Chapter 5
Conclusions and Recommendations

The purpose of this chapter is three-fold. The first is to offer a synopsis of the literature review and the research methodology. The second purpose is to describe findings and conclusions. The final purpose is to suggest implications and recommendations for further study.

The review of literature reveals that the high school scheduling structure developed nearly a century ago has seen little change for decades. Time provided in the schedule is an influencing variable for instructional effectiveness (Siefert & Beck, 1984, Walberg, 1988, Dewalt & Rodwell, 1988, Cotton, 1990) and how that time is used is a factor in student achievement (Siefert & Beck, 1984, Goodlad, 1984). Research reports (Cawelti, 1994), professional organizations (NCTM, 1991), educators at all levels (Sizer, 1985, Canady & Rettig, 1995, DeJarnett, 1995), and others (McDonnell, 1989) have called for change and improvement in the high school schedule. Current trends indicate that a growing number of high schools across Virginia (Rettig, 1996) and the United States are implementing a variety of block scheduling options, including the alternate day block schedule that is the focus of this study.

The review of literature provides evidence that teachers see positive effects for student grades with the block and that teachers working in a block schedule regularly use a variety of teaching strategies including problem-solving, cooperative learning, computer activities, student projects, guest speakers, and field trips (Averett, 1994, Sessoms, 1995). Opposing voices in the literature offer differing views regarding the potential benefits of a block schedule for teaching mathematics (algebra.) On one hand, the block schedule is seen as possibly hampering students who have difficulty learning mathematics (Usiskin, 1995) while on the other, the block has been offered as a possible solution to high failure rates in ninth-grade algebra (Canady, 1995). The apparent contradictions among national experts combined with a lack of specific data on algebra instruction in the block establishes a need for this study of algebra instruction in the alternate-day block schedule.
This study is built upon an instructional framework consisting of three key variables (teacher, student(s), and the lesson) that interact constantly during the allotted time. The primary purpose of this study was to answer the question "What kinds of learning experiences are evident in algebra classes in a block schedule?" This was accomplished by closely examining instruction in first-year algebra in an alternate-day block schedule and then developing thick descriptions to represent the reality and perceptions of those closest to the classroom as well as the perceptions of the researcher. Data sources included multiple classroom observations, a written survey, individual teacher interviews, and an examination of school records (grades reported.) A case record was developed for each of six teacher cases. Triangulation of sources was important to developing the cases and cross-case matrices were used during the analysis.

By its nature, qualitative research does not guarantee generalizations across populations. However, through careful examination of detailed cases, insights from specific cases may prove valuable to the general.

Summary of Findings
All of the teachers indicated that they were 'not part of the decision' to use a block schedule, even though all but one of the teachers were teaching in the same two high schools in 1993 when the decision was made. Four of the six felt unprepared for that first year and two, in particular, said that it had been a difficult first year, citing a lack of specific training or knowledge to which they might turn. Learning new strategies as well as continuously reflecting on and polishing current strategies takes time. Successful change requires planning before and during the implementation process. Teachers' viewed the planning prior to implementation as inadequate and a limiting factor to both their initial readiness and their current level of satisfaction with teaching algebra in the block.

"It has been well-known...that staff development and successful innovation or improvement are intimately related. However, even in the narrow sense of successful implementation of a single innovation, people have underestimated what it takes to accomplish this" (Fullan, 1990, p. 3).
Each of the teachers indicated a strong sense of responsibility for using available time well. This supports John Goodlad's (1984) reference to time as "the most precious resource" for teachers. Four of the six said that they are becoming more comfortable with the block; three asserted that they now enjoy the longer block of time. However, teachers' comments also indicate concerns with the current configuration. They offer suggestions for modifications, including shorter class periods and meeting students on a daily basis for three or four classes (four-by-four plan.)

All six teachers said that they have been challenged to try new strategies and that their algebra lessons are now more varied. All indicate greater use of cooperative group strategies (primarily partners and groups of four) along with regular use of lecture, problem-solving, and some student projects. These findings are compatible with Sessoms' study (1995). Other strategies consistently observed in the algebra lessons were modeling and demonstration, use of reading skills, extensive questioning and dialogue, guided practice in applying the rules or algorithms of algebra, a variety of assessments (individual and group, student-scored and teacher-scored), use of graphing calculators, and some applications requiring real data. One teacher used student discovery activities on a regular basis.

The algebra teachers mentioned several benefits of the block schedule that have been noted by others. These benefits include interacting with fewer students each day so teachers get to know students better and having more time during class to reinforce ideas and to finish an activity (taking the student from concept to application) (Cushman, 1995). They believe that both teachers and students are less rushed and more relaxed. The six teachers' algebra lessons reflect claims and informal findings reported by other Virginia high schools. That is, that the block schedule offers time for projects, variety in student groupings, use of technology (in this case, graphing calculators) and time for the teacher to get to know students better. However, certain strategies suggested by the same informal reports were not observed, including use of community resources (guest speakers or field trips), an expanded use of computer technology, or use of student journals or portfolios.
Planning was a central issue for case teachers who cited planning time as key to accomplishing the change to a block schedule. The schedule provides a long planning block every other day (which teachers like, but which requires them to be good time managers.)

The teachers' interview statements support Cushman (1995) who says that teachers 'wish to reinvent their role, but this takes time.' The six teachers offered a variety of suggestions for improving their practice, including visiting algebra teachers in other high schools with block scheduling in order to share and receive guidance from others. This was particularly important to the teacher who was unsure of herself and felt lacking in creativity. As Goodlad says, teachers are "conditioned by school" (Goodlad, 1984, p.29). When unsure what to do, it is natural to rely on prior training and experience and to continue doing what has been done. Lacking experience with the block and receiving no specific training in new strategies, teachers relied on their knowledge base built in teacher training programs and student teaching as well as on-the-job during their years of teaching primarily in shorter, daily time frames. They learned by doing, often fitting familiar strategies into the new structure. Change is a gradual process (Guskey, 1986). Teachers do not easily relinquish or modify teaching practices that they have developed and refined in the classroom over time. "Effective implementation [change] consists of alterations in curriculum materials, practices and behaviors, and beliefs and understandings by teachers vis-a-vis potentially worthwhile innovations. Put simply, successful change involves learning how to do something new" (Fullan, 1990, p.4).

In addition to visiting other teachers, these six teachers would have liked unencumbered planning time (perhaps in the summer) with their colleagues as a local team. They could have planned together, reviewed materials, examined the curriculum demands, and shared ideas. "...teachers benefit from a broad spectrum of activities that let them define, investigate and solve real problems, reflect on their own experiences, and collaborate with others. Finding time for regular teacher learning and conversation is a crucial aspect of any professional development agenda" (Robinson, 1996, p. 39). Think time is critical. If teachers are to analyze a substantive problem such as how to reshape algebra instruction for a block schedule, they need time.
Given time to reflect and to plan, it is likely that these teachers might find ways to accomplish the tasks they advise other teachers to tackle before beginning to teach algebra in a block schedule.

Fullen (1990) synthesizes research showing that innovations take root based upon the quality of assistance given during the change process. A high level of assistance might provide teachers with access to conferences, inservice training, committee structures, teams, visits to other sites, materials, peer consultants, external consultants, and support from central office. Case teachers perceived that they received minimal or no assistance as they made the change to the block schedule.

These teachers recognize algebra as a gateway course, critically important to students in terms of graduation requirements. All high school students in Newton must enroll in algebra prior to graduation. Teachers' voices reflect anxiety when they speak of the need for student engagement and time-on-task, especially when they recognize that some students are motivated in mathematics and others are not. These teachers suggest that ninth graders may be less able to concentrate and absorb all of the material than older students and they indicate that the longer block is a special challenge for the math-anxious student or the student whose primary interest is not mathematics. Under current conditions, the experiences of these six teachers do not provide evidence that the alternate-day block can be a particular help with ninth graders in algebra (Canady, 1995).

The teachers uniformly agree that students who have attendance problems tend to become lost and find it difficult to catch up. In fact, their comments support Usiskin's (1995) statement that the block tends to hamper students with difficulty concentrating, or who are absent more than others, or who have difficulty in mathematics. Student absences influence achievement (grades) in algebra. The teachers' perceptions that student achievement in algebra has not improved with the alternate-day block schedule is correct. In these teachers' algebra classrooms, 26% of the students earned a D and 31% earned an F at the end of the year. This compares to district data showing that 25% of the students enrolled in algebra earned a D and 30% earned an F prior to implementation of the block schedule. These data support Usiskin's
suggestion (1995) that student performance (in mathematics) is not likely to improve with the block schedule.

Conclusions
1. Teachers in this study did not feel involved in the initial decision to change to a block schedule and they did not feel adequately prepared to teach in the block. Over time they have adjusted to the schedule and have devised strategies that work with their students. Some teachers indicate that they are comfortable with the schedule and are enjoying it more. Others continue to reflect some discomfort and dissatisfaction with the schedule. Some teachers have modified previously successful strategies. Others have tried a variety of new strategies and new materials. In each case, teachers use their content knowledge, personal skills or artistry, and past experiences to fashion algebra lessons that utilize the time available in the block. Teachers have been 'making it work', some more successfully than others.

2. Although the literature on block scheduling suggests a wide range of instructional strategies that may be evident when longer blocks of time are available (Averett, 1994, Sessoms, 1995), this study found a consistent pattern of strategies used most frequently in the algebra lessons. These strategies reflect a basic three-part instructional model that includes a prompt beginning to focus student attention, a period of explanation and modeling, and a time for practice and summarization. Most lessons included a discussion of homework problems and concluded with a new homework assignment. All teachers permitted students to use graphing calculators and all used some type of cooperative grouping arrangement at least occasionally. Teachers indicated that the block has required them to try new strategies but there are some strategies that did not appear to be utilized in algebra lessons, including use of journals and portfolios, guest speakers and field trips, or computer lab activities and simulations.

3. Student grades in algebra have not improved since implementation of the block. A recent change in local graduation requirements has expanded student enrollment in algebra by requiring all ninth graders to enroll in algebra (or a higher-level mathematics course.) The percentage of students failing algebra has increased slightly in the alternate-day block.
Local implications
Educational change and improvement is a lengthy process requiring leadership, technical support, on-going dialogue among participants and appropriate staff development (Fullan, 1990, Joyce, 1990). If we accept that change is gradual and that feedback along the way is important to achieving a major change, then we must provide teachers with time and feedback. "Innovations are most successful when teachers can regularly discuss their experiences in an atmosphere of collegiality and experimentation" (Guskey, 1986, p.10). Any consideration of block schedule should incorporate staff development and time for teachers to prepare in advance. The advice of these six teachers to others reflects an awareness of specific activities that, if accomplished prior to beginning a block schedule, would result in a more positive instructional experience for students and teachers. These tasks include researching alternative teaching strategies, designing and planning for student projects, finding relevant application problems, planning lab activities, redesigning student homework assignments, developing a plan for homework support and a plan for increasing parent involvement, developing course timelines, planning lessons to include at least three different activities for students, and locating and purchasing appropriate hands-on materials and algebra software. Time must be provided during the year for teachers to work as teams or study groups. Such unencumbered opportunities to think and talk with other professionals should increase the likelihood of success in the block.

At Hamilton and Russell High Schools, the initial planning year has passed. However, it is not too late to recognize the need to engage teachers in the process of reflecting on the current situation in order to revise or modify the block. Fullan's "comprehensive framework for classroom and school improvement" (1990, p. 15) values the 'teacher-as-learner' concept. The model suggests that teachers develop their technical repertoire (instructional skills and strategies) while engaged in the process of reflective practice. Teachers are given an opportunity to investigate and explore within the innovation while offering ideas and assistance to others (and receiving the same.) Interaction with others is critical. Learning new strategies by observing demonstrations and then practicing with feedback from a coach (whether consultant or skillful colleague) supports transfer of theory to practice in new situations.
A training model that includes theory combined with demonstration, practice, and feedback through coaching has been shown to be a most effective staff development model (Joyce and Showers, 1988). Such a model could be used to assist teachers to take the actions they have recommended to improve instruction. Student engagement and learning are driving forces in these models as is leadership. [Leadership was not a focus of this study and no specific evidence was gathered to determine the impact of leadership on the change to block schedule.] "All group learning ultimately reflects someone's original values" (Schein, 1992, p. 19). The leadership in Hamilton and Russell High Schools advocated a shift to block schedule for several reasons. One reason was a desire to improve student achievement. That goal has not been achieved in algebra with the result that the block schedule has not met validation with the algebra teachers. Until the group participates in joint actions resulting in an outcome that confirms the leader's proposal, the belief of the leaders (that the block schedule will lead to improved instruction and improved student achievement) will not become a shared value (Schein, 1992). Under the current schedule, student achievement in algebra is not improving. This is a local dilemma. The block schedule may yet contribute to a solution; further study requires that teachers be at the center of the problem-solving process.

This study provides rich information for local planning. The snapshots are clear. The view into the algebra classrooms shows teachers' uneven efforts to provide appropriate, engaging activities for students to enhance student learning in algebra. The cases reveal occasional positive examples as well as problems to confront and solve. The challenge is to engage teachers in a systemic reflective process that further clarifies needs and then to link the opportunity for teacher development to classroom improvement. Time is an essential variable supporting instruction. Teachers must participate in developing and implementing a plan that optimizes use of time while redefining algebra instruction to improve student achievement. Such a plan may require further changes in the block schedule.

Recommendations for future study
This study was designed to provide insight into algebra instruction in one type of block schedule—the alternate day hundred-minute block. A similar study of algebra
instruction in a four-by-four semester block schedule would provide useful comparisons. Studies situated in other content areas as well as other mathematics classes could provide useful information. What kinds of learning experiences are evident in social studies classes? How does the reality of the geometry classroom compare to the situation in algebra?

Inadequate planning and preparation prior to implementation of the block was a central concern of case teachers. Other studies might examine the transition process in order to determine the impact of planning on the variety of strategies observed in the [algebra] classroom as well as teacher satisfaction and student grades.

Other issues important to the teachers in this study were homework and the impact of absenteeism on achievement in algebra. These issues warrant further study. Although findings in this study indicate that student grades in algebra did not improve, further achievement studies are needed. What patterns of achievement occur in other mathematics courses or other disciplines in a block schedule? Student achievement might be tracked across courses for comparison (by course, block design, or student characteristics.)

One point of entry to change in instruction is through the individual planning time provided for the teacher. Teachers may utilize their personal planning time to effect changes in instruction. In order to explore the relationship between change and planning, it would be useful to examine ways that teachers utilize their planning time throughout the year in order to understand the connection between planning time, teacher reflection, and change in instruction. How does the variable of teacher planning time support change? Teachers note the importance of planning time to delivery of effective lessons. However, teachers must do more than simply manage planning time well. The culture surrounding teacher planning time and how that time is used may need to be reexamined and redefined. Such issues pose questions for further study.