students' Needs

Most teachers indicated they were concerned with meeting the needs of individual students. As described in the grouping section above, many teachers indicated cluster grouping had provided a better way to address individual students within their classrooms. The strategies teachers used to challenge and meet the needs of students in their cluster grouped classrooms are summarized in Table 9. Related themes of challenge, choice, and student interest emerged through all of these strategies.

Table 9

Frequency of Strategies for Challenging and Meeting Students' Needs

Strategy	Grade 3 Responses (Total $N = 5$)	Grade 4 Responses (Total $N = 4$)	Grade 5 Responses (Total $N = 5$)
CHALLENGE			
Integrating Higher Order Thinking Skills	5*	3*	3*
Developing Critical Thinking Skills	2	3*	3*
Using Creative Thinking Skills	2*	2*	2*
Integrating Problem Solving	3*	2*	3*
Assigning Projects	3*	1*	1*
Using Acceleration	1*	2*	1*
Adjusting Assignments	4	3*	3
CHALLENGE & INTEREST			
Spending Time with High Achievers	1*	1*	1*
Developing Curricular Extensions	5*	4	3*
CHOICE & INTEREST			
Providing Choice of Partners or Groups	2*	2*	4*
Providing Choice to Work Alone or Together	3*	2*	3*
CHALLENGE, CHOICE, & INTEREST			
Using Open-ended Questioning	5*	4*	4*
Offering Independent Study	2*	2*	3*
Using Challenge Questions	2*	2*	1
Implementing Curriculum Compacting	4*	1*	3*
Providing Enrichment Experiences	5*	2*	3*
Providing Choice of Problems or Assignments	2*	2	3*

*Indicates that one of the respondents included the teacher of the *high achieving* cluster.

As indicated in Table 9, the majority of strategies were reported to have been used by the teachers who taught the classrooms with the high *achieving* cluster students. However, many strategies were used in other classrooms with students of all achievement levels. For example, curriculum compacting was used by all teachers who had the high achieving students, but also by five other teachers. Four teachers with regular classrooms had implemented the choice of independent study with their students, and seven teachers regularly provided enrichment experiences beyond the curriculum to their students. Many typical gifted education strategies were used in classrooms with all students, as teacher 5D explained:

> Extra projects were something I started doing, an idea that I got from [5A, the cluster teacher with the high achieving students]. With the higher achievers, after they read something they would have to do a demonstration of it, and they loved doing that. It taught the other kids a lot of things and even a lot of the lower kids wanted to do it because the higher kids did it. So the extra projects kind of spread among the students of all levels in my classroom, even though I started out using them to challenge the higher achievers.

Teachers in many classrooms reported using thinking, questioning, and problem solving strategies, and over half of the teachers reported that they provided students with choices in grouping assignment and curriculum assignments. The majority of teachers ($N = 11$; 79%) indicated that they addressed individual students' interests in their classrooms. A variety of methods were used to incorporate student interests including the use of enrichment/interest centers ($N = 10$); curriculum compacting ($N = 8$); and independent study in an area of student choice and interest ($N = 7$). As teacher 4A described:

> Because their ideas are implemented, their ideas become part of what we do. Students are pretty empowered in the classroom. For example, a couple of years ago we had two girls really interested in special education. They did some research and worked once a week with the hearing impaired teacher and her students, and then they came back to class and taught us sign language and shared what they learned.

Additionally, 12 of 14 teachers (85%) indicated that they thought that the cluster grouping program did a good job in identifying students from under represented groups for inclusion in the high achieving cluster, such as those from low socioeconomic backgrounds. All administrators thought that the program was equitable. According to district annual reports, approximately 30% of students in this district are provided with free or reduced lunches, and by fifth grade, over one-quarter of the students in the high achieving cluster classroom for both the class of 2000 and 2001 were receiving free or reduced lunch.

General School Environment

Strong Administrative Leadership and Support

Evidence of strong administrative leadership and support existed. When asked if they thought the administration had been supportive of the program, only one teacher said the administration had not been supportive, two others expressed that support had been mixed, and 11 indicated that there had been firm support on the part of the administration. Teacher 5E explained: "I think [the administrators] were very supportive. I think there wasn't ever a time that they weren't supporting what was going on with any group."

Three teachers commented on the changes that had taken place in the program since its inception in 1988. After one year of programming, using an identification matrix for placement of students, the teachers were unhappy with the configurations of their classrooms. The administration discussed this problem with the teachers, and together they developed the conferencing technique currently used to identify and place students into the classrooms. As the superintendent indicated:

> The teachers are the ones making the decisions, so they have a great deal of say in the program. I think that this type of leadership in the classroom had given them real ownership into the program. Our job as administrators is to support the program that the teachers have developed. All I have to do is work with our administrators and pat people on the back for doing a great job, because it really boils down to the teacher in the classroom doing the job.

The district demonstrated its support of the program each year, by budgeting over $30,000 to support gifted education, which included the cluster grouping program. The specific budget for the cluster grouping program included money for materials to extend the curriculum in the classrooms with the high achieving cluster and to offer professional development in the area of talent development for all interested staff. Other funds were applied to a county-wide consortium that provided staff and students with services and program coordination.

Professional Development Opportunities

Professional development was ongoing, and most teachers indicated that it was an important part of their success as teachers and with the cluster grouping program. Before implementing the cluster grouping program, all staff attended a one day workshop on concept of cluster grouping. Since the district could not afford an enrichment teacher position to assist the elementary teachers with their academically advanced students, the staff chose to try the cluster grouping program. The first workshop was followed the next year with site visitations to a school using cluster grouping successfully. Seven teachers chose to go on this visitation. National, state, regional, and local professional development opportunities in gifted education were made available to staff, with all participating in at least the local opportunities. Local workshops included: a follow-up to cluster grouping for all of the staff; curriculum compacting; differentiating and individualizing curriculum and instruction; promoting science talent through Science

Olympiad; working with LD gifted and underachievers; and meeting the needs of gifted math students. Five teachers attended the national conference on gifted education where they also made presentations; two attended a 2-week summer institute on gifted education; six attended the state conference on gifted education, four as presenters; and nine attended regional conferences on gifted education. A total of 64% of the teachers attended national, state, or regional professional development conferences or workshops in gifted education.

These teachers explained how their professional development experiences had affected their teaching:

> I've gone to a lot of gifted conferences [and] I always go to [one on] exceptional children every year in March. That's the special education side of me. I'm lucky—I get to go to both because of what I do. I implement a lot of the gifted stuff into the LD stuff. Because I think those things work with all kids—not just gifted kids. (Teacher 3B)

> I don't ever go to any [inservice] that I don't learn something. I've been teaching 34 years, and each year there seems to be an interest area. I've taken classes, right now I'm taking inservice in technology. Each year there seemed to be a need for me to become a better teacher. (Teacher 4D)

> I think [the cluster grouping inservice] was helpful—there are many things people assume educators know automatically and I think the experience in being told and given a model in how to do something has always been helpful to me. I know it is with kids. I like to see new things, and particularly cluster grouping, I thought it was good to see. (Teacher 5B)

A final part of the influences of professional development became evident when six teachers mentioned how helpful it was to have the teachers who teach *high achieving* clusters in the building as resource persons. Two fifth grade teachers expressed how much they had learned and borrowed from teacher 5A over the years. "I definitely learned a lot from her, and not that she would tell me 'do this,' but she might just mention something or let me borrow her ideas or materials" (Teacher 5D). Another teacher explained:

> I've learned so much from [Teacher 3A] and I adapt many of the strategies that she uses with her high achievers and use them with my LD and low achievers. I don't think that gifted education is just for gifted students.

<u>Belief in Colleagues and Collaboration</u>

The administration and teachers demonstrated strong support of and confidence in the teachers. There was a general atmosphere in this school of quality and of caring by teachers who seemed to do their best to work with students. Fifty-five percent of the teachers who were not responsible for the *high achieving students* indicated that they used strategies in their classrooms that they thought were typically "gifted education" strategies. All of the third grade teachers, for example, indicated that they were glad that teacher 3A had the cluster of high achievers because she had to put so much extra effort into meeting these students' needs and she was talented in working with those children. They also expressed that they worked together as a grade level to develop strategies that worked with their students. As teacher 3B put it, " I think we have a very dedicated staff. I think people go way beyond, and every teacher tries very hard to meet the needs of each student, whether they're low or whether they're high."

When asked if they thought their colleagues did a good job in matching curriculum and instruction to meet the needs of individual students, all of the teachers answered "yes" without reservation. For example, teacher 5B explained:

> Almost a 100%—yes. I've been around, in the high school and middle school, and I've seen a lot of different teaching techniques and ways that groups work together, and I've been really impressed by the way the teachers in this elementary school have worked together—real impressed.

Teacher 4B indicated that she thought her colleagues "Do just about as much as they can to meet academic needs." Additionally, the administrators had high regard for the teaching staff, and recognized the talent and effort that these teachers put forth. As the superintendent explained:

> I have been in a lot of different school systems in the state . . . and without any question . . . we have the most supportive group of educators in this district that I've ever had a chance to work with. I think at the elementary level, constantly hearing that our faculty has a nurturing effect on the kids that come in here is a good feeling. The teachers have a solid reputation for caring and excellence.

The teachers had confidence in each other, worked together, and were regarded as competent by the administration. This was evident by the flexible manner in which they grouped students and by the positive comments they made about their colleagues.

<u>Program Benefits to All Students and Teachers</u>

The program was viewed as successful because the teachers and administrators believed that it was beneficial both to the teachers and to the students. The teachers liked the program, as described earlier, and many believed that the programs helped them to better meet the needs of the students in their classrooms. Teacher 3B explained how she viewed the program:

> One thing—I remember how skeptical I was at the beginning because I'm not a risk-taker. I thought the same thing a few other people thought—oh, you take those top kids out and I'm not going to have any spark. And that was so far from being true. I see lots of sparks in my room. And then with the high cluster—and having my daughter in it and see her go through the other grades. There's such a difference in her attitude and her love for school is back and it hasn't been there since she's been in preschool. Before being placed in the *high achieving* cluster,

> she wasn't being challenged in school, now to see her doing research projects as an 8 year old. She comes every night with books and does homework, she's doing projects so beyond what I ever thought and she is so excited about school. I can't get her to go to bed.
>
> As we worked with the program and fine tuned it, I've seen a lot of kids getting advantage out of it and that's all kids—including the low kids. I think they would be intimidated by the high achievers. I've seen some kids that I would not have expected to be leaders taking over in my classroom. (Teacher 3D)
>
> In math because we [regroup between classes], I only have 13 kids with a full time aide. These kids need one-on-one structure; they don't have good study habits and it takes two of us right there all the time. I guess in that way we're meeting the needs of those students. (Teacher 4C)

Five of the teachers who teach classrooms other than the one that contains the *high achieving* students indicated that they were glad this cluster existed in another classroom.

> I'm just very, very happy that [Teacher 3A] has the kids she has. She has a group every year that just has so much energy and enthusiasm—it's a blinding light coming out of her room and it takes more energy to teach a group that is gung-ho. She does a lot of extra projects. (Teacher 3E)

A follow-up question about whether the absence of high achieving students in her classroom made her feel "left out" elicited the following response:

> Oh, goodness, no—in fact, I enjoy more the kids I have in my room. I guess I relate to them better. They have a lot of emotional problems usually. Not that the others don't but . . . I like to work with Chapter kids for instance . . . . (Teacher 3E)

The administrators who were interviewed expressed their believed that the cluster grouping program had helped the teachers do their jobs. As the superintendent explained:

> Well, I think we've got some real benefits. I had a great deal of skepticism when we first started because I thought, well, are we looking at an elitist program, where we're taking the cream of the crop and separating them even though they may be within a classroom with other students that's going to "dummy down" the other classes. In fact, it's had just the opposite effect. We have been able to have leadership rise in other classes where we don't have the very bright students who have been in those classes. So it's had a real bonus effect for more general education students, from what I can see, than it has the gifted students and at the same time accomplishing more challenges for the gifted kids. Additionally, I think that the cluster grouping program actually makes the teachers' jobs easier.

The curriculum coordinator concurred with the superintendent's assessment explaining:

> . . . teachers feel that the students who are in their room are placed there because their ability to provide service to them. There's not that wide [achievement] range so they don't feel stressed . . . it's manageable, it's doable, and it gives them that freedom to be able to provide the opportunities within that range so kids can succeed. They don't feel rushed because there's too many kids that are going too fast or too slow . . . they have more of an opportunity to allow kids to do things at the pace that is suitable for the kids. So I think that they are allowing themselves to see the kids produce in many different ways . . . [and] see things they didn't see before.

Summary

Qualitative findings provided further insight into the treatment school and classrooms regarding the identification and achievement of students in the cluster program. Data analyses produced three core categories that included use of grouping, impact of individual teachers, and general school environment. It became evident that the individuals involved in the program used various forms of grouping, including between-class grouping and within-class grouping, and the grouping arrangements were flexible. Additionally, the majority of teachers believed that the cluster grouping arrangement was responsible for the identification of increasing numbers of students at higher levels each year, and that cluster grouping made it easier for them to meet the individual needs of students in their classrooms. Placing high achievers together in a classroom challenged these students, enabled other students to become academic leaders, and reduced the range of achievement in the classrooms, thereby helping the teachers to do a better job with students who were placed in their classrooms. These teachers had positive classrooms, high expectations of all of their students, and used a variety of strategies to challenge and meet student needs. The program was supported by strong administrative leadership, and teachers had continuing professional development and growth opportunities in which most teachers chose to become involved. Both teachers and administrators worked collaboratively and indicated confidence in their colleagues' abilities. All involved in the program believed that it was beneficial to both students and teachers, because it structured classes in a manner that enabled teachers to better address individual needs.

Conclusions

In this study, the number of students identified as *high achieving* increased as more students were recognized by their teachers as achieving at higher levels during the 3 program years. Students in the treatment school scored significantly higher than their comparison school counterparts after controlling for initial differences in total battery NCE scores by grade 5. Additionally, significant gains were found in the treatment school students' mean scores during the 3 program years. Qualitative findings offered an explanation of the gains and the differences in the achievement and identification of the treatment school students.

Limitations

What This Study Is and What This Study Is Not

This study was not intended to isolate one variable and study that variable and attribute causality beyond doubt. Rather, the intent was to study, in all of its complexity, a real program that existed in a real school. Schools are complex and so are the findings of this study. There was more going on than just "cluster grouping"—as there would be in any school. However, viewed in total, the findings are powerful, and much can be learned about classroom practices, identification, and student achievement by examining the ways in which cluster grouping was integrated with and applied to an elementary school program, curriculum, and instruction. It would not be appropriate in this study of cluster grouping or any other that takes place in an actual school to make a claim that simply placing students in a cluster group (or not) will increase achievement among students—without the flexible grouping both within and between classes—without the staff development and buy in—without high teacher expectations—without differentiation of curriculum and instruction for all levels of students—without the reduction of range of achievement levels that the teacher had to teach. The key to these findings is that the use of cluster grouping facilitated many other positive changes in this school which were perceived by the teachers. They recognized rich staff development opportunities, ownership in a program that they developed, high teacher expectations, and a reduction in the range of achievement levels in their classrooms which helped facilitate teachers' desire to better meet the individual needs of all students. As with any form of ability grouping, cluster grouping is not a variable that should be isolated. All of the things that occur or fail to occur within ability grouped situations need to be considered and are key to whether the effects of the "grouping" are positive or negative. The use of grouping is a rich complex issue, and far too many researchers have attempted to isolate and oversimplify its use. The intention of this study was to understand the working dynamics of cluster grouping in a school that saw consistent increases in achievement and identification of their elementary students. To this end, it is clear that cluster grouping played a significant role in this school' s success.

Although certain weaknesses exist in ex post facto and quasi-experimental research, for example, limited manipulation of the independent variable, lack of experimental control, limited attribution of causality, and limited generalizability (Borg & Gall, 1989; Gall, Borg, & Gall, 1996; Kerlinger, 1973), a study such as this is valuable in other ways. First, it enabled the investigation of a practice being implemented in an actual school setting, in contrast to an investigation of an intervention contrived for the sake of research. Second, it investigated a school initiated innovation, as opposed to an innovation demanded by external sources such as through federal funds or special mandates. Because the innovation was school-based, local control and ownership were vested in the program. There are problems associated with the use of intact groups which are discussed further in this section, however use of intact groups provided a distinct advantage in this research. The intact groups examined were stable over time, and facilitated longitudinal comparison of students between and within groups during the course of a 3 year program. Finally, this study examined a practice, for which little research exists, and the findings can serve as the basis for further, more carefully controlled experimental or quasi-experimental research.

Internal Validity

Instrumentation, history, and differential selection threatened the internal validity of this study (Borg & Gall, 1989; Gall, Borg, & Gall, 1996). Due to purposive sampling and the ex post facto, quasi-experimental nature of this study, existing measures of student achievement had to be used. Obtaining a comparison school that administered the same measures of student achievement was impossible. Therefore, NCE scores across two tests, the *ITBS* and the *CAT* were used to compare student achievement between the two schools. Although not optimal, the large number of students involved in the study made it possible to compare student achievement over time.

History was a threat to internal validity. Because the treatment took place over 3 years, and data were collected after the treatment, little information was available regarding what other events may have occurred influencing student achievement at both the treatment and comparison schools. The use of two data sets and repeated measures helped control for this threat, because consistent findings across both data sets and over time helped to increase confidence that the results were not simply due to chance. The consistent findings of increased achievement scores by both classes of treatment school students indicated a trend in achievement when compared to the achievement of the students in the comparison school. The major differences between the two schools were that the treatment school had been involved in cluster grouping and gifted education staff development, while the comparison school used heterogeneous grouping and had not been involved in gifted education staff development, suggesting that the differences in student achievement between these schools may be due to the cluster grouping program and teaching methods used in the treatment school. However, this conclusion must be made with the acknowledgment that other events may have occurred during the time of the treatment of which the researcher is unaware.

Differential selection was another threat to internal validity. The cluster grouping program in the treatment district involved the entire school population. In this district there was only one elementary school, therefore, comparison within the same district either between schools or within the treatment school was impossible. The study was designed to examine the effects of the cluster grouping program on all students in the school, which made random assignment in the treatment school impossible. This threat was addressed by locating a similar school for comparison purposes.

To control for differences between the two schools a covariate procedure was used; however, as Huck and Cormier (1996) described, even this procedure must be used with caution when there are intact groups. First, they cautioned that if the sample means are different from the population means, the adjusted means will be biased, and therefore, inaccurate estimates of corresponding population means. The use of standardized achievement measures, on which the students in this study scored very near the national means, addressed this concern. Additionally, they cautioned that when a covariate is used to equate intact groups there may be other differences between the groups that are unaccounted for by the use of the covariate. However, because student achievement was being measured and the covariates were not highly correlated with the grouping variables, the use of the covariates total battery achievement at grade 2 helped equate these groups and allow for more meaningful comparisons on subsequent measures of achievement.

Additionally, whenever intact groups are used, problems arise that limit findings. When intact groups (such as students in classrooms or schools) are used as in this study, the subjects are often correlated simply due to the fact that they are in groups (Barcikowski, 1981; Scariano & Davenport, 1987). This violates the assumption that data are independent and inflates the alpha level (Barcikowski, 1981). Barcikowski suggested that when subjects are grouped for no reason—as might be done in a heterogeneous classroom—there is an intra-class correlation (ICC) of about .20, which, in five classrooms of 30 students inflates the alpha level from $p < .05$ to $p > .50$. As the ICC increases, this problem is exacerbated. For example, an ICC of .80 will produce and actual alpha of .89, which brings into question any claims of significance by the researcher. The problems associated with ICC may produce findings when none actually exist.

One method for addressing ICC is to make the classroom the unit of analysis, an impossible option in this study for three reasons. First, unlike a study that examined students during one year of their schooling, this study examined them during 3 school years, and the classrooms to which the students were assigned changed each year. Second, through the use of within-class and between-class grouping, the groups in which the students worked changed during the school day. Finally, because the data were gathered after the fact, no information regarding the classroom placements of the comparison students was available. Another method for addressing ICC is to use a nested design; again not possible in this study due to the changes in classroom configurations and the lack of information regarding classroom placements of students in the comparison school.

To control for the inflated probability of Type I error, alpha levels could be adjusted if more information was available regarding the entire data set. Instead, the alpha levels of the statistically significant findings had to be examined in the context of this problem. The ANCOVA analyses produced significance at $p < .0001$; and the contrasts produced significance ranges from $p < .05$ to $p < .001$, indicating that even with the ICC problem associated with intact groups, the findings may still be significant. However, as Cohen (1994) suggested, perhaps testing statistical significance is not meaningful, and that the practical significance determined by effect sizes should be examined and reported instead. As a result, in addition to reporting statistical significance for the findings, effect sizes were reported for all findings to provide a more practical interpretation. The findings reported in this study were practically significant with medium to large effect sizes as defined by Cohen. Both alpha levels and the explanation of effect sizes pertaining to the significance tests increases confidence in the results when considering the problems associated with ICC.

Credibility

With regard to the qualitative aspect of this study, Lincoln and Guba (1985) suggest credibility as a replacement term for internal validity. Concerning a study's credibility Miles and Huberman (1995) ask, "Do the findings of the study make sense? Are they credible to the people we study and to our readers? Do we have an authentic portrait of what we were looking at?" (p. 278). To ensure the credibility of this study, results were fully described, adequate time was spent in the field, data sources and methods were triangulated, and peer debriefing was used.

External Validity

Both purposive sampling and the ex post facto, quasi-experimental design limit the generalizability of this study (Tabachnick & Fidell, 1989). However, this study has provided an in-depth descriptive account of the effects of a program with regard to student achievement and compared these students with others who did not take part in the total school cluster grouping program. Because the study examined two entire classes of students over 3 years of their elementary education and compared these students with similar students, it offered an in-depth examination of the effects of a program. This was a program that existed in a school and was not developed for the purposes of research, but was developed based on recommendations by experts in the field of gifted education as a means to meet the needs of gifted students in the regular elementary classroom. While the findings may not be widely generalizable, they provide insight into how a program such as cluster grouping works when implemented in a real school environment over time. General trends and findings from this study can serve to add to the knowledge base regarding the use of cluster grouping within elementary schools as well as form the basis for future research. Additionally, the findings may be used by schools that want to implement cluster grouping.

Transferability

Lincoln and Guba (1985) suggest transferability as a qualitative measure of external validity. However, Merriam (1988) explained that the intent of qualitative research is not to generalize findings but to form an interpretation of the events that occurred in the situation being studied. Transferability can be explained as "demonstrating the applicability of one set of findings to another context" (Marshall & Rossman, 1989, p. 114), and the burden of transferring the findings from one context to another rests with future researchers. To enhance the possibility of future replicative investigations, detailed description of data collection methods were provided. Additionally, the program is well described in order to provide future researchers the information needed to base a decision about the transferability of the findings to a similar situation or context (Lincoln & Guba, 1985). This study provides other schools with information about how cluster grouping was implemented in the treatment school and the effects that it had on the students and teachers in that school. As a result, this study provides direction in the development of similar programs for other schools.

CHAPTER 5: Discussion, Implications, and Recommendations

In this section the research findings are discussed with their implications in three parts. First findings and implications related to the identification of students in the treatment school are reviewed; followed by findings and implications related to the achievement of students in the treatment and comparison schools. Finally, the qualitative follow-up analyses are discussed together with the implications they may have regarding the use of cluster grouping in elementary schools.

Identification Findings and Implications: Students Are Seen as Becoming Brighter!

Quite simply, as discussed earlier, more students were identified as *high achieving* and fewer students were identified as *low achieving* during the 3 program years. By fifth grade, one entire class of students was identified as *high achieving*, while all other classrooms still contained groups of students identified as *above average*. Students in this program appeared to become better achievers as they progressed from third to fifth grade in the program.

Qualitative follow-up to these findings yielded interesting results that might explain the trend of identifying more higher achieving students during the course of the 3 program years. Many teachers (N = 13; 93%) and all administrators (N = 3) believed that the increase in the number of students identified at higher levels was directly related to the grouping practices used in this school. For example, as Teacher 4C explained:

> Maybe cluster grouping has a lot to do with it. The cluster grouping may give the lower achieving students more self-confidence because I think they become more involved in class when the high [achieving] kids are removed. And you know that those high kids are competitive and tend to dominate class sometimes. Also the average student or high average student really blossomed, too, which may be due to cluster grouping.

From the perspective of Teacher 3E:

> We've talked about why we find more higher achieving students for several years. Part of it, I feel, is that when you pull those really high kids out—those who always have their hand up first and jump in with the answers—when you get rid of those students by putting them together in a cluster classroom—the other kids have a chance to shine. They take risks more often and see themselves as being leaders of the group. They are no longer frightened to offer answers.

The teachers in this study believed that removing the highest achievers from four of the five classrooms provided the opportunity for other students to grow and achieve at higher levels than they might have if the highest achieving students had remained in the classroom. This finding is consistent with those of Kennedy (1989), who found that when the gifted students were absent from the regular classrooms new talent emerged.

Additionally, teachers ($N = 8$; 64%) and administrators ($N = 2$; 67%) suggested that the increased number of students identified as high achievers was due to efforts by the teachers to facilitate achievement among all of their students. These efforts included maintaining high expectations, creating a positive learning environment, and using a variety of strategies to challenge individual students at appropriate levels. As Teacher 5A explained:

> One thing that caused more students to be identified was our expectations. I think that when kids are expected to achieve at a higher level they try to do that. And I think that high expectations help students to try, and this effort boosts their scores. I think when students are exposed to higher level thinking skills and challenging work it helps them achieve. When they are with other kids who are working at high levels I think that helps them. I know I found that with the cluster grouping that year.

A combination of grouping and teacher practices may have been responsible for the changes in identification of students in this study. As achievement of students increased within the classrooms, they were more likely to be identified as higher achieving. The cluster grouping program provided these students with the opportunity to achieve by removing the highest achievers from four of the five classrooms in each grade level. Teachers believed in the program and in their students' abilities. The teachers indicated that the grouping and placement used in the cluster program helped them to better meet individual needs and that with the highest achieving students removed from their classrooms, other students gained in achievement and confidence. The teachers expectations were high and their methods challenged the students in their classrooms without regard to the achievement levels of these students. Perhaps deliberate placement of students into classrooms with teacher involvement and input can have a positive impact on achievement and on teacher perceptions of ability and achievement.

These results suggest that cluster grouping, used in conjunction with challenging instruction and high teacher expectations, may improve how teachers view their students with respect to ability and achievement. With the highest achieving students grouped in one classroom, teachers in the other classrooms may have opportunities to recognize the talents and achievement of other students. Additionally, students who may not have been regarded as achievers may be recognized when the traditional high achievers are removed from the classroom and placed together in another classroom. These findings are contrary to popular views in the reform movement that grouping somehow damages the low achieving students (George, 1993; Oakes, 1985; Slavin, 1987a; Wheelock, 1992), and should be considered together with analyses of ability grouping (Kulik & Kulik, 1992; Rogers, 1991), when decisions are made regarding how children will be placed in elementary classrooms. Cluster grouping may provide students with opportunities for academic growth as well as recognition by their teachers, and its use should be seriously considered by elementary schools.

Achievement Findings and Implications: Student Achievement Increases

Consistent with the identification findings, analyses of student achievement revealed that achievement scores improved for treatment school students in both data sets. Further, even though students in the treatment school began with lower total achievement scores than the students in the comparison school, after 3 years in a cluster grouping program, the treatment school students outperformed their comparison school counterparts. The growth in achievement was significant between grades three and five. All or these findings were both statistically and practically significant. Special consideration should be given to these findings given that growth was measured by the use of Normal Curve Equivalent (NCE) scores on a repeated measures basis each year. From a measurement standpoint, no growth should be anticipated using NCE scores, and zero growth each year would represent an average growth of one year for the students in achievement. Students in this school showed substantial gains on this norm-referenced measure during the 3 program years. Since many of the high achievers were already high scorers, much of this growth can be attributed to students identified in the other categories.

Qualitative findings indicated that students in the treatment school were regrouped for reading and math instruction on the basis of performance in reading and math each year of the program, whereas, whole language and heterogeneous whole group instruction were used for teaching reading and math in the comparison school. This may indicate that the effects of the cluster grouping combined with regrouping had a positive impact on the achievement of treatment school students. Qualitative findings also indicated the use of a variety of instructional strategies around the themes of challenge, choice, and interests. High teacher expectations and the use of grouping may also have influenced student achievement in the treatment school. Again, contrary to the popular anti-grouping sentiment, these findings reinforce that the use of flexible grouping, coupled with appropriate instruction may positively influence student achievement. The implication for elementary schools is that flexible achievement grouping used in conjunction with challenging curriculum should be considered when designing educational programs. As Teacher 3C explained:

> By using achievement grouping we are able to challenge the high achievers and meet the needs of the low achievers without having the low achievers or the high achievers feel like they've been singled out. We are able to adjust our curriculum and instruction to meet the individual needs of the students at their levels.

As indicated in the qualitative part of this analysis, many teachers ($N = 11$; 79%) and all administrators ($N = 3$) thought that the restriction of the range of achievement in classrooms, as well as the between-class grouping by achievement levels in reading and math, helped teachers to meet the individual needs of students in their classrooms.

Qualitative Findings and Implications

Quantitative findings indicated that treatment school students improved their achievement and/or outperformed comparison school students in total achievement. Qualitative findings attempted to explain why these differences existed and provided insight into the treatment school classrooms, teacher practices, and school environment. Data analyses produced three core categories: use of grouping, impact of teachers, and general school environment.

Grouping: Go Ahead and Use It!

With regard to grouping, teachers reported that

- various forms of grouping were used including between-class grouping and within-class grouping;
- grouping arrangements were flexible;
- cluster grouping arrangement was responsible for the identification of increasing numbers of students at higher levels each year;
- cluster grouping made it easier for them to meet the individual needs of the students in their classrooms;
- having the high achievers together in one room challenged these students, enabled other students to become academic leaders, and lessened the range of achievement in the classrooms thereby enabling them to do a better job with the students they were given.

The quantitative findings (increased achievement, and increased numbers of students identified as *high achieving* in the treatment school) combined with the qualitative findings indicate that grouping, when combined with effective teaching may have a positive impact on all students in a school. All teachers and administrators involved in the program believed that cluster grouping was beneficial to both students and teachers, because it helped students be successful by structuring classes in a manner that helped teachers better address individual needs. These findings supported research-based suggestions by Kulik and Kulik (1992) and Rogers (1991), who suggested that grouping by achievement or ability, when used in conjunction with appropriate differentiated instruction can be beneficial to the achievement of students. In a recent publication, McBrian and Brandt (1997) claimed that "Ability grouping is frequently found in school settings where traditional teaching methods (e.g., lecture and recitation) are also used" (p. 49). As findings in this study show, this was not one of those schools. Clearly, as has been shown again and again in the research, attribution of gains or losses in scores cannot be reduced to one variable—whether grouping was or wasn't used. This study supports grouping as a valuable tool when used with appropriate curriculum and instructional strategies.

Teachers Do Make a Difference!

As has been suggested repeatedly in the literature, it is not the use of grouping alone that contributes to student growth (or decline), but rather, it is what is done within the groups and the impact of teachers responsible for all levels of groups. In this school teachers:

- created positive classroom environments in which high expectations were held for all students;
- used a variety of strategies to challenge and meet student needs;
- worked collaboratively with colleagues and administration.

Unlike findings by Oakes (1985), the teachers in this study who did not have the cluster of high achieving students were not regarded as poor teachers, and did not lower their expectations for students. In fact, they reported that the opposite occurred, and they expected the same or more from their students as highlighted by the following teacher comments.

> I like to keep my expectations much the same without identifying the lower kids from the average or high average. I think I have pretty high expectations for the children—for their behavior, their academics, and things. I encourage students and keep [my classroom] positive. (Teacher 4B)
>
> I guess I have the same high standards for the average and low achieving student as I do for any other student. (Teacher 4 C)

School Environment Counts!

Finally, the school had:

- strong, supportive leadership;
- teachers who believed in a program they worked to develop;
- teachers and administrators who had confidence in each others' abilities;
- had continuing professional development and growth opportunities in which they became involved.

These findings were similar to those found in the exemplary programs for gifted investigated by Delcourt and Evans (1994) who cited the following characteristics of these programs: strong leadership, supportive atmosphere and environment, and curriculum and instruction that were flexibly matched to student needs.

Gifted Education Program as an Integral Part of the School

As noted by Tomlinson and Callahan (1992), Renzulli (1994), Reis, Gentry, and Park (1995), and the U.S. Department of Education (1993), the use of gifted education "know-how" has the potential to improve general education practices. The cluster grouping program investigated in this study was designed to simultaneously address the needs of high achieving students *and* the needs of other students. As a result of this connection with the general education program, professional development opportunities in gifted education were made available to all staff, and dialogue between teachers of the high achieving cluster students and the rest of the staff was encouraged. All teachers received professional development in gifted education strategies, and reported using these strategies in their classrooms with all of their students. Teacher 5D explained that she started using strategies that she learned from teacher 5A with her advanced students: "It taught the other kids a lot of things and many of the lower kids wanted to be involved because of the high achiever's work, so more students became involved in more advanced work." Teacher 5A summarized this concept when she related a situation that had occurred in her classroom:

> I used the same materials but just adjusted my criteria and evaluation for the other kids. I used the same materials that I used with what we were calling the gifted and talented kids, and I adjusted my evaluation and my approach to teaching. When we came to evaluation time I discovered that the kids who were not classified as G/T had made tremendous strides in their academics and growth. One girl in particular I remember because I was so astounded she had gained 3 years' growth on her test at the end of the year. So it really convinced me that the strategies that we used with G/T kids are good for all kids, and I use those strategies in all my classes. I'm a real believer in it.

Unlike the classrooms described by Archambault et al. (1993) and observed by Goodlad (1984) and Westberg et al. (1993), the classrooms in this school were characterized by a variety of challenging activities and varied instructional strategies. Renzulli (1994) noted that the practice in many schools of diagnosing and remediating weaknesses should be replaced with a talent development approach to enrichment learning and teaching that recognizes student interests, strengths, and talents as a basis for their education. In this study, integration of the cluster grouping program with the general education program affected all teachers and students in the school. The treatment school teachers applied many strategies from gifted education to their daily teaching, something that might not have happened had professional development in gifted education been reserved only for teachers of high achieving students. The implication is that all staff, and consequently all students, can benefit from inservice in gifted education strategies. Therefore, schools should be careful not to limit their professional development in gifted education to just those teachers who work with identified gifted students. Perhaps talent can be developed in more students in our schools by offering more teachers opportunities to learn and to apply gifted education know-how.

Significance of the Study: What Does This All Mean?

This research is significant because very little research exists regarding the use of cluster grouping, and virtually no research exists regarding the effects of the use of cluster grouping on the achievement of all students. This study not only added to the limited research base concerning the use of cluster grouping as a programming strategy for gifted students, but it examined the effects of cluster grouping on all students in the school. Findings from this study have significant implications for school districts, administrators, and teachers, because they offer information regarding teacher practices, student achievement and identification, and programming. These findings can be considered when developing an elementary program for gifted students as well as when trying to improve school for all students.

School Districts

The findings of this study should interest school districts struggling with meeting the needs of gifted students in the regular classroom (one of the most frequently requested inservice topics by school districts that contact The National Research Center on the Gifted and Talented, University of Connecticut). Although current reform trends suggest that heterogeneous grouping is preferred (George, 1993; Hopfenberg & Levin, 1993; Oakes, 1985; Slavin, 1987a; Wheelock, 1992) when developing elementary classroom configurations, the findings of this study suggest that the deliberate placement of a narrower range of achievement groups into teachers' classrooms, including the placement of a group of *high achieving* students together in one room, is beneficial to both students and teachers. It stands to reason that if high achieving students are placed with a teacher that has the background and willingness to adjust curriculum and instruction to meet these students' special needs, their needs are more likely to be met than if they are randomly placed into all teachers' classrooms for the sake of heterogeneous grouping. Further, as was done in the program in this study, if the placement of students in other teachers' classrooms is done thoughtfully, and includes a group of students who are above average, then districts might see growth in identification and achievement similar to that observed in this study. The implication for districts is that a well developed cluster grouping program, such as the one in this study, can offer gifted education services to high achieving students while helping teachers better meet the needs of all students.

Elementary Classroom Teachers

Elementary classroom teachers might find the results of this study interesting as they struggle to meet the individual needs of students. Of special interest are reports by teachers in this study that removing the highest achievers from four of five classrooms per grade level did not affect the way teachers viewed students in their classrooms. There was no report of "losing the spark" by teachers who were not responsible for the *high achieving* students. On the contrary, these teachers reported that having the *high achieving* students removed from their classrooms made their task of teaching easier, while encouraging new talent to emerge. Other teachers may want to consider the views of teachers involved in this study when deciding whether to try a cluster grouping approach to programming and classroom placements.

The varied uses of grouping found in this study have implications for teachers who have questions regarding its appropriate uses. The teachers in this study used between-class achievement grouping in math and reading, reporting that this made it easier for them to challenge students at appropriate levels. They also used other forms of flexible grouping and indicated that none of the groups was fixed. The implications are that achievement grouping has the potential to produce academic gains for all students, and that grouping should be flexible.

Staff Development, Curriculum, and Instruction

The findings of this study indicated that staff development and collaboration played a major role in influencing teacher practices. Teachers in this study were involved in staff development regarding gifted education. They worked together with the best interest of the students as their goal. They had high expectations for the students in their classrooms. Many reported that they employed strategies used in gifted education, or strategies that they learned from the teacher responsible for the *high achieving* students, with students of other achievement levels. By offering professional development in gifted education pedagogy to all staff and encouraging high teacher expectations, strategies often observed in programs for gifted students can radiate throughout the entire school. As recommended by the *National Excellence* report (U.S. Department of Education, 1993) and many reformers, the use of gifted education pedagogy should be used to improve all of education. Recent research has demonstrated that when involved in a gifted education program used with all students, teachers incorporated the strategies they learned into their regular classrooms (Reis, Gentry, & Park, 1995). The implication is that extending professional development opportunities to all teachers and encouraging collaboration between teachers of the high achieving students and other teachers increase the likelihood of more teachers using strategies previously used only in programs for the gifted.

Conclusion

In conclusion, this study has added to the research base on the practice of cluster grouping, and further confounded the debate on ability grouping. The findings seem to indicate that a total school cluster grouping program can lead to teachers' recognition of students who are achieving at higher levels, have a positive effect on student achievement, and influence teachers' classroom practices. These findings seem most likely to occur when teacher expectations are high in positive classroom environments, collaboration exists, and professional development is provided. The treatment school's development and implementation of a cluster grouping model can serve other districts that are considering developing a cluster grouping program.

References

Airasian, P. W. (1989). Review of the California Achievement Tests, Forms E and F. In J. C. Conoley & J. J. Kramer (Eds.), *The Tenth Mental Measurements Yearbook* (pp. 126-128). Lincoln, NE: Buros Institute of Mental Measurement.

Alderman, M. K. (1990). Motivation for at-risk students. *Educational Leadership, 48*(1), 27-30.

Archambault, F. X., Westberg, K., Brown, S. B., Hallmark, B. W., Emmons, C. L., & Zhang, W. (1993). *Regular classroom practices with gifted students: Results of a national survey of classroom teachers* (Research Monograph 93102). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Balzer, C., & Siewert, B. (Eds.). (1990). *Program and service models: Suggested programs and services for identified talented and gifted students, K-12. Technical assistance paper 3*. (Rev. ed.). Salem, OR: Oregon Department of Education.

Barcikowski, R. S. (1981). Statistical power with group mean as the unit of analysis. *Journal of Educational Statistics, 6,* 267-285.

Bloom, B. S. (Ed.). (1985). *Developing talent in young people*. New York: Ballantine Books.

Borg, W. R., & Gall, M. D. (1989). *Educational research: An introduction.* White Plains, NY: Longman.

Brophy, J., & Good, T. (1970). Teachers' communication of differential expectations for children's classroom performance: Some behavioral data. *Journal of Educational Psychology, 61*, 365-374.

Brown, S. B., Archambault, F. X., Zhang, W., & Westberg, K. (1994, April). *The impact of gifted students on the classroom practices of teachers*. Paper presented at the annual conference of the American Educational Research Association, New Orleans, LA.

Bryant, M. A. (1987). Meeting the needs of gifted first grade children in a heterogeneous classroom. *Roeper Review, 9*, 214-216.

California Achievement Test, Form E. (1984). Monterey, CA: CTB/McGraw-Hill.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Cohen, J. (1994). The earth is round. *American Psychologist, 49(12),* 997-1003.

Coleman, M. R. (1995). The importance of cluster grouping. *Gifted Child Today, 18*(1), 38-40.

Cornell, D. G., Delcourt, M. A. B., Bland, L. C., & Goldberg, M. D. (1990, November). *What happens to students in gifted programs? The learning outcomes study at the University of Virginia.* Paper presented at the 37th annual convention of the National Association for Gifted Children, Little Rock, AR.

Cuban, L. (1984). *How teachers taught: Constancy and change in American classrooms, 1890-1980*. New York: Longman.

Davis, G. A., & Rimm, S. W. (1985). *Education of the gifted and talented.* Englewood Cliffs, NJ: Prentice-Hall.

Delcourt, M. A. B., & Evans, K. (1994). *Qualitative extension of the learning outcomes study* (Research Monograph 94110). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Delcourt, M. A. B., Loyd, B. H., Cornell, D. G., & Goldberg, M. D. (1994). *Evaluation of the effects of programming arrangements on student learning outcomes* (Research Monograph 94108). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Fuchs, L. S., Fuchs, D., & Phillips, N. (1994). The relation between teachers' beliefs about the importance of good students work habits, teacher planning, and student achievement. *The Elementary School Journal, 94*(1), 331-345.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). White Plains, NY: Longman.

Gentry, M. L. (1996). *Cluster grouping: An investigation of student achievement, identification, and classroom practices*. Unpublished doctoral dissertation, University of Connecticut, Storrs.

George, P. (1993). Tracking and ability grouping in the middle school: Ten tentative truths. *Middle School Journal, 24*(4), 17-24.

George, P. (1995). Is it possible to live with tracking and ability grouping? In H. Pool & J. A. Page, (Eds.), *Beyond tracking: Finding success in inclusive schools* (pp. 45-56). Bloomington, IN: Phi Delta Kappan Educational Foundation.

Good, T. (1981). Teacher expectations and student perceptions: A decade of research. *Educational Leadership, 38*(5), 415-421.

Good, T. L., & Brophy, J. E. (1987). *Looking in classrooms* (4th ed.). New York: Harper & Row.

Goodlad, J. I. (1984). *A place called school*. New York: McGraw Hill.

Grinder, R., & Nelson, E. A. (1985). Individualized instruction in American pedagogy: The saga of an educational ideology and a practice in the making. In M. C. Wang & H. J. Walberg (Eds.), *Adapting instruction to individual differences* (pp. 24-43). Berkeley, CA: McCutchan.

Hallinan, M. T. (1988). Chapter 1 and student achievement: A conceptual model. *Studies in Educational Evaluation, 12*, 193-213.

Hansen, J. B., & Feldhusen, J. F. (1994). Comparison of trained and untrained teachers of gifted students. *Gifted Child Quarterly, 38*(3), 115-121.

Hieronymus, A. N., Hoover, H. D., & Lindquist, E. F. (1984). *Iowa tests of basic skills*. Chicago: Riverside Publishing.

Hoover, S., Sayler, M., & Feldhusen, J. F. (1993). Cluster grouping of elementary students at the elementary level. *Roeper Review, 16*, 13-15.

Hopfenberg, W. S., & Levin, H. A. (1993). *The accelerated schools resource guide*. San Francisco: Jossey-Bass.

Huck, S. W., & Cormier, W. H. (1996). *Reading statistics and research*. New York: HarperCollins.

Ivey, J. D. (1965). Computation skills: Results of acceleration. *The Arithmetic Teacher, 12,* 39-42.

Juntune, J. (1981). *Successful programs for the gifted and talented.* Hot Springs, AR: National Association for the Gifted and Talented.

Kaplan, S. N. (1974). *Providing programs for the gifted and talented*. Ventura, CA: Office of the Ventura County Superintendent of Schools.

Kennedy, D. M. (1989). *Classroom interactions of gifted and nongifted fifth graders*. Unpublished doctoral dissertation, Purdue University, West Lafayette, IN.

Kennedy, D. M. (1995). Teaching gifted in regular classrooms: Plain talk about creating a gifted-friendly classroom. *Roeper Review, 17*, 232-234.

Kerlinger, F. N. (1973). *Foundations of behavioral research* (2nd ed.). New York: Holt, Rinehart and Winston.

Kulik, J. A. (1992). *An analysis of the research on ability grouping: Historical and contemporary perspectives* (RBDM 9204). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Kulik, C.-L. C., & Kulik, J. A. (1984). *Effects of ability grouping on elementary school pupils: A meta-analysis*. Paper presented at the annual meeting of the American Psychological Association, Toronto, Canada. (ERIC Document Reproduction Service No. ED 255 329)

Kulik, C.-L. C., & Kulik J. A. (1985). *Effects of ability grouping on achievement and self-esteem*. Paper presented at the annual convention of the American Psychological Association, Los Angeles, CA.

Kulik, J. A., & Kulik, C-L. C. (1987). Effects of ability grouping on student achievement. *Equity and Excellence, 23*(1, 2), 22-30.

Kulik, J. A., & Kulik, C-L. C. (1991). Ability grouping and gifted students. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 178-196). Boston: Allyn and Bacon.

Kulik, J. A., & Kulik, C-L. C. (1992). Meta-analytic findings on grouping programs. *Gifted Child Quarterly, 36,* 73-77.

LaRose, B. (1986). The lighthouse program: A longitudinal research project. *Journal for the Education of the Gifted, 9,* 224-32.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Long, M. (1981). *Rural programs for gifted and talented students*. Spokane, WA: Center for Gifted Education.

Long, R. G. (1957). A comparative study of the effects of an enriched program for the talented in advanced algebra classes. *Dissertation Abstracts International, 18,* 529. (University Microfilms No. 00-24831)

Lou, Y., Abrami, P. C., Spence, J. C., Poulsen, C., Chambers, B., & d' Apollonia, S. (1996). Within-class grouping: A meta analysis. *Review of Educational Research, 66*(4), 423-458.

Marshall, C., & Rossman, G. B. (1989). *Developing qualitative research*. New York: Sage.

McBrien, J. L., & Brandt, R. S. (1997). *The language of learning: A guide to education terms*. Alexandria, VA: Association for Supervision and Curriculum Development.

McInerney, C. F. (1983). *Cluster grouping for the gifted, the bottom line: Research-based classroom strategies. A series for teachers*. St. Paul, MN: LINE, Inc.

Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. San Francisco: Jossey-Bass.

Michigan Department of Education. (1994, August). *1992-93 Bulletin 1014: Michigan K-12 school districts ranked by selected financial data*. Lansing, MI: Author.

Miles, M. B., & Huberman, A. M. (1995). *Qualitative data analysis* (2nd ed.). Thousand Oaks, CA: Sage.

Mitchell, E. S. (1986). Multiple triangulation: A methodology for nursing science. *Advances in Nursing Science*, *8*(3), 18-26.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative of educational reform*. Report to the nation and the Secretary of Education. Washington, DC: U.S. Government Printing Office.

Oakes, J. (1985). *Keeping track: How schools structure inequality*. New Haven, CT: Yale University Press.

Purcell, J. (1994). *The status of programs for high ability students* (CRS94306). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Reis, S. M., Gentry, M. L., & Park, S. (1995). *Extending the pedagogy of gifted education to all students: The enrichment cluster study* (Research Monograph 95118). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Reis, S. M., Westberg, K. L., Kulikowich, J., Caillard, F., Hébert, T., Plucker, J., Purcell, J. H., Rogers, J. B., & Smist, J. M. (1993). *Why not let high ability students start school in January? The curriculum compacting study* (Research Monograph 93106). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Renzulli, J. S. (1977). *The enrichment triad model*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan*, *60*(3), 180-184, 261.

Renzulli, J. S. (1993). *Schools are places for talent development: Applying "gifted education" know-how to total school improvement*. Unpublished manuscript. Storrs, CT: University of Connecticut.

Renzulli, J. S. (1994). *Schools for talent development: A comprehensive plan for total school improvement*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1985). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1991). The reform movement and the quiet crisis in gifted education. *Gifted Child Quarterly*, *35*, 26-35.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A how-to guide for educational excellence* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Smith, L. H., Callahan, C., White, A., & Hartman, R. (1977). *Scales for rating the behavioral characteristics of superior students*. Mansfield Center, CT: Creative Learning Press.

Rogers, K. B. (1991). *The relationship of grouping practices to the education of the gifted and talented learner* (RBDM 9102). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Rogers, K. B. (1993). Grouping the gifted and talented: Questions and answers. *Roeper Review, 16*, 8-12.

Rosenthal, R. (1994). Interpersonal expectancy effects: A 30-year perspective. *Current Directions in Psychological Science, 3*(6), 176-179.

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupil's intellectual development*. New York: Holt, Rinehart, & Winston.

Scariano, S., & Davenport, J. (1987). The effects of violations of the independence assumption in the one way ANOVA. *American Statistician, 41,* 123-129.

Schlichter, C. (1986). Talents unlimited: Applying the multiple talent approach to mainstream and gifted programs. In J. S. Renzulli (Ed.), *Systems and models for developing programs for the gifted and talented* (pp. 352-390). Mansfield Center, CT: Creative Learning Press.

Schunk, D. H. (1987). Peer models and children's behavioral change. *Review of Educational Research, 57,* 149-174.

Simpson, R. E., & Martinson, R. A. (1961). *Educational programs for gifted pupils: A report to the California legislature prepared pursuant to Section 2 of Chapter 2385, Statutes of 1957*. Sacramento, CA: California State Department of Education. (ERIC Document Reproduction Service Number ED 100 072)

Slavin, R. E. (1987a). Ability grouping: A best-evidence synthesis. *Review of Educational Research, 57,* 293-336.

Slavin, R. E. (1987b). Grouping for instruction. *Equity and Excellence, 23*(1, 2), 31-36.

Slavin, R. E. (1990). Ability grouping, cooperative learning, and the gifted. *Journal for the Education of the Gifted, 14*, 3-8.

Smith, H. W. (1975). Triangulation: The necessity for multi-method approaches. In W. H. Smith (Ed.), *Strategies of social research: The methodological imagination* (pp. 271-292). Englewood Cliffs, NJ: Prentice-Hall.

Smith, M. L. (1980). Meta-analysis of research on teacher expectations. *Evaluation in Education, 4(*1), 53-55.

Strauss, A. L. (1987). *Qualitative analysis for social scientists*. New York: Cambridge University Press.

Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics*. New York: HarperCollins.

Thorndike, R. L., & Hagen, E. P. (1986). *Cognitive abilities test*. Chicago: Riverside.

Tomlinson, C. A., & Callahan, C. M. (1992). Contributions of gifted education to general education in a time of change. *Gifted Child Quarterly*, *36*, 183-189.

U.S. Department of Education, Office of Educational Research and Improvement. (1993). *National excellence: A case for developing America' s talent*. Washington, DC: U.S. Government Printing Office.

VanTassel-Baska, J. (1987). Point-counterpoint: The ineffectiveness of the pull-out program model in gifted education, a minority perspective. *Journal for the Education of the Gifted, 10*, 255-263.

Westberg, K. L., Archambault, F. X., Dobyns, S. M., & Salvin, T. J. (1993). *An observational study of instructional and curricular practices used with gifted and talented students in regular classrooms* (Research Monograph 93104). Storrs, CT: University of Connecticut, The National Research Center on the Gifted and Talented.

Wheelock, A. (1992). *Crossing the tracks: How untracking can save America's schools*. New York: New Press.

Williams, F. (1986). The cognitive-affective interaction model for enriching gifted programs. In J. S. Renzulli (Ed.), *Systems and models for developing programs for the gifted and talented* (pp. 463-484). Mansfield Center, CT: Creative Learning Press.

Willson, V. L. (1989). Review of the Iowa Tests of Basic Skills, forms G and H. In J. C. Conoley & J. J. Kramer (Eds.), *The tenth mental measurements yearbook* (pp. 395-398). Lincoln, NE: Buros Institute of Mental Measurement.

Winebrenner, S. (1992). *Teaching gifted kids in the regular classroom.* Minneapolis, MN: Free Spirit.

Winebrenner, S., & Devlin, B. (1994). *Cluster grouping fact sheet: How to provide full-time services for gifted students on existing budgets*. Lombard, IL: Phantom Press.

Ziehl, D. C. (1962). An evaluation of an elementary school enriched instructional program. *Dissertation Abstracts International, 24,* 2743. (University Microfilms No. 62-04644)

Research Monograph Series

The National Research Center on the Gifted and Talented
The University of Connecticut
362 Fairfield Road, U-7
Storrs, CT 06269-2007
www.gifted.uconn.edu

Production Assistants
Dawn R. Guenther
Siamak Vahidi

Reviewers
Beverly Coleman
Gary Davis
Bessie Duncan
E. Jean Gubbins
Leticia Hernandez
Valentina Kloosterman
Harry Milne
Emily Stewart

Also of Interest

Regular Classroom Practices With Gifted Students: Results of a National Survey of Classroom Teachers
Francis X. Archambault, Jr., et al.

An Observational Study of Instructional and Curricular Practices Used With Gifted and Talented Students in Regular Classrooms
Karen L. Westberg, et al.

Why Not Let High Ability Students Start School in January?
The Curriculum Compacting Study
Sally M. Reis, et al.

Evaluation of the Effects of Programming Arrangements on Student Learning Outcomes
Marcia A. B. Delcourt, et al.

Qualitative Extension of the Learning Outcomes Study
Marcia A. B. Delcourt and Karen Evans

Also of interest from the

Research Monograph Series

Toward a New Paradigm for Identifying Talent Potential
Mary M. Frasier and A. Harry Passow

Talents in Two Places: Case Studies of High Ability Students With Learning Disabilities Who Have Achieved
Sally M. Reis, Terry W. Neu, and Joan M. McGuire

The Effects of Group Composition on Gifted and Non-Gifted Elementary Students in Cooperative Learning Groups
David A. Kenny, Francis X. Archambault, Jr., and Bryan W. Hallmark

Extending the Pedagogy of Gifted Education to All Students
Sally M. Reis, Marcia Gentry, and Sunghee Park

Case Studies of Talented Students Who Achieve and Underachieve in an Urban High School
Sally M. Reis, et al.

Profiles of Successful Practices for High Ability Students in Elementary Classrooms
Karen L. Westberg and Francis X. Archambault, Jr.

Academic Diversity in the Middle School: Results of a National Survey of Middle School Administrators and Teachers
Tonya R. Moon, Carol A. Tomlinson, and Carolyn M. Callahan

A Triarchic Approach to Giftedness
Robert J. Sternberg

A Study of Achievement and Underachievement Among Gifted, Potentially Gifted, and Average African-American Students
Donna Y. Ford

Instruments Used in the Identification of Gifted and Talented Students
Carolyn M. Callahan, et al.

Instruments and Evaluation Designs Used in Gifted Programs
Carolyn M. Callahan, et al.

Preservice Teacher Preparation in Meeting the Needs of Gifted and Other Academically Diverse Students
Carol A. Tomlinson, et al.

Also of interest from the

Research Monograph Series

Project START: Using a Multiple Intelligences Model in Identifying and Promoting Talent in High-Risk Students
Carolyn M. Callahan, et al.

NRC G/T

The National Research Center on the Gifted and Talented Research Teams

University of Connecticut

Dr. Joseph S. Renzulli, Director
Dr. E. Jean Gubbins, Associate Director
University of Connecticut
School of Education, U-7
Storrs, CT 06269-2007
860-486-0283

Dr. Deborah E. Burns
Dr. Sally M. Reis
Dr. Karen L. Westberg

City University of New York, City College

Dr. Deborah L. Coates, Site Research Coordinator
City University of New York (CCNY)
138th and Convent Avenue
NAC 7/322
New York, NY 10031
212-650-5690

Stanford University

Dr. Shirley Brice Heath, Site Research Coordinator
Stanford University
Department of English
Building 50, Room 52U
Stanford, CA 94305
415-723-3316

Dr. Guadalupe Valdés

University of Virginia

Dr. Carolyn M. Callahan, Associate Director
Curry School of Education
University of Virginia
405 Emmet Street
Charlottesville, VA 22903
804-982-2849

Dr. Tonya Moon
Dr. Carol A. Tomlinson

Yale University

Dr. Robert J. Sternberg, Associate Director
Department of Psychology
Yale University
P.O. Box 208205
New Haven, CT 06520-8205
203-432-4632