

AN ASSESSMENT OF STANDARDS BASED REFORM IN FLORIDA'S MIDDLE  
SCHOOL SCIENCE PROGRAMS

By

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Kathryn Elizabeth Stuart Hammer

To my parents,  
Joan and Frank Stuart,  
my husband,  
Joachim Hammer,  
and my daughter,  
Amelia Joan Hammer

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Abstract of Dissertation Presented to the Graduate School  
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By

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The era of school accountability and standards based reform (SBR) has brought many challenges and changes to Florida's public schools. It is important to understand any shifts in teachers' attitudes and to identify the changes teachers are making as they implement SBR. The study was designed to assess teachers' attitudes and perceptions of changes related to SBR and the Florida Comprehensive Assessment Test (FCAT) in middle school science programs in Florida. Survey questions sought to identify teacher perceptions of changes in curriculum, instruction and daily practice as schools documented and incorporated the Sunshine State Standards (SSS) for science and began focusing on preparing students for the science FCAT.

The survey was distributed to 265 randomly selected middle school science teachers throughout the State of Florida. Seventy-six and ninety-two percent of teachers reported increased levels of stress as a result of SBR and the science FCAT, respectively. Eighty-six percent of teachers reported loss of autonomy and control over what goes on

in their classrooms, and fifty-four percent of teachers reported loss of freedom and creativity regarding curriculum and lessons. Eighty-three percent of teachers believe that increased time spent on test preparation has come at the expense of other important curricular items. By contrast, only nineteen percent of teachers believe that the science FCAT has brought about improvement in curriculum, instruction and student learning in science. Yet, twenty-five percent of teachers believe that reform efforts will improve their school.

An important finding is that teachers' attitudes toward reform efforts are strongly influenced by their attitudes toward the administration at their school. Teachers who receive more support from administrators have more positive attitudes toward all aspects of SBR and the science FCAT measured in this study. Although the majority of teachers reported negative attitudes toward the reform process, a small minority that report working under supportive administrators believe that reform efforts are working well or will soon show positive effects. No school should overlook the potential of a supportive administration in its effort to improve school programs.

## CHAPTER 1 INTRODUCTION

The era of school accountability and standards based reform has brought many challenges to Florida public schools. After pilot testing in the spring of 2002, the state of Florida's Department of Education administered the science FCAT to students in grades 5, 8 and 10 in all Florida schools in spring, 2003. The science FCAT is based on the Sunshine State Standards for science and has been developed to assess student learning of science in Florida's public schools. Teachers are required to demonstrate that their curriculum will cover the Sunshine State Standards for science. The process of altering curriculum and other educational practices to reflect the Sunshine State Standards is an integral part of standards based reform. It is important to identify the changes science teachers may be making as a result of standards based reform and to consider the degree to which an examination of reform efforts in science teaching might yield insight into the larger area of SBR in Florida.

Standardized tests are considered by many to be an important means of ensuring that America's educational system remains accountable for providing the best learning opportunities possible for all children. Although no test can perfectly measure what a student has learned, standardized testing may provide a quantifiable and visible estimate of what a student knows. This numerical estimate may then provide a reference point against which future achievement can be measured. These achievement reference points can be valuable in different ways to teachers, administrators, schools, districts and states, as well as to policymakers at all levels of government. Data from standardized tests can

be used to identify trends at the national level, and by organizations to study various curricular and testing issues.

For teachers, standardized test data, such as FCAT, can be used to determine patterns in student performance. Teachers can determine which students are not working to their ability by identifying students with high test scores and mediocre or inconsistent work in class. Teachers can also identify students who seem to be working above their potential, and those students who may be consistently in need of extra help. In general, teachers can use standardized test scores as a tool in determining the needs of their students.

Administrators can use standardized test data to see how their school's achievement compares to other similar schools. They can work with teachers to set goals for student achievement. In addition, administrators can use student test scores as an incentive for effective instruction on the part of teachers. Teachers who are aware that student scores will be carefully considered may be more likely to do everything they can to help their students succeed. Finally, student test scores may help administrators identify teachers who are ineffective at helping students learn.

School districts and states also use standardized test data to compare student achievement and to look for trends. Standardized test data can help districts and states decide how best to allocate money and resources. Data obtained from standardized tests can also be helpful to organizations by giving diagnostic information needed for designing better tests. Data can also be helpful in determining what adjustments could be made to curriculum and instruction on a large scale. Particularly now that there are national standards and standards for 49 of the 50 states, standardized assessments may

provide a way to determine how well teachers are incorporating standards into their teaching.

Although there is a definite role for standardized testing, there is cause for concern that test scores might be used in what some consider harsh accountability programs. The term high-stakes is used to describe standardized tests in Florida and some other states because of the important nature of the decisions based on standardized test scores. FCAT scores, and the Governor's A+ Schools Program, (2000), for example, are used to make decisions on issues such as graduation, retention, increases in teacher salaries and school funding, and even the placement or removal of school principals. Although utilizing FCAT scores is a relatively fast and cost effective means of demonstrating educational accountability to the public, educators worry that detrimental effects to student learning may outweigh the benefits. One negative effect is that the intense pressure to prepare students for the FCAT each year may cause a shift in priority in curriculum planning to increase time spent for test preparation at the expense of other material teachers believe is important (Settlage & Meadows, 2002, Wideen et al., 1997). Increases in test scores do not always correlate with increased student learning as measured by other instruments. In some instances the reverse has proven to be true, in that increased test scores have been correlated with a decrease in effective instruction and even a decrease in students' motivation to learn (Amrein and Berliner, 2002, Berliner & Biddle, 1995, McNeil, 2000).

### **Statement of Problem**

Ideal conceptualizations of SBR in K-12 science education have been described in the *National Science Education Standards* (National Research Council, 1996) and in documents published by the American Association for the Advancement of Science such

as *Science for All Americans* and *Benchmarks for Science Literacy* (AAAS 1990, 1993).

The National Science Teachers Association, (NSTA), has also espoused these ideal conceptualizations of SBR in K-12 science education. SBR in K-12 science education as it is taking place in the state of Florida may be driven less by the ideal conceptualizations and more by state and national legislation such as No Child Left Behind (2001), and The Governor's A+ Plan for Schools (2000).

In the best cases of standards based reform, the reform process is much more carefully implemented than is realized by most people. The first step is often for schools or districts to form a committee that includes teachers, administrators, district and state level educators, college of education faculty and members of the school community. The committee may review state and national standards documents and, by consensus, select the ones that are appropriate for their school or district, based on new standards. After standards are selected, the committee may create a comprehensive visionary framework of reform for their school or district, based on new standards. These framework documents often take two to three years to create and can be thought of as a large scale school improvement plan, which is also an important component of many successful middle schools. After the framework document is complete, teachers work together to develop curriculum around the selected standards. Interdisciplinary curriculum is possible and encouraged by experts including Vars, Beane and Jackson. Many teachers enjoy working with standards frameworks because they are allowed a degree of freedom and flexibility to develop the best curriculum and instruction for their school and students (Vars, 2001, Vogler, 2003).

Upon close inspection, the best cases of standards based reform require much of the same infrastructure utilized by the best middle schools (St. John & Pratt, 1997). The framework committee functions like a leadership team in a highly functioning middle school. The entire process takes place in a manner similar to the way in which a successful middle school might implement a school improvement plan. Standards based curriculum is designed by the same kinds of teacher teams often utilized in middle schools. In short, successful standards based reform is implemented very much like the way struggling middle schools are reformed.

### **Purpose of Study**

The purpose of this study was to complete a comprehensive assessment of standards based reform in middle school science programs in Florida. Results from this study were based on responses of sixth, seventh and eighth grade science teachers to a survey designed to discover their perceptions of 1) the degree to which teachers have made changes in curriculum and instruction in the process of incorporating the Sunshine State Standards (SSS) for science and preparing students for the science FCAT; and 2) teachers' perceptions of the consequences of SBR and FCAT both in science and across subject areas at their schools. In addition, the survey was intended to portray teachers' attitudes regarding: 1) SBR school wide; 2) SBR specific to the changes they are making in their science classrooms; and 3) the overall effect of SBR on science curriculum and instruction.

Specifically, the following research questions were answered:

1. How widespread are standards based reform efforts in science in Florida middle schools?
2. What kinds of changes have schools made in the process of reform efforts?

3. How effective are current reform efforts based on teachers' perceptions?
4. What are teacher attitudes regarding current or upcoming reform efforts?
  - a. How favorable are teachers' attitudes toward standards based reform?
  - b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?
5. What kind of changes have teachers made, or do they anticipate making, in their work as a result of standards based reform? These changes may involve, for example, curriculum, instruction, pacing, grouping of students, or use of technology.
6. Are there patterns in teacher attitudes related to:
  - a. Total number of years at current school,
  - b. Teacher attitudes toward school administration,
  - c. Percentage of students on free and reduced lunch,
  - d. Type of school community environment: urban, suburban, rural,
  - e. Percentage of minority students at each school,
  - f. Grade being taught: sixth, seventh or eighth.

Answers to the questions above would allow some degree of clarification of the kinds of changes taking place in schools as a result of SBR. In addition, it may be possible to identify patterns regarding the above features of schools and teachers. Do teachers with differing levels of seniority have different attitudes from newer teachers regarding standards based reform? Do teachers of sixth, seventh and eighth grade have differing perspectives? Do teachers in schools with high numbers of minority and/ or poor students have different attitudes from teachers at predominantly white or affluent schools? Do teachers in urban, rural and suburban schools have differing perspectives? Finally, it may be possible to identify schools where teachers believe reform efforts have had a positive effect on curriculum and instruction and take note of practices at these schools. The answers to these questions may provide valuable information on how to

accomplish standards based reform without compromising effective teaching and learning environments in middle schools.

### **Significance of Study**

Documentation of teacher perspectives has allowed information to be assessed and catalogued regarding the status of SBR in middle school science in the state of Florida. In addition, the study has provided insight into the perceptions of teachers as to the progress and effectiveness of the standards based reform movement. Since teachers are at the center of all reform efforts, their perspective is critical. They are in a position to know not only what is happening, but also how well reform efforts are working. Positive results may show that standards based reform and high stakes testing can have a positive impact on teaching and learning environments. The information gathered from teachers may provide suggestions for maximizing the success of standards based reform and student learning in Florida.

### **Outline of Procedure**

Middle school science teachers will be asked to complete a survey, as described below.

### **Instrumentation and Types of Data Collected**

The instrument consists of a survey designed for middle school science teachers at the sixth, seventh and eighth grade levels. All questions will be answered from the perspective of these middle school science teachers. The survey will be divided into the following sections:

#### **Aspects of school science curriculum**

This portion of the survey was intended to elucidate aspects of schools' sixth, seventh and eighth grade science curriculum from the viewpoint of the teachers. In

addition, some questions will be added about curricular practices outside of the science program. Teachers will be asked to respond to questions such as: “What grade level do you primarily teach?” “What kind of curriculum do you have? Is it traditional subject-based? Is it interdisciplinary or integrated? Is parallel curriculum used?” What is the primary source of your curriculum, textbook or curriculum package? Is it created by teachers or school district?” “To what extent is your curriculum based on the SSS for science?” “What kinds of assessments do you use? Multiple-choice? Essay exams? Portfolio assessments? Alternative, authentic or performance based assessments?” “How much time is spent in the laboratory or on laboratory type activities?” “How much time is spent on constructivist, student-centered or inquiry based activities?”

#### **General aspects of SBR at individual schools**

The survey was intended to obtain teachers’ perceptions of standards based reform in their own school program. For example, questions were asked about teacher attitudes toward the Governor’s A+ Schools Program, (2000), and the reading and math FCAT. Examples of questions included were: “To what extent is your school involved in standards based reform?” “How many hours have you spent this year at your school in professional development in the area of SBR?” “Do you feel pressure to prepare students for the FCAT?” “How much of your instructional time is dedicated to standardized test preparation?” “Do you believe that increased school accountability has been a positive effect of the Governor’s A+ Schools Program?”

#### **Aspects of SBR in middle school science programs**

The survey contained questions on whether teachers have been asked to make changes in their teaching involving the Sunshine State Standards for science or the science FCAT and what those changes are. The survey also addressed teacher attitudes

toward standards based reform and the effect it has had on their own teaching. There were also questions asking teachers about the effect the changes have had on their own teaching. Examples of survey questions are: “Who requires the use of the SSS for science? Principal? Superintendent? Department chair?” Do you believe that student achievement in science has increased as a result of SBR or the science FCAT?” “Have you felt pressure to alter your science curriculum to prepare students for the science FCAT?” “Do you believe that SBR has resulted in increased effectiveness of your science curriculum?”

### **Background information from participating teachers**

Information was collected including total number of years teaching and seniority of teachers in terms of number of years teaching at current school. This information was collected in order to help determine whether teacher attitudes vary depending on the length of their career and the length of time since their training.

### **Demographic information on schools and surrounding communities**

Information was collected on the percentage of students on free and reduced lunch at each school. This information was collected in order to help determine whether teachers at schools with affluent students have attitudes toward reform which are different from teachers at schools with predominantly low income or less affluent students.

### **Individual teacher comments**

Since the survey format did not allow teachers to elaborate on their responses, they were encouraged to send in additional comments with their surveys.

**Data Collection**

Surveys were mailed to a random sample of sixth, seventh and eighth grade science teachers throughout the state of Florida with an accompanying cover letter. Teachers completed surveys and recorded their data on scantron forms that were returned along with the surveys and any additional comments teachers wished to make. The survey data remain confidential with a catalog system in which each teacher is assigned a number according to his/her county. Replacement surveys needed only to be sent to teachers who had not yet returned a survey. The catalog number allowed for clarification of whether a survey has been returned.

**Pilot Testing**

The survey instrument underwent pilot testing in Alachua County with 30 middle school science teachers. The purpose of the Pilot Testing was to test the procedure for data collection and determine whether the teachers had any problems answering the questions on the survey.

**Statewide Mailing**

Following the analysis of pilot data, the survey was distributed to middle school science teachers throughout Florida. Two hundred sixty five surveys were sent to middle school science teachers in Florida. In order to obtain as high a response rate as possible, four personalized contacts were made with each teacher according to the Tailored Design Method (Dillman, 2000). The first mailing was an introductory letter that described the study, its significance to curriculum and instruction in science, and the critical importance of teachers' experience as a variable in answering the questions posed in the study. A second mailing two days later restated the important points summarized in the first letter, and included the survey itself. A third mailing was sent within a week to thank the

teachers for responding. The fourth mailing sent two weeks later included a replacement survey for teachers who had not yet responded.

### **Sample**

A systematic sampling technique was utilized where every tenth middle school science teachers of grades six, seven and eight, in the state of Florida was selected. The sampling frame consists of the entire target population of middle school science teachers of grades six, seven and eight throughout the state of Florida. A list of all Florida middle school teachers was obtained from Market Data Retrieval service.

### **Definitions**

- **Standards Based Reform (SBR):** Used to refer to changes made within the classroom, school or school district in the State of Florida having to do with incorporating and/or documenting the Sunshine State Standards for science and as a result of preparing students for the FCAT, the Florida Comprehensive Assessment Test.
- **High Stakes Testing:** refers to the practice where states use standardized test scores to make important decisions such as graduation, retention, school funding, teacher salary increases, and placement and removal of school principals. High stakes testing is a controversial issue since many people argue test scores only reflect test-taking ability and not how much a student really knows.
- **Curriculum Alignment:** refers to the degree of alignment between curriculum, national or state standards and assessment. Generally curriculum alignment is a good thing since material covered in class is directly related to assessments. Problems can arise when assessments are not aligned with curriculum because teachers often may alter curriculum and instruction and remove important material to prepare students for tests.
- **National Science Education Standards (NSES):** refers to a document published by the National Research Council that outlines guidelines for content, teaching, professional development and assessment for K-12 science.
- **Sunshine State Standards for Science (SSS for science):** Refers to the State of Florida's individual content standards for K-12 science. This document does not include standards for teaching, assessment or for professional development.
- **American Association for the Advancement of Science (AAAS):** An association of scientists and engineers responsible for the seminal publications *Science for All*

*Americans and Benchmarks for Science Literacy*. They have also provided the resources and personnel for the national reform effort *Project 2061*.

- **National Science Foundation (NSF):** The influential government organization providing a major source of funding for research in science and science education.
- **National Science Teachers Association (NSTA): The national organization of K-12 science teachers.**
- **The Florida Comprehensive Assessment Test (FCAT):** Florida's annual standardized testing regimen. Consists of tests in math, reading and science.
- **Statewide Systemic Initiatives (SSI):** Statewide SBR initiatives funded by the National Science Foundation. Funds were given to twenty-five states in the 1990's to help states begin reform. Data are still being collected and analyzed.
- **Stanford Research Institute, International (SRI International):** the research institute which compiled the case studies of the various SSIs explained above.
- **National Council of Teachers of Mathematics (NCTM):** the national organization of K-12 teachers of mathematics, similar to the NSTA for science teachers. NCTM is the creator of the national standards for the teaching of mathematics.
- **Third International Math and Science Study (TIMSS):** an international study in which students around the world in their last year of secondary school were tested in math and science. Results were compared and countries were ranked according to student performance.

### Summary

This chapter provides some of the pertinent background information on high-stakes testing, standards based reform and science education reform. In addition, the focus of the research was provided, along with the procedures followed, the instrumentation and the questions addressed by the study. The second chapter discusses contemporary efforts at reform in K-12 science education. It includes ideal conceptions of reform from the national science education reform documents and the reality of standards based reform in science. In addition, Chapter 2 provides a summary of the middle school concept and explains the theoretical basis of the study. In chapter 3 the

methodological issues of the study are discussed and the research questions presented. Chapter 4 contains the data analysis and the results of the study, and Chapter 5 presents a discussion of the findings and their implications for education.

## CHAPTER 2 REVIEW OF LITERATURE

### **Introduction**

The purpose of this study was to complete a general assessment of standards based reform in Florida middle schools based on perceptions of sixth, seventh, and eighth grade science teachers. The purpose of this chapter is to discuss contemporary efforts at reform in K-12 science education including ideal conceptions of reform from the national science reform documents and the reality of standards based reform in science. In addition, the middle school concept is discussed, and a summary is provided of the conceptual framework of the study, which is based on large scale change theory, as described by Michael Fullan of the University of Toronto

#### **An Introduction to Standards Based Reform In K-12 Science Education**

One strong motivating factor of recent reform efforts in science education has come as a result of the Third International Math and Science Study (TIMSS) completed in 1997. TIMSS data received a great deal of media attention portraying American students as average to below average in math and science. The American Association for the Advancement of Science has responded to public dissatisfaction with the degree of science preparation among K-12 students with the documents *Science for All Americans* and *Benchmarks for Science Literacy*, published in the early 1990's. Both volumes have attempted to capture what students should learn in science by the end of secondary school.

A committee of experts including scientists, college of education faculty, and K-12 science teachers prepared the AAAS documents. The documents are part of an ongoing reform effort called Project 2061, named after the periodic comet Halley that appears once every 75 years. The AAAS had two reasons for associating their project with Halley's comet. First, they hope that by the year 2061, many of their visions for science education will become reality. Second, the 75-year period of Halley corresponds with the average life span of a human being. AAAS hopes to encourage science learning over a lifetime, rather than just through secondary school, which is true for most people.

The AAAS *Benchmarks* organize the knowledge and skills in a format that has roughly 90% overlap with the National Research Council's *National Science Education Standards* (NRC, 1996). Like the AAAS documents, the NSES outline detailed standards for science content, science teaching including science process skills and inquiry, assessment and professional development. Professional communities of scientists, educators and teachers developed the standards through a process of extensive discussion and review. The NSES represent goals for K-12 science education. They are based on research on teaching and learning, and focus on helping students develop a depth of knowledge about fundamental science content and processes (Bybee et al., 1997). It is helpful to think of these standards as tools for promoting deeper and more reflective approaches to setting state, district and local standards, creating assessments, selecting curriculum and designing professional development. Measures of effectiveness must be implemented later as a part of evaluating the form process. A companion volume, *Teaching Inquiry with the Standards* (NRC, 2000), was prepared by a similar committee of experts, and outlines detailed strategies for teachers to use in the classroom. The

National Science Teachers Association (NSTA) recommends the NSES serve as a consensus for what must be done in K-12 science education in the United States.

### **Factors Contributing to the Best Cases of SBR in K-12 Science Education**

There are several factors that contribute to success in the best cases of standards based reform (St. John & Pratt, 1997). A strong and experienced leader, committed to working with NSES and science reform, is among the most important factors. Such a person is usually an administrator or a district level educator, who must work with politicians and national level science reformers and build support among teachers. These leaders must appeal to other influential individuals at the state and district level for commitments to provide critical reform infrastructure such as funding, release time for teachers, resources, expertise and consensus building. Supporting relationships such as partnerships with the national reform community, college of education faculty, businesses and the scientific community are also important. SBR is a highly individual process for each state, district and school, and is strongly influenced by the character of the local leadership.

The degree to which SBR becomes a reality in a particular district or state depends on the overall health and functionality of the systems that are seeking to transform themselves. SBR is most likely to be successful in states and districts that have manageable circumstances such as strong leadership, reasonable size (smaller is better) and lack of financial or political turmoil. Parents should be included as much as possible. Finally, it is important to keep in mind that SBR has both educational and political faces, which are often at odds with each other. Care must be taken to build consensus among stakeholders from different factions of the community such as teachers and politicians (Kirst et al., 1997). While the inclusion of teachers and other stakeholders makes reform

a slow process, it is important to remember that there are no quick fixes. (Atkin & Black, 2003).

### **The Importance of Strategic Frameworks and the Inclusion of Stakeholders**

In addition to teachers and students, participants in the reform process include governors, state legislators, state education departments, state and local school boards, school districts and schools. Other individuals involved include college of education faculty, publishers, curriculum and assessment developers, business and industry, informal educators, and professional organizations. Lastly, individuals who can offer political and public support are important including scientists and engineers, business and industry, federal, state and local governments, parents, the general public and teacher unions. Bybee et al. (1997), recommend the following five step strategic framework for implementation of SBR:

1. Dissemination, which involves developing awareness of the goals of NSES among those responsible for policymaking, programs and teaching. This step also addresses what the standards are, why they are needed and how they can be used to shape policies and practice.
2. Interpretation, which involves increasing the understanding of and support for the standards. Interpretation also involves analysis, dialogue, challenging current conceptions for deeper understanding of the standards.
3. Implementation, including changing policies, programs and practices.
4. Evaluation of information gathered about impact can contribute directly to improvement. Monitoring and feedback to various parts of the system results in evolution.
5. Revision: improving the efficacy and influence of the standards.

### **Examples of Contemporary Reform Efforts in K-12 Science Education**

To date, standards based reform in science in many schools in the United States has not entirely followed the vision conceptualized in the national reform documents such

as *NSES* and *Science for All Americans*. The following paragraphs discuss various challenges, problems and successes.

### **Lessons Learned From Reform in K-12 Mathematics**

Similar challenges and problems have been experienced in the process of standards based reform in K-12 mathematics education (Burrill, 1997). The *NCTM* standards for K-12 mathematics education are a few years older than *NSES*; more follow-up study has taken place to evaluate progress made. Results in K-12 science education are expected to be similar (Burrill, 1997). Research in K-12 Mathematics education has shown that most states have written their own standards and are gradually beginning to think in terms of how the standards will actually be put into practice. It is easy to blame standards when reform efforts fail, but it is difficult to know whether successes and failures are due to standards or the degree to which they are implemented. Schools need to adopt more than just content standards. Teaching, assessment and professional development standards, although usually neglected, are also very important. Common barriers to full implementation of the *NCTM* standards include lack of teacher preparation and unqualified or minimally qualified teachers, (Burrill, 1997). Financial inequalities, lack of necessary materials and lack of access to technology also remain problems. Other issues are lack of access for students (tracking), labeling products "standards based" that aren't, and lack of understanding by politicians.

### **The Problem of Equity**

Equity is another critical issue in SBR in K-12 science education. One study, "Bridging the Gap: Equity in Systemic Reform" tried to identify factors affecting equity in urban systemic reform in two large urban middle schools in Ohio (Hewson et al., 2001). Progress was assessed by three factors: access, retention and achievement, each of

which has a number of indicators. When the indicators were present and/ or improving, reform efforts were considered to be succeeding. Results showed that one school was succeeding and one was not. The most serious barriers to success in the failing school were fragmented community of teachers and administrators, and high levels of racial tension (Hewson, et al., 2001).

### **Teachers' Science Backgrounds**

Another barrier to implementing effective SBR is that many science teachers are poorly trained. Many districts lack a Ph.D. level science educator with teaching experience (Kumar, 1999). Field based teacher preparation programs facilitated by college of education faculty are recommended as a solution along with professional development networks and professional communities of practitioners. Integration of knowledge about science with knowledge about teaching and pedagogy and science methods classes that reflect what is really going on in real science classrooms are also of critical importance (Kumar, 1999). Emphasis should also be placed on discussion, sharing and collaborating as well as creation of communities of learners.

### **Lessons Learned from Ohio's Reform Efforts**

Ohio was one of the first 10 states to receive NSF funding for a Statewide Systemic Initiative (SSI), (Boone, 1997). Analysis of attitudinal data collected from Ohio teachers and principals has helped to identify the level of support for NSES and the degree to which implementation of NSES is likely to proceed (Boone, 1997). Results showed that teachers and principals have slightly different priorities. Principals' values are more traditional and conservative, and, Boone reports that principals are less likely than teachers to see the importance of many items that are a critical part of science reform. Successful implementation of the *NSES* may require making explicit connections

between activities principals value and those critical to conducting inquiry based science. Recommendations include short, targeted workshops or programs on NSES for principals. In addition, broad and deep professional development is recommended for teachers to facilitate full implementation of NSES. Videos of exemplary teaching are also suggested for teachers, because principals are reluctant to give release time for observations. Finally, six-week teacher institutes are recommended for important topics such as nature of science and process of inquiry (Boone, 1997).

Nine additional states, Maine, Connecticut, New York, Vermont, Michigan, Louisiana, California, Montana and Arkansas received extensive NSF funding for Statewide Systemic Initiatives (SSIs) during the 1990's (SRI International, 1998). Case studies of the SSI process for the above states were compiled by researchers at SRI International. The case studies conveyed how states mobilized people and resources from academia, school personnel, state level educators, and legislators to accomplish reform. Florida was one of 15 additional states to receive initial NSF funding for SSIs, although a case study of Florida was never published by SRI International.

### **The Case of Maine's SSI**

Maine is an excellent example of a state that conducted its SSI process similar to the recommendations of St. John and Pratt (St. John & Pratt, 1997). According to the case study published by SRI, outcomes were very positive (Adelman, 1998). The objectives for Maine's SSI were to improve math and science outcomes for students, and to raise their academic aspirations for higher education; Maine has typically lower enrollments in post secondary institutions than other states.

**The Maine mathematics and science alliance (MMSA)**

Maine's SSI operated as the Maine Mathematics and Science Alliance (MMSA) a non-profit organization independent from the State department of education, but still closely aligned with it and its other partners. The extra-governmental status of MMSA was considered to be critical as it facilitated a local control environment with significant sources of local expertise for state and local policy makers to consult. MMSA accomplished an atmosphere of collaboration and cooperation over many factions that allowed many stakeholders to contribute. This allowed Maine's SSI to avoid feelings of frustration and resistance encountered in other states such as California (Shields et al., 1998) which proceeded with a more specifically state-mandated top-down approach to reform initiatives. MMSA was organized around four committees, each chaired by one or more SSI principal Investigators. The committees worked to influence state policy, support local demonstrations of systemic reform, provide local technical assistance to local districts on requests, and to develop statewide and regional leadership necessary to institutionalize its vision of math and science reform.

**MMSA accomplishments**

In terms of accomplishments MMSA developed a curriculum framework for math and science content standards. In addition, it developed legislative policy called "Maine's Learning Results" with which statewide assessments were aligned. MMSA oversaw development and implementation of seven demonstration projects called "Beacon Sites" (Adelman, 1998) that served as examples for the ongoing implementation of reform measures. The Beacon sites, along with MMSA staff provided assistance to school districts as they worked with curriculum frameworks, the Learning Results legislation and student assessments. Teacher networks were developed to provide

support for local teachers. The SRI case study estimated that over the period of the SSI, assistance with reform reached approximately sixty percent of Maine's teachers. Twenty percent received intensive guidance.

### **Governance and organization of MMSA**

Governance and organization of MMSA and Maine's SSI, were overseen by a thirty member board of advisors that represented a wide array of stakeholders in math and science reform, which included The state education agency, institutes of higher education, the state legislature, the state board of education, non-profit agencies, research institutions, and representatives from business and industry. MMSA's four committees were the Curriculum, Instruction and Assessment Committee (CIA), the Professional Preparation and Development Committee (PPD), the Community Integration Committee (CIC), and the Strategic Planning and Assessment Committee (SPA).

The Curriculum, Instruction and Assessment Committee (CIA) was co-chaired by math and science specialists from the State Department of Education. The primary responsibility was to oversee the development of Maine's curriculum frameworks for math and science. In addition, the CIA committee was responsible for development of strategies to disseminate framework and train local districts, schools and teachers about how the framework can improve curriculum at the local level. The CIA committee was also responsible for oversight of the seven Beacon Centers.

The Professional Preparation and Development Committee (PPD) was chaired by a former president of the University of Maine. The PPD's focus was on pre-service preparation of new teachers and continuing professional development of the states math and science teachers. The PPD was also responsible for planning of the initiative's professional development academies for math and science. The PPD facilitated

connections and collaboration with the higher education community. Finally, it was responsible for overseeing state certification standards for teachers.

The Community Integration Committee (CIC) was chaired by the director of human resources for a large Maine semiconductor company that had a vested interest in a state workforce that is well prepared in math, science and technology. The CIC was responsible for increasing public awareness for the need to improve math and science education, and for building corporate support for MMSA and Maine's SSI. In addition, the CIC was to work with community action teams consisting of groups of professionals assembled to support the reform movement. These action teams were responsible for restructuring at each of the Beacon Centers.

The fourth committee was the Strategic Planning and Assessment Committee (SPA), which was responsible for internal and external evaluation of MMSA and Maine's SSI. External evaluation was contracted to the Center of Research and Evaluation at the University of Maine, Orono, and occasional out of state consultants. The internal evaluation was also overseen by the Center for Research and Evaluation at University of Maine, Orono.

### **Maine's SSI outcomes**

Teachers reported no changes in their own classrooms regarding the use of traditional practices. However, they reported vastly increased use of innovative practices. This suggests that Maine's teachers are expanding their instructional repertoire, but they are making seasoned choices regarding appropriate assessment of old and new practices (Adelman, 1998). In terms of effects on students, Beacon School students outperformed other students in the state on the Maine Educational Assessment (MEA). During the period of the SSI the gender-gap narrowed for MEA scores; scores for Native American

students also improved. Enrollment increased in higher-level courses and at post-secondary institutions. These improvements were believed to be at least partly attributable to the efforts of MMSA. In terms of effects on schools, the greatest effects were seen at schools where the faculty had adhered to some central plans for whole school change (Adelman, 1998).

### **A summary of Maine's SSI**

In summary, MMSA as an organization independent of state government, was critical to the progress made in Maine's SSI for K-12 science education. In addition, the distribution of leadership roles in reform initiatives to a wide array of stakeholders was helpful both by encouraging commitment and by creating lasting partnerships. Investigators also found that by allowing local control, districts and schools remained productive as long as there was statewide consensus on expectations for students. Finally, there must be commitment from state and MMSA personnel to help local decision makers understand and incorporate critical changes in their schools.

### **Aspects of the Middle School Concept Promoted by Middle School Advocates**

There is a direct relationship between effective middle school programs and personnel who understand early adolescents and take their needs seriously. It is therefore important for educators to have a clear understanding of early adolescents and their unique needs. Early adolescence is a period marked by many changes including accelerating physical and intellectual development. Seven characteristics have been identified in middle school students that are unique to their age group (George, 1993), including:

1. Becoming aware of increased physical changes,
2. Organizing knowledge and concepts into problem solving strategies,

3. Learning new social/sex roles,
4. Recognizing ones identification with stereotype,
5. Developing friendships with others,
6. Gaining a sense of independence,
7. Gaining a sense of morality and values.

An informed and caring staff must address these factors, which run the full range of the, intellectual, the physical, and the emotional.

The “middle school concept” was created based on these characteristics of young adolescents, (Alexander et al. 1968). Eight critical guidelines for effective middle schools based on the middle school concept are described (Carnegie Council, 1989) including:

1. Creating a community of learners,
2. A core academic program,
3. Ensure success for all students,
4. Empower teachers and administrators with creative control and decision making power,
5. Staff teachers who are experts on the young adolescent,
6. Improve academic performance through fostering health and fitness,
7. Re-engage families in the education of students,
8. Connect schools with communities in the form of partnerships and the sharing of resources.

As more and more students who are at risk for failure enter middle schools, the problem of ineffective middle schools has become catastrophic. A major examination and restructuring effort is necessary in middle schools across the United States. Rigorous reform of traditional middle school with the middle school concept in mind will allow the creation of student centered schools. In an environment designed with their needs in

mind, more middle school students will have a chance to make a successful transition through middle school.

### **Interdisciplinary Teams**

Schools that are divided into smaller subgroups and teams can help create a seamless environment where all students feel valued. Because students believe they belong, they display more enthusiasm and learning increases. Although successful academic teams differ from school to school, there are several characteristics that are considered essential. One requirement is that a core group of teachers be paired with a core group of students. Two to four teachers typically are assigned a group of 50-150 students who spend most of every day together. A team of four teachers might consist of one math, one English, one science and one social studies teacher (Arnold & Stevenson, 1998). An alternative is that two teachers will teach two subjects each, for example one math and science, and the other English and social studies. Teams of two teachers will typically be responsible for half the number of students as four teacher teams. Team teachers should have both common planning time and individual planning time. Common planning time should be used for regular meetings to discuss students, curriculum and other team issues. Team teachers have decision-making power regarding their students, as well as curricular and administrative issues. Every team must have a leader to direct team meetings and to serve as a liaison with other teams, the administration and parents.

Within these groups, students are able to get to know every other student on their team. Many close friendships develop from this daily proximity of students on the same team. Teachers are responsible for fewer students, although they may teach more subject areas. With fewer students, teachers are able to get to know every one of their students to a much greater extent. Teachers can better provide support to each student where he or

she needs it most. On teams with interdisciplinary, thematic curriculum, students are better able to make connections across subject areas. Students have greater opportunities to collaborate with teachers in terms of curriculum and classroom policies. This leads to greater cooperation, motivation, and overall enthusiasm. Scheduling can better accommodate special projects since teachers can decide as a team how to allocate their time together (Erb & Stevenson, 1999). Finally, academic teams can facilitate the formation of a true community of learners. Academic teaming can help student collaboration and enthusiasm reach exceptional levels. Utilization of academic teams can also facilitate smoother year-to-year transitions for students.

### **Shared Decision-Making**

Instead of the traditional approach, where one administrator has complete control over how a school is run, a more democratic form of governance can allow teachers to have a greater stake in important aspects of school structure and function (Darling-Hammond, 1997, Senge, 1994). The democratic school leadership plan consists of many intercommunicating groups working on different aspects of school improvement. With democratic school leadership, the entire school community participates in creating an effective learning environment. Everyone is a stakeholder, because everyone is affected by the outcome. Research has shown that in schools where everyone has a voice, achievement is higher in students of all ability levels. Components of the democratic leadership model are leadership teams, inquiry groups, school improvement plans, student involvement, and an updated role for the school principal.

### **Leadership Teams**

Typically, leadership teams consist of the principal and each of the teacher team leaders (Senge, 1994). Other members are also sought from the school community, such

as the teacher's union representative, health and social service professionals, parents, community members and students. These individuals may serve in a volunteer or elected capacity. Meetings are typically open to the public, but only the core members may vote on issues. The primary responsibility of the leadership team is to draft and implement a school improvement plan (SIP). In addition, the leadership team must integrate and facilitate all school improvement efforts, as well as make all information available to the entire school staff and community.

### **Inquiry Groups**

Once leadership teams have identified problems on which to focus, groups of teachers are assigned to Inquiry Groups. Teachers work within an inquiry group to investigate a particular problem and report back with possible solutions (Darling Hammond, 1997). Every teacher should participate in at least one inquiry group based on their individual strengths and interests. Possible topics for inquiry groups include additional workshop and professional development opportunities, as well as research on possible program changes such as small teacher teams and alternative schedules.

### **The School Improvement Plan**

In the process of creating a School Improvement Plan (SIP) the leadership team must analyze the school's strengths and weaknesses, and set goals for improvement. Since action and change are the most important outcomes of the SIP, goals must be reasonable, "with realistic action steps, time lines, roles, responsibilities and resources for accomplishing them" (Jackson, 2000). All teachers should be involved in preparing and implementing the SIP either as part of the leadership team or in inquiry groups. There are five important steps of the SIP process:

1. To create a school wide vision,

2. Assessing the schools current circumstances,
3. Setting priorities,
4. Developing strategies for action,
5. Evaluating effects of changes to monitor progress.

Extensive information should be collected from members of the school community and used for “systematic data analysis” (Jackson, 2000). Complete and extensive documentation helps ensure that careful and correct decisions are made. Recurring “self-studies” are also encouraged, first for obtaining baseline information, and later for assessing and re-assessing changes and improvements (Jackson, 2000).

### **The Updated Role of the Principal**

The principal’s role in a successful school is “...to cultivate teachers’ intrinsic motivation and to create a culture of continuous improvement”, as well as to develop and oversee a democratic plan of shared leadership and decision-making (Jackson, 2000). Successful schools have successful leaders (Useem, 1997, Valentine, 1997). Success as a principal depends on facilitating smooth cooperative efforts among all members of the leadership team and inquiry groups. The principal must also obtain community and staff support for all changes by informing them of all benefits and inviting them to participate. Districts need to give principals full support to carry out the steps in school improvement plans. School improvement efforts will not be successful without district support, or when the district is pulling in a different direction altogether. Finally, the principal must establish criteria for hiring new teachers, and for the evaluation of existing teachers. The principal must be free to uphold these criteria and ensure that all teachers at the school are effective in promoting student learning.

### **Theoretical Framework of the Study: Change Theory**

The theoretical framework underpinning this examination of Florida's statewide standards-based reform initiatives is that of change theory as described by Michael Fullan. Professor and Dean of the Ontario Institute for Studies in Education at the University of Toronto, Michael Fullan is a leading expert on change theory. He is also the author of several books on the subject which provided the information for the following discussion (Fullan, 1993, 1999, 2001).

#### **An Introduction to Change Theory**

The process of incorporating standards, aligning curriculum and incorporating new standardized assessments requires change at a systemic level that is extraordinarily complicated, time consuming and difficult to create and sustain. There is no single protocol that can work for all schools. Because every school is unique, processes and techniques cannot be borrowed without some degree of modification. Every school must create a plan to suit its own particular culture. Principals are the key players and are in the correct position to create effective schools, referred to as "moving", "learning enriched" schools, "professional learning communities" or "interactive communities of practice" (Fullan, 1999).

Only twenty five percent of successful school reform is knowing what steps to take. The remaining seventy-five percent involves developing effective processes and conditions among and within school personnel. Most people do not fully understand or invest in a process unless they are deeply involved. All stakeholders must have a sense of ownership of reform that is a "progressive process achieved individual by individual until a critical mass is received....All involved must feel a common stake in the process"

(Fullan, 1999). Unpredictability, conflict and inconsistency must be expected and overcome throughout the process.

According to change theory all educational change ultimately depends on what teachers do and think. It is especially important to keep this in mind because reform and change can be stressful for many teachers. An effective tool is the development of learning communities and an atmosphere of collegiality where teachers feel respected, included and instrumental in all parts of the reform process.

Principals are the “gatekeepers of change” (Fullan, 1993). In order for schools to improve, they must have a principal to lead the transformation process. However, it is a very difficult process and not all principals are up to the task. Principals must share leadership by reaching out to parents and community. They must strive to expand the professional capacity of teachers and develop a coherent, professional community. Characteristics of good leaders include being relationship centered, promoting individual accountability, developing clear collegial value frameworks, fostering conditions required for school growth, developing shared commitment to mutual purpose and shared belief in ongoing common actions, ability to develop school capacity, increase quality of teaching within school and work to promote cohesiveness and eliminate fragmentation (Fullan, 2001). With excellent leaders, students are more likely to have three good teachers in a row, which is a critical factor in student success.

### **A Balance of Top-down and Bottom-up Reform**

Although districts and states must be involved to provide standards and support, ultimately the schools must be responsible for creation and implementation of successful plans for improvement. There must be a balance of top-down and bottom-up reform, and there are key similarities among effective schools, leaders, teachers and districts. The

first is that all leadership is based on a relationship of trust at all levels to pursue autonomy rather than dependency. The second is that districts must support learning among principals who will, in turn, support learning for teachers who will do the same for students. The third is the requirement of individual cultural transformations within each school. At all levels, it is much more productive to foster an atmosphere of autonomy rather than dependency. Again, while external standards and support are necessary, real and lasting improvements must be generated from within the school itself.

In terms of government's role in educational change, accountability measures and pressure to change schools without focus on support and capacity building will not succeed. Accountability measures and pressure cannot change the quality of teaching and learning, or create the beliefs and behaviors required for success. Moreover, overload can be created by accountability measures, curriculum reform and dramatic changes imposed by government. Principals must be courageous, independent and flexible enough to adapt innovations to suit their own schools. Many principals fail to create positive change because they comply blindly with demands imposed by government. One strategy is that governments begin with top-down reform in terms of accountability, standards and pressure on local schools. Then there must be capacity building and support for schools to create their own cultural change and professional learning communities.

In order for successful systemic reform to occur, more good teachers must be attracted to the teaching professions. To a large extent, schools that succeed in capacity building and reculturing efforts to become professional learning communities will be

attractive places for good teachers to work. In addition, work must be done to improve teacher education programs and professional development opportunities.

Parents and community members can be a great resource to schools and are largely untapped resources in most cases. Teachers must reach out to parents because a productive alignment of teachers, parents and students can make huge differences in student success. Many parents will need help and support from teachers and schools to play a productive role, and schools must be prepared to help bring out whatever each parent has to offer the school community. New community or regional institutions may be needed to integrate schools into the wider community.

### **The Three Stories of Reform: Inside, Inside-Out and Outside-In**

The dynamics of systemic change involve internal and external forces that can be explained with three stories that are critical to the understanding of reform: the inside story, the inside-out story and the outside-in story (Fullan, 2000).

#### **The inside story of reform**

The inside story is what is known about how to change the internal dynamics of a school for the better. Schools that are more successful have teachers and administrators who do the following three things on a regular basis: they conscientiously create a professional learning community at their school; they focus on student work and alternative assessments; and they alter instructional practices to obtain better results.

There is an important need for both restructuring and reculturing in schools. Restructuring, refers to changes in structure, roles and related elements of the school organization. Each school should have a site based team or local school council to oversee school restructuring. Restructuring is easier than reculturing but by itself makes no difference in the quality of teaching and learning in a school.

Reculturing is the process of developing professional learning communities within the school. It involves the transition toward full attention to the issues of assessment and pedagogy and improvements in student achievement. A key difference between restructuring and reculturing is that while structures within the school can block or facilitate the process, the development of the professional community within the school is the critical factor in creating and maintaining change. The professional community can help create changes in both structure and culture. One of the complicating factors of school reform on a systemic scale is that there can be no plan or guide that will work for all schools. Every school must devise their own plan based on the unique needs and character of its own school environment.

### **The inside-out story of reform**

The inside out story is based on the fact that even schools with large amounts of local control are still working with significant external factors such as government policy, parents and community, the wider teaching profession, technology and corporate connections. All of these factors may complicate school functioning, but they must be dealt with appropriately for successful improvement and change to occur. The big challenge for schools is to figure out how to make all of these outside forces work in their favor. Schools must cope with and overcome negative forces, and identify all resources. At times negative forces may turn out to be resources if they are approached appropriately. Schools must continually learn from outside forces, mobilize resources and build coherence.

A good plan of action for schools that wish to develop their professional learning community and become collaborative schools is to be selective about the innovations they try to implement. They must make selective choices for staff development, and

constantly work on connectedness. Schools must continue to work on applying what they learn.

### **The outside-in story of reform**

The outside-in story is the perspective of individuals on the outside looking in, for example department of education personnel, school district personnel, whole states or sets of intermediate agencies in between. Although much is known about how to help make individual schools succeed, little is known about how to make large numbers of schools in the same system succeed at once. There are four key elements of external reform, specifically policies regarding decentralization, local capacity building, rigorous external accountability, and stimulation of innovation.

In terms of decentralization, a delicate balance must exist between top-down and bottom up reform. External forces must play a role in empowering schools to improve their structure and culture. It is important for local schools to have independence and control over how to make the appropriate changes for their individual situation. However, outside forces must remain invested and aware of an individual school's progress. They must maintain both pressure and support for positive change. In addition, care must be taken to ensure that existing state policies are conducive to school improvement and change. Policies that do not facilitate improvement must be replaced with those that will, and no policy should work at cross-purposes to any other, which can be a serious barrier to reform.

Local capacity building must be supported by outside forces. Schools must be empowered to build their individual professional learning community and engage in restructuring and reculturing. Investments must be made in local schools' policies, training, and professional development. Ongoing support must be provided, as well as

training for school teams and local school councils. Initial teacher education programs must be redesigned, and new activities must be adopted to prepare existing teachers, principals, parents and others to function as part of the professional learning community, both within and outside the school.

Another significant influence from outside local schools is that of external accountability. External accountability systems must be rigorous and built into the infrastructure, because schools do best when they attend to standards and performance. The external accountability system should generate the data and procedures that will be helpful in identifying areas for change and improvement. There must be a balance between accountability support and accountability intervention. Although external sources must intervene in failing schools, they must also focus on capacity building for all schools. Adequate support must be provided for schools to build their individual professional learning communities.

In order to stimulate innovation, which is the fourth key element of external reform, investments must be made in research, development, and innovative networks. The market place of education must constantly be maintained, and all new implementations must be maintained.

### **A summary of change theory**

The three interrelated components discussed above must be functioning smoothly in order for successful systemic change. Individual schools must work to restructure and reculture themselves into professional learning communities. At the same time, they must be responsive to forces and demands outside the school. Forces outside the school must take part in both support and intervention within individual schools. In order for systemic reform to succeed, there must be a balance between top-down and bottom-up

reform. Schools must be free to determine their own culture and needs, but they will not succeed unless they are actively connecting to the outside. Outside forces must provide both pressure and support to individual schools. Fullan has designated a formula (Fullan, 2001), to summarize and explain his philosophy of systemic reform:

$E = MCA^2$ , where:

E = the rate of efficacy of the system

M = motivation for reform in terms of will, purpose and commitment

C = capacity for reform in terms of skills, resources and know how

A<sup>2</sup> = assistance x accountability

The greatest energy for reform is generated in a system of integrated pressure and support in which capacity and accountability are both increased. The biggest barriers to reform are overload, where too much is attempted at one time, and fragmentation, which causes community and collaborative efforts to break down.

### **A Summary of the Overlap between Change Theory and Literature on K-12 Science Education Reform and Highly Functioning Middle Schools**

It is clear that there are several overlapping features among the characteristics of best cases of reform according to change theory, the science education community and Maine's case study as a successful reform effort. Many of the same features are also present in highly functioning middle schools. In particular, all promote collaboration between and among all major stakeholders and the development of a shared vision that is unique for each school. Although external accountability measures that apply standards and pressure to schools are necessary, schools also need support and autonomy for successful reform to occur.

The exact degree to which each of the Florida schools participating in this study followed these guidelines of reform is impossible to determine from one survey.

However, teachers' responses to the survey have reinforced, to some extent, the recommendations made in the literature summarized above. The results and implications for this study will be discussed in later chapters, as explained below.

### **Summary**

The purpose of this chapter was to discuss contemporary efforts at reform in K-12 science education including ideal conceptions of reform in the national science reform documents and the reality of standards based reform in science. In addition, the middle school concept was discussed, and a summary provided of the conflict between reformers and advocates of the middle school. The theoretical framework of the research was discussed.

Chapter three will discuss the methodology of the study, including an analysis of data from the pilot study in Alachua County. Chapter four will present the results of the study, and Chapter five will present the conclusions.

## CHAPTER 3 METHODOLOGY

### **Introduction**

This chapter outlines the methods used for the study. The following paragraphs contain a summary of the study, the research questions, an outline of the procedure consisting of the instrumentation and types of data collected, reliability and validity of the instrument, the pilot study, data collection, sample and analysis of data.

### **Summary of Study**

This study was designed to assess the status and effectiveness of SBR in Florida middle school science programs. It was exploratory in the sense that little information is available yet about teachers' perspectives of reform. Specifically, this study was intended to provide an assessment of teacher's perceptions of changes taking place in their classrooms and schools as a result of SBR and the FCAT in middle school science programs in Florida. Because teachers are at the center of all reform efforts, their perspective is critical. They are in a position to know what is happening and how well reform efforts are working. To date, few studies have documented teachers' perceptions of reform. The term standards based reform, or SBR, was used to refer to changes made within the classroom, school or school district in the State of Florida that result from incorporating and/ or documenting the Sunshine State Standards and preparing students for the science FCAT, the Florida Comprehensive Assessment Test.

Results from this study were based on responses of sixth, seventh and eighth grade science teachers to a survey designed to discover their perceptions of 1) the degree to

which teachers have made changes in curriculum and instruction in the process of incorporating the Sunshine State Standards (SSS) for science and preparing students for the science FCAT; and 2) Teacher's perceptions of the consequences of SBR and FCAT both in science and across subject areas at their schools. In addition, the survey was intended to portray teacher attitudes regarding: 1) SBR school wide; 2) SBR specific to the changes they are making in their science classrooms; and 3) The overall effect of SBR on science curriculum and instruction.

### **Research Questions**

1. How widespread are standards based reform efforts in science in Florida middle schools?

In order to answer this question the survey included questions including: "To what extent is your curriculum based on the Sunshine State Standards For Science?" "To what extent is your school engaged in standards based reform?" "How many professional development workshop hours have been spent at your school addressing issues in SBR?" Answers to these kinds of questions may clarify how much emphasis different schools are placing on reform efforts, and how much progress schools have made with reform efforts.

2. What kinds of changes have schools made in the process of reform efforts?

What are the kinds of changes schools are making regarding documenting and / or incorporating the SSS for science and to prepare students for the FCAT? Are there similarities among schools in terms of the kinds of changes made, or are there variations among schools? Are there consistent patterns among these differences and similarities? In order to answer these questions teachers were asked to respond to questions on the survey including curricular, instructional and assessment practices used currently,

whether changes are being made, and what those changes are. Clarification of what those changes are may allow us to discover the kinds of changes schools are making in the process of reform.

Specific examples of questions are: “What is the primary source of your curriculum?” “What kinds of assessments do you normally use?” “Do you use interdisciplinary or integrated curriculum?” “Has the amount of time spent on basic skills changed?” “Has the use of technology changed?”.

### 3. How successful are current reform efforts based on teachers’ perceptions?

Teachers were asked to answer survey questions regarding whether they think implementation of SBR has had primarily positive or negative effects on curriculum and instruction. Teachers who have complicated views were encouraged to expand on their opinions and return their comments with the survey. Examples of specific yes or no response questions were: “I believe student achievement has increased as a result of standards based reform.”; “I believe student achievement has increased as a result FCAT.”; “I believe that increased school accountability has been a positive effect of the Governor’s A+ Schools Program”; and “I believe that increased time spent on test preparation has come at the expense other important curricular items.”

### 4. What are teacher attitudes regarding current or upcoming reform efforts?

- a. How favorable are teachers’ attitudes toward standards based reform in general?
- b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?

Teachers were asked about their attitudes toward the math and reading FCAT and the Governor’s A+ Program as well as their opinions about what they are asked to do in their own classrooms regarding SBR. For example, there were survey items that asked

teachers if they believe SBR has had a positive effect on teaching and learning in science. The attitude questions were included in the attitude scale section of the survey. Examples of survey questions are: "I believe that SBR and FCAT preparation has led to increased teacher stress." "I believe increased student achievement has been a positive effect of the Governors' A+ Schools Program." And "I believe the Governor's A+ Schools Program has caused a deterioration in our school's climate." Again, teacher opinions and attitudes are of critical importance because of the central role they play in SBR, and the preparation of students for the FCAT.

5. What kinds of changes have teachers made, or anticipate making, in their work as a result of standards based reform?

Teachers were asked about changes they have been requested to make in their classrooms. For example, the survey contained items regarding documentation of the SSS for science in lesson plans. In addition, there are questions that allow teachers to specify particular changes they are making in their classrooms. Examples of yes or no survey questions are: "As a result of SBR and the Science FCAT I have been encouraged to spend more time covering basic skills." "As a result of SBR and FCAT I have less freedom to allow students to learn at their own pace.", and "As a result of the science FCAT the amount of memorization I require of my students has increased." Information collected from teachers regarding changes they are asked to make in their teaching can help specify what is happening in schools as a result of standards based reform and FCAT.

6. Are there patterns in teacher attitudes related to:

- a. Number of years teachers have been teaching at their current school,
- b. Teacher attitudes toward school administration,

- c. Percentage of students on free and reduced lunch,
- d. Type of school community environment: urban, suburban, rural,
- e. Percentage of minority students at each school,
- f. What grade level they are teaching: sixth, seventh or eighth?

The survey collected data regarding 1) the number of years they have been teaching at their current school, 2) teacher attitudes toward the administration at their school, 3) the number of students on free and reduced lunch, 4) whether their school community is in an urban, rural or suburban environment 5) the percentage of minority students at each school and 6) whether teachers are teaching sixth, seventh or eighth graders. This may be important, for example, if there is more pressure on eighth grade teachers to prepare students for the science FCAT since the science FCAT is given only to eighth graders at this time.

Answers to these questions may allow clarification of whether the level of seniority a teacher has at a particular school influences their attitudes toward SBR. In addition, teacher attitudes may be influenced by socio-demographic factors of the school community, the type of community surrounding the school, or by the levels of recognition and support they receive in their schools.

### **Outline of Procedure**

#### **Instrumentation and Types of Data Collected**

The instrument consists of a survey designed for middle school science teachers at the sixth, seventh and eighth grade levels. The survey can be found in Appendix A. All questions were answered from the perspective of these middle school science teachers. The survey is divided into the following sections:

### **Aspects of school science curriculum**

This portion of the survey was intended to elucidate aspects of schools' sixth, seventh and eighth grade science curricula from the viewpoint of the teachers. In addition, some questions were included about curricular practices outside of the science program. Teachers were asked to respond to questions such as: "What grade level do you primarily teach?" "What kind of curriculum do you have? Is it traditional, subject-based? Is it interdisciplinary or integrated? Do you use parallel curriculum?" "What is the primary source of your curriculum? Curriculum or textbook package? Is it created by teachers or school district?" "To what extent is your curriculum based on the SSS for science?" "What kinds of assessments do you use? Multiple-choice? Essay exams? Portfolio assessments? Alternative, authentic or performance based assessments?" "How much time is spent in the laboratory or on laboratory type activities?" and "How much time is spent on constructivist, student-centered or inquiry based activities?".

### **General aspects of SBR at individual schools**

A portion of the survey was intended to obtain teachers' perceptions of SBR in their own school program. Examples of questions are: "To what extent is your school involved in standards based reform?" "How many hours have you spent this year at your school in professional development in the area of SBR?" "Do you feel pressure to prepare students for the FCAT?" "How much of your instructional time is dedicated to standardized test preparation?", and "Do you believe that increased school accountability has been a positive effect of the Governor's A+ Schools Program?".

### **Aspects of SBR in middle school science programs**

The survey contained questions on whether teachers have been asked to make changes in their teaching involving the Sunshine State Standards for science or the

science FCAT and what those changes were. The survey also addressed teacher attitudes toward SBR and the effect it has had on their own teaching. There were also questions asking teachers about the effect the changes have had on their own teaching. Examples of survey questions are: “Who requires the use of the SSS for science? Principal? Superintendent? Department chair?” Do you believe that student achievement in science has increased as a result of SBR or the science FCAT?” “Have you felt pressure to alter your science curriculum to prepare students for the science FCAT?” and “Do you believe that SBR has resulted in increased effectiveness of your science curriculum?”

### **Background information from participating teachers**

Information regarding the seniority of teachers in terms of number of years teaching at current school was collected. This information may be helpful in determining whether teacher attitudes vary depending on the length of their career and the length of time since their training.

### **Demographic information of schools and surrounding communities**

Information was collected on the percentage of students on free and reduced lunch at each school. The percentage of minority students and information on the type of community surrounding the school: urban, rural or suburban, was obtained from Market Data Retrieval. This information may be helpful in determining whether teachers at schools with affluent students are different from teachers at schools with predominantly poor students, or if inner city schools are different from suburban or rural schools.

### **Individual teacher comments**

Since the survey format did not allow teachers to elaborate on their responses, they were encouraged to send in additional comments with their surveys. Many teachers did

choose to return individual comments. These anonymous comments are summarized by county in Appendix C.

### **Reliability of Instrument**

Table 3.1. Reliability Analysis of Teacher Attitude Scale

Teacher Attitude Scale (Questions 66-107)	Alpha =.9155
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The reliability of the instrument was determined using data from the statewide study, described later. All survey questions used to answer research question #6 for the statewide study were in the Teacher Attitude Scale section of the survey. The reliability for the teacher attitude scale section of the survey was alpha = .9155. Item total correlations for all questions were above .2 except for number 107, which was .0691, indicating that all items except for number 107 were performing well. All item total correlations are available in appendix G.

### **Validity of Instrument**

The item total correlations described above also helped determine the content validity of the survey instrument. The instrument was also examined prior to pilot testing by the following experts to determine content validity. All experts determined that the survey was acceptable for use.

1. Paul S. George, Distinguished Professor of Teaching and Learning, University of Florida.
2. M. David Miller, Professor, Department of Educational Psychology, University of Florida
3. Anne E. Seraphine, Assistant Professor, Department of Educational Psychology, University of Florida.
4. Lee J. Mullally, Associate Professor of Teaching and Learning, University of Florida

5. Maurice E. Lucas, Director of Research, Evaluation and Zoning, School Board of Alachua County, Gainesville, Florida
6. Joan S. Lindgren, Assistant Professor of Science Education, Florida Atlantic University, Jupiter, Florida.
7. Randall C. Penfield, Assistant Professor, Department of Educational Psychology, University of Florida.

### **The Pilot Study**

This study was divided into two parts. First, a pilot study was completed with teachers from Alachua County only. The pilot data was used to test the procedure for data collection and determine whether the survey items were functioning properly. Following analysis of pilot data, a statewide study was completed in which surveys were sent to 265 randomly selected teachers throughout the state of Florida. The procedure for data collection worked well for the pilot study and was used for the statewide study, as described below. No changes were made to the survey as a result of analysis of pilot data. A summary of pilot data is available in Appendix D.

### **Data Collection: Statewide Mailing**

Following analysis of pilot data, the survey was distributed to middle school science teachers throughout Florida. Two hundred sixty-five surveys were sent to middle school science teachers in Florida. In order to obtain the best possible response rate, the Tailored Design Method was used (Dillman, 2000). In the Tailored Design Method, four individualized contacts were made with each teacher. Each teacher was addressed in each mailing by name and title. In the first mailing, an introductory letter was sent describing the study, its significance to curriculum and instruction in science, and the critical importance of teachers' experience in helping to answer the questions posed in the study. A second mailing was sent two days after the first containing a second cover and the

survey itself. A third mailing was sent within a week containing a thank you note to all teachers for returning the completed survey. The fourth mailing which contained a replacement survey was sent two weeks later. The cover letter sent to teachers has been included in Appendix E, and the informed consent form for teachers has been included in Appendix F.

### **Sample**

The sample consisted of systematically selected middle school science teachers of grades six, seven and eight, from throughout the state of Florida. A list of all Florida middle school science teachers and their addresses was obtained from Market Data Retrieval Service. The sampling frame consisted of the entire target population of middle school science teachers of grades six, seven and eight throughout the state of Florida. Any teachers missing from the list purchased from Market Data Retrieval Service could not be included in the sampling frame.

The systematic sampling technique used provides similar advantages to random sampling. Every tenth teacher was selected from the list to receive a survey. Surveys were sent to 265 teachers. Despite utilizing the Tailored Design Method, only ninety-nine out of 265 teachers returned completed surveys. The teacher response rate for the survey was 37%. The response rate for the study is discussed further in the limiting factors section of Chapter 5.

### **Data Analysis**

Research questions one through five were answered using response frequency data. Research question six was answered using regression analysis. Variables and analyses are described below.

### **Regression analysis: response variables**

Based on research questions two through five, six response variables, also known as dependent or outcome variables, were created. These six response variables were used to test the degree to which those factors can be explained by various conditions already existing in schools. The six response variables are listed below:

1. Changes teachers have made in the process of SBR as described in the survey (CHANGE).
2. Teacher attitudes toward SBR in general (ATSBARGEN).
3. Teacher attitudes toward SBR in science (ATSBRSKI).
4. Teacher attitudes toward the science FCAT (ATSFCAT).
5. Teachers' perceptions of the consequences of SBR (SBRCONS).
6. Teachers' perceptions of the consequences of the science FCAT (SFCATCONS).

### **Regression analysis: explanatory variables**

In order to explain each of the above response variables based on conditions that already exist in schools, six characteristics of schools were chosen that were expected to influence teachers' attitudes toward reform. The six explanatory variables, also known as independent variables, are listed below.

1. Number of years teaching at current school.
2. Percentage of students on free and reduced lunch.
3. Teacher attitudes toward administration.
4. Area in which school district is located: Urban, Suburban, Rural.
5. Percentage of minority students.
6. Grade level teacher is primarily teaching: sixth, seventh or eighth grade.

### **Regression analysis: explanation of models**

In order to answer research question number six, regression analysis was used. Regression analysis allowed for discovery of the degree to which the response variables are associated with the set of explanatory variables. In other words, it is possible to determine how well the explanatory variables "explain" or "predict" the response variables. A separate regression equation was used for each of the six response variables.

The equation for each of the response variables is referred to as a “model”. Each equation, or model, follows the same general format. The entire set of explanatory variables was included in the equation/model for each of the response variables. The general regression formula for each model is shown below:

$$Y_i = a + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} + b_6X_{6i} + e_i$$

where  $Y_i$  is the response variable and each of the X terms is one of the set of six explanatory variables. The explanatory variables remain the same in each equation while the response variable (Y), changes for each equation. Each equation resembles the following, where Y changes to include the appropriate response variable for each model: CHANGE, ATSBRGEN, ATSBRSCI, ATSF CAT, SBRCONS, SFCATCONS, as shown below:

$$Y_i = a + b_1X_1(\text{Years at Current School})_{1i} + b_2X_2(\% \text{Free and Reduced})_{2i} + b_3X_3(\text{Teacher Attitudes Toward Admin})_{3i} + b_4X_4(\text{Urban/Suburban/Rural})_{4i} + b_5X_5(\% \text{Minorities})_{5i} + b_6X_6(\text{Teacher Grade Level})_{6i} + e_i$$

The fit of each model was assessed by examining the magnitude of the parameter estimates. Statistical tests included measures of association, R-square, regression coefficients and F-tests associated with the R-square. All statistical tests were conducted at  $\alpha = .05$ .

### **Statement of Investigator Bias**

The investigator is a career science educator, committed to the implementation of rich and robust science curriculum in middle level schools. Although it is nearly impossible to eliminate investigator bias entirely, significant effort has been made to

include a balance of questions representing a wide variety of teacher perceptions and opinions, and to phrase the questions in ways that do not reveal a bias.

### **Conclusions**

The next chapter, Chapter 4, presents the results of the study with a discussion and presents the statistical analyses of the data. This analysis will provide information on standards based reform and the consequences of the science FCAT from the perspective of Middle School science teachers.

## CHAPTER 4 RESULTS AND DISCUSSION

### **Introduction**

As the literature review in Chapter 2 revealed, successful large-scale reform requires a combination of factors such as a balance of central and local control, participation of all stakeholders and a shared vision for the future of each school. The purpose of this study was to discover teacher's perceptions of reform efforts in Florida's middle school science programs. Teacher's responses were compiled to create a summary of reform efforts in Florida.

The following paragraphs will include a restatement of the research questions, and the answers to the research questions. Research questions one through five will be answered first using response frequency data. Question six will be answered last using regression analysis. The chapter will conclude with a summary of the answers to each research question.

### **Research Questions**

In the process of assessing teachers' attitudes and perceptions the following questions were answered:

1. How widespread are standards based reform efforts in science in Florida middle schools?
2. What kinds of changes have schools made in the process of reform efforts?
3. How successful are current reform efforts based on teachers' perceptions?
4. What are teacher attitudes regarding current or upcoming reform efforts?

- a. How favorable are teachers' attitudes toward standards based reform?
  - b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?
5. What kind of changes have teachers made (or do they anticipate making) in their work as a result of standards based reform?
6. Are there patterns in teacher attitudes related to:
- a. Total number of years at current school,
  - b. Teacher attitudes toward school administration,
  - c. Percentage of students on free and reduced lunch,
  - d. Type of school community environment: urban, suburban, rural,
  - e. Percentage of minority students at each school,
  - f. What grade level they are teaching: sixth, seventh or eighth?

Answers to the above questions have allowed some degree of clarification of the kinds of changes taking place in Florida schools as a result of SBR. In addition, it has been possible to examine patterns regarding the above features of schools and teachers. It has been examined whether teachers with greater levels of seniority have different attitudes from newer teachers regarding standards based reform. It has been examined whether teachers of differing grade levels have differing perspectives on reform. It has been determined whether teachers in schools with high levels of minority and/ or poor students have different attitudes than teachers at predominantly white or affluent schools. It has been determined whether teachers in urban, rural and suburban schools have differing perspectives on reform. Finally, it has been examined whether a pattern exists regarding teacher attitudes toward school administration and teacher attitudes toward reform. The entire survey with response frequencies can be found in Appendix B.

## Teacher Attitudes Toward SBR and the Science FCAT: Answers to Research Questions

### General Frequency Data: Research Questions One through Five

Research Question #1: How widespread are SBR efforts in Florida's Middle School science programs?

According to frequency data, fifty one percent of responding middle school science teachers report that SBR is already underway in their school. Another twenty-four percent say that their school has begun the reform process. Three percent of teachers say their school is exploring possibilities and seventeen percent say they have not yet begun the reform process at their school.

Table 4.1. Relevant Survey Questions and Responses For Research Question #1

<b>23. To what extent is your school engaged in standards based reform</b>			
We are currently exploring possibilities for SBR at our school 3%	We have begun the process of SBR at our school. 24%	SBR is already in place at our school. 51%	We have not yet begun the process of SBR at our school 17%
<b>24. At your school, how many hours will you have spent this year in professional development in the area of SBR?</b>			
<1 hour 14%	1-5 hours 45%	< 5 hours 22%	Not sure
<b>25. At your school, how many hours will be spent in the near future in professional development in the area of SBR?</b>			
<1 hour 10%	1-5 hours 35%	>5 hours 30%	Not sure 24%

Twenty-two percent of teachers report that they have already spent more than five hours in professional development workshops focused on SBR. Another forty five percent report they have spent between one and five hours in reform oriented workshops. Fourteen percent have spent less than one hour in reform workshops. In terms of upcoming professional development opportunities and workshop, thirty percent of

teachers report that they expect to spend more than five hours on reform in the coming months. Another thirty five percent report that they expect to spend between one and five hours. Ten percent of teachers expect to spend less than one hour in reform workshops and twenty-four percent do not know if their school intends to allocate in service time to the subject of reform.

Research Question #2: What kinds of changes have schools made in the process of reform efforts?

In terms of changes in school curriculum, eighty-three percent of teachers are required to document the SSS for science in their lesson plans. Seventy-five percent of teachers believe that SBR has resulted in increased curriculum alignment and seventy-three percent believe SBR has resulted in increased standardization of the science curriculum. Seventy-seven percent of responding teachers believe the science FCAT has resulted in increased curriculum alignment in science and seventy-six percent believe that the science FCAT has resulted in increased standardization of the science curriculum.

In terms of other school issues, twenty-two percent of teachers believe that SBR has resulted in increased interdisciplinary teamwork among teachers of different subject areas. Fifty-six percent of teachers believe that SBR and/or FCAT preparation has resulted in increased science department collaboration. Sixty percent of teachers believe that the middle-school-concept, or in other words the attention given by schools to the developmental needs of the early adolescent, has suffered at their school. Forty-nine percent of teachers say that ability grouping and tracking have increased as a result of the science FCAT. Twenty-nine percent of teachers say that increased parent involvement has been a result of the Governors A+ Plan for Schools.

Table 4.2. Relevant Survey Questions and Responses For Research Question #2

29. We are required to document the SSS for science in our lesson plans	YES 83%
34. I believe that increased curriculum alignment in middle school science has occurred as a result of SBR	75%
35. I believe that increased curriculum alignment in middle school science has occurred as a result of FCAT.	77%
36. I believe that increased standardization of the science curriculum has occurred as a result of SBR.	73%
37. I believe that increased standardization of the middle school science curriculum has occurred as a result of FCAT.	76%
42. I believe that standards based reform has resulted in increased interdisciplinary teamwork among teachers of different subject areas	22%
43. I believe that SBR and/ or science FCAT preparation has increased science department collaboration.	56%
54. The “Middle School Concept”, or in other words, our attention to the needs of early adolescents, has suffered at my school as a result of FCAT and/or SBR.	60%
57. Preparation for the science FCAT has resulted in more ability grouping or tracking at my school.	49%
61. I believe increased parent involvement has been a positive effect of the Governor’s A+ Schools program.	29%

Research Question #3: How effective are current reform efforts based on teachers’ perceptions?

### **Student learning and achievement**

In terms of student achievement, thirty-eight percent of teachers believe that student achievement has increased as a result of SBR, while thirty-four percent believe student achievement has increased as a result of the FCAT. Thirty five percent of teachers believe that student achievement has increased as a result of the Governor’s A+ plan for schools. Sixteen percent of teachers agree or strongly agree that the Governor’s A+ plan for schools has helped improve student learning in Florida. Twenty-five percent agree or strongly agree that the methods of SBR their school is engaging in will improve their school.

Table 4.3. Relevant Survey Questions and Responses For Research Question #3

38. I believe that student achievement has increased as a result of SBR	YES 38%
39. I believe that student achievement has increased as a result of FCAT.	34%
41. I believe that SBR has resulted in increased effectiveness of our science curriculum.	41%
58. I believe increased school accountability has been a positive effect of the Governor's A+ Schools program.	29%
59. I believe increased teacher accountability has been a positive effect of the Governor's A+ Schools program.	27%
61. I believe increased parent involvement has been a positive effect of the Governor's A+ Schools program.	29%
62. I believe increased student achievement has been a positive effect of the Governor's A+ Schools program.	35%
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	83%
64. I believe that a negative aspect of the Governor's A+ Schools Program is that all schools do not have equal chances for success	84%
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	65%

Twenty-six percent of teachers agree or strongly agree that the FCAT for reading and math has improved student learning at their school. Thirty-two percent of teachers agree or strongly agree that SBR efforts at their school will improve student learning in science. Twenty-four percent of teachers believe that the science FCAT will improve student learning in science at their school. Nineteen percent of teachers agree or strongly agree that the science FCAT has already had a positive influence on curriculum, instruction, and/or student learning in science.

### **Curriculum and instruction**

Forty-one percent of responding teachers believe that SBR has resulted in increased effectiveness of the science curriculum at their school. Thirty-four percent of teachers agree or strongly agree that the FCAT for reading and math has improved curriculum and instruction at their school. Twenty-six percent of teachers agree or

strongly agree that the science FCAT will improve science curriculum at their school, while twenty-seven percent believe the science FCAT will improve science instruction at their school. Eighty-three percent of teachers believe that increased time spent on test preparation has come at the expense of other important curricular items.

Table 4.4. Relevant Survey Questions and Responses For Research Question #3

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
66. I believe the methods of SBR our school is engaging in will improve our school.	13%	16%	44%	14%	11%
68. I believe there has been close linkage of the SBR movement to the FCAT and I believe this has had an overall positive effect.	20%	28%	29%	17%	5%
69. I believe SBR efforts at my school will improve student learning in science.	15%	21%	31%	25%	7%
70. I believe that the FCAT for reading and math has improved curriculum at our school.	16%	24%	25%	26%	8%
71. I believe that the FCAT for reading and math has improved instruction at our school.	16%	24%	24%	28%	8%
72. I believe that the FCAT for reading and math has improved student learning at our school.	19%	26%	28%	20%	6%
73. I believe that the science FCAT will improve science curriculum at my school.	19%	26%	28%	20%	6%
74. I believe that the science FCAT will improve science instruction at my school.	21%	24%	27%	21%	6%
75. I believe that the science FCAT will improve student learning in science at my school.	21%	19%	25%	18%	6%
85. I believe the science FCAT has already had a positive influence on curriculum, instruction and/or student learning in science.	17%	33%	30%	14%	5%
86. I believe that the Governors A+ Schools program has helped improve student learning in Florida.	20%	36%	25%	13%	3%

**Other aspects of SBR**

Twenty-nine percent of teachers believe that increased school accountability has been a positive effect of the Governor's A+ schools program, while twenty-seven percent of teachers believe that increased teacher accountability has been a positive effect of the Governor's A+ schools program. Twenty-three percent of teachers believe that the close linkage between the SBR movement and the FCAT has had an overall positive effect. Twenty-nine percent of teachers believe that increased parent involvement has been a positive effect of the Governor's A+ Plan for Schools. Eighty-four percent of teachers believe that a negative aspect of the Governor's A+ Plan for Schools is that all schools do not have equal chances for success, while sixty-one percent of teachers believe the A+ Program has caused a deterioration of their schools climate.

Research Question #4: What are teacher attitudes regarding current or upcoming reform efforts?

- a. How favorable are teachers' attitudes toward standards based reform?
- b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?

Question 4a: Nineteen percent of teachers say that their attitude toward SBR has changed for the better since reform efforts have begun at their school. Fourteen percent believe that SBR has resulted in increased teacher autonomy and control over the curriculum. Seventy-six percent of teachers believe that SBR has contributed to increased teacher stress, while ninety-two percent of teachers believe that FCAT preparation has contributed to increased teacher stress. Seventy-eight percent of teachers believe that SBR has contributed to less emphasis within the curriculum on student interests, and sixty-one percent of teachers report that the Governor's A+ Plan for Schools has caused a deterioration in the climate at their school.

Table 4.5. Relevant Survey Questions and Responses For Research Question #4a

40. I believe that SBR has resulted in increased teacher autonomy and control over the curriculum	YES				
	14%				
45. I believe that SBR has contributed to increased teacher stress	76%				
46. I believe that FCAT preparation has contributed to increased teacher stress.	92%				
47. I believe that SBR has contributed to less emphasis within the curriculum on student interests.	78%				
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	61%				
	Strongly Disagree			Strongly Agree	
	1	2	3	4	5
79. My attitude toward SBR has changed for the better since reform efforts have begun at my school.	12%	30%	37%	13%	6%
83. I believe SBR is implemented only in response to the science FCAT.	8%	25%	26%	31%	10%
84. I believe SBR in science is a good idea independently of the FCAT.	8%	13%	35%	28%	15%
96. In my experience there is a close association between high stakes testing such as FCAT and SBR in Florida.	9%	12%	32%	31%	13%

Forty-four percent of teachers report that in their experience there is a close association between high stakes testing such as the FCAT and SBR in Florida. Forty-one percent of teachers agree or strongly agree that SBR is implemented only in response to the FCAT, and forty-three percent of teachers believe that SBR is a good idea independently of the FCAT.

Question 4b: Sixty-nine percent of teachers believe that preparation of students for the FCAT has contributed to a decrease in quality of the science curriculum, and sixty-seven percent of teachers believe that SBR has contributed to decreased teacher autonomy and control in the classroom. Thirty-two percent of teachers agree or strongly agree that SBR efforts at their school have caused them to make changes in what they do

in their classrooms that are not entirely comfortable to them. Fifty-four percent of teachers agree or strongly agree that mandatory changes made at their school in the process of SBR have restricted their freedom and creativity as a teacher.

Table 4.6. Relevant Survey Questions and Responses for Research Question #4b

44. I believe that SBR has contributed to decreased teacher autonomy and control over the science curriculum.	YES				
	67%				
49. I believe that preparation of students for the FCAT has contributed to decreased quality of the science curriculum.	69%				
76. I believe mandatory changes made at my school in the process of SBR have restricted my freedom and creativity as a teacher.	Strongly Disagree			Strongly Agree	
	1	2	3	4	5
	10%	18%	15%	33%	21%
77. I believe that using the SSS for science to the extent required at our school has restricted my freedom and creativity as a teacher.	11%	34%	24%	24%	7%
78. I believe that the mandatory changes imposed on my teaching in the process of SBR have restricted my freedom and creativity as a teacher beyond using the SSS for science.	10%	28%	25%	30%	6%
67. SBR efforts at our school have caused me to make changes in what I do in my classroom that are not entirely comfortable to me.	10%	22%	33%	27%	5%
101. In my experience, SBR is a top-down state mandated effort in which teachers experience loss of autonomy and control over what goes on in their own classrooms.	10%	11%	29%	30%	15%
106. I am less satisfied than I used to be with my teaching position due to state mandated reforms.	9%	27%	19%	29%	15%
107. If my decrease in satisfaction with my teaching position continues I may consider leaving the profession.	18%	26%	11%	17%	25%

Thirty-one percent of teachers agree or strongly agree that using the SSS for science to the extent required at their school has restricted their freedom and creativity as a teacher. Thirty-six percent of teachers say that mandatory changes at their school have restricted their freedom and creativity beyond just using the SSS for science. Forty-five percent of teachers agree or strongly agree that in their experience, SBR is a top-down state-mandated effort in which teachers experience loss of autonomy and control over what goes on in their classrooms. Forty-four percent of teachers agree or strongly agree that they are less satisfied than they used to be with their teaching position due to state mandated reforms. Forty-two percent of teachers agree or strongly agree that if their decrease in satisfaction with their teaching position continues, they may consider leaving the profession.

Research Question #5: What kind of changes have teachers made, or do they anticipate Making, in their work as a result of standards based reform?

Table 4.7. Relevant Survey Questions and Responses For Research Question #5

50. As a result of SBR and the science FCAT I have used fewer Internet and/or technology based activities.	YES 40%
51. As a result of standards based reform and the science FCAT the amount of worksheets I use in class has increased.	46%
52. As a result of standards based reform and the science FCAT the amount of memorization I require of my students has increased.	42%
53. As a result of SBR and the science FCAT the amount of work my students do in small groups has decreased.	35%
55. As a result of SBR and the science FCA I have been encouraged to spend more class time covering basic skills.	77%
56. As a result of SBR and the science FCAT I have less freedom to allow students to learn at their own pace	84%
60. As a result of standards based reform and preparation for FCAT we have taken fewer field trips.	62%
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	83%

Twenty-percent of teachers agree or strongly agree that their principal has asked them to change the way they teach as a result of SBR, and twenty-seven percent say the same is true for the science FCAT. Fifty-nine percent of the science teachers agree or strongly agree that as a result of the reading and math FCAT they have spent more time covering reading and math skills, and eighty-three percent of teachers believe that increased time spent on test preparation has come at the expense of other important curricular items. Seventy-seven percent of teachers report that as a result of standards based reform and the science FCAT they have been encouraged to spend more time covering basic skills.

Table 4.8. Relevant Survey Questions for Research Question #5

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
89. My principal has asked me to change the way I teach as a result of SBR.	32%	31%	16%	15%	5%
90. My principal has asked me to change the way I teach as a result of the science FCAT.	27%	31%	14%	19%	8%
98. As a result of the reading and math FCAT I devote more attention to reading and math skills.	10%	13%	16%	45%	14%
104. My homework assignments have changed in a positive way as a result of SBR and the science FCAT.	11%	32%	36%	12%	5%

Forty-percent of teachers report that as a result of SBR and/ or the science FCAT they are using fewer Internet and/or technology based activities in their classrooms. Forty-six percent of teachers report that the number of worksheets they use has increased, and forty-two percent of teachers say the amount of memorization they require of their students has increased as a result of SBR and the science FCAT. Eighty-four percent of teachers report that as a result of SBR and the science FCAT they have less freedom to

allow students to learn at their own pace, and thirty-five percent of teachers report that the amount of work their students do in small groups has decreased. Sixty-two percent of teachers report that they have taken fewer field trips as a result of SBR and the science FCAT, and seventeen percent agree or strongly agree that their homework assignments have changed in a positive way as a result of SBR and the science FCAT.

Research Question #6: Are there patterns in teacher attitudes related to:

- a. Total number of years at current school,
- b. Percentage of students on free and reduced lunch,
- c. Teacher attitudes toward school administration,
- d. Type of school community environment: urban, suburban, rural,
- e. Percentage of minority students at each school,
- f. What grade level they are teaching: sixth, seventh or eighth?

### **Regression Analysis Results: Research Question Six**

Regression analyses were run for research questions 6a through 6f. The results are summarized in the following section. As explained in chapter three, six response variables related to research questions two through five were chosen and regression analyses were run for each response variable. These six response variables were used to test the degree to which those factors can be explained by various conditions already existing in schools. The six response variables were as follows:

1. CHANGE: teachers' attitudes toward changes they have made in their classrooms as part of the reform process,
2. ATSBRGEN: teachers attitudes toward standards based reform in general across all subject areas,
3. ATSBRSCI: teacher's attitudes toward standards based reform in science,
4. ATSCFCAT: Teachers attitudes toward the science FCAT,

5. SBRCONS: Teacher's perceptions of the consequences of SBR,
6. SFCATCONS: teacher's perceptions of the consequences of the science FCAT.

As described in Chapter 3, seven explanatory variables that were suspected might influence teacher attitudes toward reform were used to look for patterns and factors that might account for teacher attitudes. In other words, correlations were looked for between teacher attitudes and other factors existing at the school. For example, does the percentage of minority or low-income students, or the degree of teacher seniority, or the type of school community or teacher attitudes toward school administration influence teachers' attitudes toward any of the six response variables listed above?

## Results

Question 6, part one looked at teacher attitudes toward SBR with respect to changes they have made in their classrooms in the process of reform. The following results are summarized in tables 4.8, 4.9 and 4.10, below. The  $R^2$  value, or effect size, of .204 is statistically significant at  $F(7,77) = 2.821$ ,  $\text{Sig.} = .011$ , suggesting that 20.4% of the variance associated with teacher attitudes toward changes they have made in their classrooms as a result of SBR is associated with the seven explanatory variables explained above.

Table 4.9. Model Summary for Dependent Variable: CHANGE

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452a	.204	.132	6.96045

Table 4.10. ANOVA for Dependent Variable: CHANGE

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	956.658	7	136.665	2.821	.011a
Residual	3730.919	77	48.453		
Total	4687.576	84			

Table 4.11. Coefficients for Dependent Variable: CHANGE

Model	Unstandardized Coefficients		Standardized Coefficients		Sig
	B	Std. Error	Beta	t	
1 (Constant)	23.192	6.019		3.853	.000
SENIORIT	.360	.746	.051	.482	.631
LOWINCOM	1.294	.888	.174	1.547	.149
GRADE	3.9E-02	1.015	.004	.039	.969
ADMATS	.636	.195	.344	3.258	.002
URBAN1	-1.904	1.909	-.112	-.997	.322
URBAN0	1.899	1.917	.115	.991	.325
STMINORI	-1.464	1.176	-.151	-1.245	.217

While the model for changes teachers have made in the process of SBR (CHANGE) is significant overall, only one explanatory variable is significant, teacher attitudes toward the administration at their school (ADMATS, sig = .002). When examined individually, only the degree of support teachers receive from the administrators at their school, (ADMATS), influences teachers' attitudes toward reform in terms of changes made in their classrooms. The more positive teachers' attitudes toward their administration, the more positive their attitudes toward changes they have made in their own classrooms as a result of reform.

Question 6, part two looked at teacher attitudes toward SBR in general, across subject areas, (ATSBRGEN). The  $R^2$  value, or effect size, of .337 is statistically significant at  $F(7,73) = 5.303$ , Sig. = .000, suggesting that 33.7% of the variance associated with teacher attitudes toward SBR in general is associated with the seven explanatory variables explained above. The data are summarized in tables 4.11, 4.12 and 4.13, below.

Table 4.12. Model Summary for Dependant Variable: ATSBRGEN

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.581a	.337	.274	7.69193

Table 4.13. ANOVA for Dependant Variable: ATSBRGEN

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2196.183	7	313.740	5.303	.000a
Residual	4319.101	73	59.166		
Total	6515.284	80			

Table 4.14. Coefficients for Dependant Variable: ATSBRGEN

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std.Error	Beta	t	
1 (Constant)	29.424	6.692		4.397	.000
SENIORIT	-.470	.849	-.055	-.544	.581
LOWINCOM	.568	1.023	.063	.556	.588
GRADE	.518	1.157	.044	.447	.656
ADMATS	1.207	.217	.548	5.563	.000
URBAN1	.190	2.144	.009	.088	.930
URBAN0	4.378	2.192	.217	1.997	.050
STMINORI	-.705	1.334	-.061	-.528	.599

While the model for teachers' attitudes toward reform in general (ATSBRGEN) is significant overall, only one explanatory variable is significant, teacher attitudes toward the administration at their school (ADMATS, sig = .000). Only the degree of support teachers receive from the administrators at their school, (ADMATS), influences teachers attitudes toward SBR in general. The more positive teacher's attitudes toward administration the more positive teachers' attitudes toward SBR in general.

Question 6, part three looked at teachers' attitudes toward SBR in science (ATSBRSCI). The  $R^2$  value, or effect size, of .322 is statistically significant at  $F(7,76) = 5.161$ , Sig. = .000, suggesting that 32.2% of the variance associated with teacher attitudes toward SBR in general is associated with the seven explanatory variables explained above. The data are summarized in tables 4.14, 4.15 and 4.16, below.

It is important to note that the model for teacher attitudes toward SBR in science, (ATSBRSCI), is unique in that not only is the model significant overall, but two of the

explanatory variables were also significant: schools in urban settings (URBAN1, sig.= .028), and teacher attitudes toward the administration at their school (ADMATS, sig.= .000). Once again, the degree of support teachers receive from the administrators at their school (ADMATS), influences teachers' attitudes toward reform in terms of changes made in their classrooms. The more positive teacher's attitudes toward administration, the more positive teachers' attitudes toward reform in science.

Table 4.15. Model Summary for Dependant Variable: ATSBRSICI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.568a	.322	.260	5.18429

Table 4.16. ANOVA for Dependant Variable: ATSBRSICI

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	970.918	7	138.703	5.161	.000a
Residual	2042.641	76	26.887		
Total	3013.560	83			

Table 4.17. Coefficients for Dependant Variable: ATSBRSICI

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	18.672	4.485		4.164	.000
SENIORIT	.9.7E-02	.562	.017	.172	.864
LOWINCOM	.066	.666	-.011	-.099	.921
GRADE	.275	.756	.035	.363	.717
ADMATS	.752	.146	.503	5.150	.000
URBAN1	-3.118	1.422	-.234	-2.243	.028
URBAN0	-.496	1.463	-.037	-.339	.735
STMINORI	.080	.892	-.010	-.090	.929

The model for teacher attitudes toward SBR in science (ATSBRSICI) is unique in that teachers in urban schools were found to have more negative attitudes toward SBR in science than did teachers in rural or suburban settings. Urban teachers did not show more negative attitudes for any other aspect of reform, or any other response variable, as measured by any other model. Prior studies have suggested that due to conditions such as

lack of resources and lack of harmonious school environment, teachers in urban settings have more negative attitudes toward reform in general (Hewson, et al., 2001; Settlage & Meadows, 2002). Although these findings are not surprising, in this particular study the type of school community did not consistently affect teacher attitudes. Teachers in urban settings only showed more negative attitudes toward SBR in science in the ATSBRSICI model, and not across models and response variables.

Question 6, part four looked at teacher attitudes toward the science FCAT (ATSFCAT). The  $R^2$  value, or effect size, of .140 is not statistically significant at  $F(7,77) = 1.792$ ,  $Sig. = .101$ . The data are summarized in tables 4.18, 4.19 and 4.20, below.

Table 4.18. Model Summary for Dependant Variable: ATSFCAT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.374a	.140	.062	4.77767

Table 4.19. ANOVA for Dependant Variable: ATSFCAT

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	286.343	7	40.906	1.792	.101a
Residual	1757.610	77	22.826		
Total	2043.953	84			

Table 4.20. Coefficients for Dependant Variable: ATSFCAT

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	16.985	4.131		4.112	.000
SENIORIT	-.427	.512	-.092	-.834	.407
LOWINCOM	.237	.610	.048	.389	.698
GRADE	-.648	.697	-.101	-.930	.355
ADMATS	.407	.134	.334	3.039	.003
URBAN1	.898	1.310	.080	.686	.495
URBAN0	.102	1.316	.009	.078	.938
STMINORI	-.894	.807	-.140	-1.11	.272

Question 6, part five looked at teacher perceptions of the consequences of SBR in science (SBRCONS). The  $R^2$  value, or effect size, of .149 is not statistically significant at

$F(7,77) = 1.925$ ,  $\text{Sig.} = .077$ . the data are summarized in tables 4.21, 4.22 and 4.23, below.

Table 4.21. Model Summary for Dependant Variable: SBRCONS

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.386a	.149	.072	1.75046

Table 4.22. ANOVA for Dependant Variable: SBRCONS

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	41.286	7	5.898	1.925	.077a
Residual	235.938	77	3.064		
Total	277.244	84			

Table 4.23. Coefficients for Dependant Variable: SBRCONS

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	4.677	1.514		3.090	.003
SENIORIT	-.152	.188	-.089	-.812	.419
LOWINCOM	.122	.223	.067	.545	.587
GRADE	-.300	.255	-.127	-1.177	.243
ADMATS	.150	.049	.333	3.048	.003
URBAN1	.616	.480	.149	1.283	.203
URBAN0	5.0E-02	.5482	.012	.103	.918
STMINORI	-.151	.296	-.064	-.509	.612

Question 6, part six looked at teacher perceptions of the consequences of the science FCAT (SFCATCONS). The  $R^2$  value, or effect size, of .130 is not statistically significant at  $F(7,77) = 1.640$ ,  $\text{Sig.} = .137$ . The data are summarized in tables 4.24, 4.25 and 4.26, below.

Table 4.24. Model Summary for Dependant Variable: SFCATCON

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.360a	.130	.051	4.84773

Table 4.25. ANOVA for Dependant Variable: SFCATCON

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	269.759	7	38.537	1.640	.137a
Residual	1809.535	77	23.500		
Total	2079.294	84			

Table 4.26. Coefficients for Dependant Variable: SFCATCON

Model	Unstandardized Coefficients		Standardized Coefficients		Sig
	B	Std.Error	Beta	t	
1 (Constant)	12.560	4.192		2.996	.004
SENIORIT	-.427	.520	-.091	-.822	.414
LOWINCOM	.424	.619	.086	.685	.495
GRADE	-.922	.707	-.143	-1.305	.196
ADMATS	.358	.136	.291	2.634	.010
URBAN1	1.425	1.329	.126	1.072	.287
URBAN0	-.396	1.355	-.036	-.296	.768
STMINORI	-.576	.819	-.0089	-.703	.484

### A Re-Examination of Models Four Through Six

As explained above, the models for dependent variables four through six were not significant overall. Models four through six included teacher attitudes toward the science FCAT (ATSFCAT), teacher perceptions of the consequences of SBR (SBRCONS) and teacher perceptions of the consequences of the science FCAT (SFCATCON). However, results from the first three models indicated that teachers' attitudes toward the administration at their school were a very strong and consistent factor in teachers' attitudes toward reform. It seemed likely that teacher attitudes toward the administration at their school may have influenced teacher attitudes in models four through six as well, even though the models overall were not significant. In order to re-examine the effects of teacher attitudes toward the administration at their school on response variables four through six, the models were revised so that all explanatory variables were removed except for teacher attitudes toward the administration at their school (ADMATS). As

explained in the following sections, each of the revised models was significant and showed that teacher attitudes toward the administrators at their school had a significant effect on teacher attitudes toward reform as measured in models four through six. The results are discussed below.

### **A new look at teacher attitudes toward the science FCAT**

A second look at the response variable teacher attitudes toward the science FCAT (ATSFCAT) examined a model in which teacher attitudes toward the administration at their school was the only explanatory variable. The  $R^2$  value, or effect size, of .092 is statistically significant at  $F(1,92) = 9.286$ ,  $\text{Sig.} = .003$ , suggesting that 9.2% of the variance associated with teacher attitudes toward the science FCAT is associated with the explanatory variable or teacher attitudes toward the administration at their school (SFCATCONS). The explanatory variable ADMATS is also significant ( $\text{sig} = .003$ ). This indicates that the degree of support teachers receive from the administrators at their school influences teachers' attitudes toward reform in terms of their attitudes toward the science FCAT. Positive attitudes toward school administration are associated with positive attitudes toward the science FCAT. The results are summarized in tables 4.27, 4.28 and 4.29 below.

Table 4.27. Revised Model Summary for Dependant Variable: ATSFCAT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.303a	.092	.082	4.67001

Table 4.28. Revised ANOVA for Dependant Variable: ATSFCAT

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	202.510	1	202.510	9.286	.003
Residual	2006.426	92	21.809		
Total	2208.936	93			

Table 4.29. Revised Coefficients for Dependant Variable: ATSF CAT

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	12.283	1.588		7.736	.000
ADMATS	.335	.116	.303	3.047	.003

### A new look at teacher perceptions of the consequences of SBR

A second look at the response variable teacher perceptions of the consequences of SBR (SBRCONS) examined a model in which teacher attitudes toward the administration at their school was the only explanatory variable. The  $R^2$  value, or effect size, of .094 is statistically significant at  $F(1,91) = 9.461$ ,  $\text{Sig.} = .003$ , suggesting that 9.4% of the variance associated with teacher perceptions of the consequences of SBR is associated with the explanatory variable teacher attitudes toward the administration at their school (ADMATS). The explanatory variable ADMATS is also significant, ( $\text{sig} = .003$ ). This indicates that the degree of support teachers receive from the administrators at their school influences teachers perceptions of the consequences of SBR. Positive attitudes toward school administration are associated with positive perceptions of the consequences of SBR. The results are summarized in tables 4.30, 4.31 and 4.32 below.

Table 4.30. Revised Model Summary for Dependant Variable: SBRCONS

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.307	.094	.084	1.72571

Table 4.31. Revised ANOVA for Dependant Variable: SBRCONS

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	28.177	1	28.177	9.461	.003
Residual	271.006	91	2.978		
Total	299.183	92			

Table 4.32. Revised Coefficients for Dependant Variable: SBRCONS

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	3.790	.592		6.399	.000
ADMATS	.134	.044	.307	3.076	.003

### A new look at teacher perceptions of the consequences of the science FCAT

A second look at the response variable teacher perceptions of the consequences of the science FCAT (SFCATCON) examined a model in which teacher attitudes toward the administration at their school (ADMATS) was the only explanatory variable. The  $R^2$  value, or effect size, of .069 is statistically significant at  $F(1,91) = 6.762$ ,  $Sig. = .011$ , suggesting that 6.9% of the variance associated with teachers' perceptions of the consequences of the science FCAT is associated with the explanatory variable teachers' attitudes toward the administration at their school (ADMATS). The explanatory variable ADMATS is also significant, ( $sig = .011$ ). This indicates that the degree of support teachers receive from the administrators at their school influences teachers' perceptions of the consequences of the science FCAT. Positive attitudes toward school administration are associated with positive perceptions of the consequences of the science FCAT. The results are summarized in tables 4.33, 4.34 and 4.35, below.

Table 4.33. Revised Model Summary for Dependant Variable: SFCATCON

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.263a	.069	.059	4.72051

Table 4.34. Revised ANOVA for Dependant Variable: SFCATCON

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	150.679	1	150.679	6.762	.011
Residual	2027.772	91	22.283		
Total	2178.452	91			

Table 4.35. Revised Coefficients for Dependant Variable: SFCATCON

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std.Error	Beta	t	Sig
1 (Constant)	9.113	1.620		5.625	.000
ADMATS	.311	.119	.263	2.600	.011

### Summary of Information Collected and Analyzed for the Research Questions

Research Question #1: a minority of schools, twenty percent, are still exploring possibilities or have not yet begun the process of SBR at their schools. Most teachers, at least seventy-five percent, have already had professional development in the area of SBR and/or expect to spend time in workshops on reform in the next year.

Research Question #2: Nearly all teachers, eighty-three percent, report their school requires them to document the SSS for science in their lesson plans, and most, around seventy-five percent, report that increases in curriculum and standardization have occurred at their schools. About half report increases in ability grouping or tracking at their school and the majority, sixty percent, report that the middle school concept has suffered at their school as a result of reform efforts.

Research Question #3: So far only nineteen percent of teachers report that the science FCAT has already had positive results on student learning, curriculum and instruction in science. Between twenty-four and twenty-nine percent believe positive effects will be seen in the future as a result of the science FCAT. Twenty-five percent of teachers believe that the methods of SBR their school is engaging in will improve their school, and thirty-two percent believe that SBR will improve student learning in science.

Research Questions #4a and #4b: The majority of teachers have negative attitudes regarding both reform in general and within their own classrooms. Ninety-two and

seventy-six percent report that FCAT and SBR, respectively, have contributed to increased teacher stress. The majority, sixty-seven percent, report loss of control over what happens in their own classrooms. Fifty-four percent report a loss of freedom and creativity over curriculum and lessons. Forty-four percent are less satisfied with their teaching position than before reform efforts began.

Research Question #5: Seventy-seven percent of teachers report spending more time covering basic skills, and fifty-nine percent report spending more time on reading and math skills. Many teachers, ranging from thirty-five to sixty-two percent, report using more worksheets, requiring more memorization of students, taking fewer field trips and using fewer Internet and technology based activities as a result of SBR and FCAT. The vast majority of teachers, eighty-four percent, report having less freedom to allow students to learn at their own pace. Twenty percent of teachers report that their principal has asked them to change the way they teach as a result of SBR, and twenty-seven report that their principal has asked them to change the way they teach as a result of FCAT.

Research Question #6: Every explanatory variable was chosen because it was expected to influence teachers' attitudes toward reform. However, of all the explanatory variables examined, only the degree of support teachers receive from the administrators at their school had a consistent influence on the six factors of reform examined in question six. In all cases, the more support teachers received from administrators, the more positive were their attitudes toward the six factors of reform indicated in the response variables.

### **Summary**

The results for the research questions and analyses performed from this study are presented in this chapter. In the next chapter, implications will be discussed in relation to

research cited in the literature and to the questions posed by this study. Some ideas for future research will also be explored as well as the implications for education will be outlined.

## CHAPTER 5 CONCLUSIONS AND IMPLICATIONS

### **Introduction**

The era of standardized testing and standards based reform has brought about many changes in Florida schools. It is important to assess what those changes are, as well as the effects they are having on teaching and learning in the form of student achievement. Since teachers are at the center of any reform process, their perceptions are of great importance. Teacher perceptions of changes taking place, as well as the consequences of those changes, are critical to understanding of the overall effectiveness of the reform movement.

In this study assessing standards based reform in Florida's middle school science programs, a survey instrument consisting of 113 questions was created and distributed to 265 randomly selected teachers in the State of Florida. Ninety-nine teachers' responded to the survey and helped to answer the following six research questions. The following paragraphs will include a restatement of the six research questions, a summary of the answers to the research questions, a look at teachers most negative and most positive attitudes and perceptions, a discussion of the research findings, an interpretation of the results, a look at the findings within the context of previous studies, a look at the findings within the context of change theory, limiting factors of the study, implications for education and future research, unanswered questions, and future analysis.

### **Research Questions**

1. How widespread are standards based reform efforts in science in Florida middle schools?
2. What kinds of changes have schools made in the process of reform efforts?
3. How successful are current reform efforts based on teachers' perceptions?
4. What are teacher attitudes regarding current or upcoming reform efforts?
  - a. How favorable are teachers' attitudes toward standards based reform?
  - b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?
5. What kind of changes have teachers made (or do they anticipate making) in their work as a result of standards based reform?
6. Are there patterns in teacher attitudes related to:
  - a. Total number of years at current school,
  - b. Teacher attitudes toward school administration,
  - c. Percentage of students on free and reduced lunch,
  - d. Type of school community environment: urban, suburban, rural,
  - e. Percentage of minority students at each school,
  - f. What grade level they are teaching: sixth, seventh or eighth?

### **Answers to Research Questions**

Research Question #1: A minority of schools, twenty percent, are still exploring possibilities or have not yet begun the process of SBR at their schools. The vast majority of teachers, seventy-five percent, have already had professional development in the area of SBR and/or expect to spend time in workshops on reform in the next year.

Research Question #2: Nearly all teachers, eighty-three percent, report their school requires them to document the SSS for science in their lesson plans, and most, around

seventy-five percent, report that increases in curriculum and standardization have occurred at their schools. About half report increases in ability grouping or tracking at their school, and the majority, sixty percent, report that the middle school concept has suffered at their school as a result of reform efforts.

Research Question #3: So far only nineteen percent of teachers report that the science FCAT has already had positive results on student learning, curriculum and instruction in science. Between twenty-four and twenty-seven percent believe positive effects will be seen in the future as a result of the science FCAT. Twenty-five percent of teachers believe that the methods of SBR their school is engaging in will improve their school, and thirty-two percent believe that SBR will improve student learning in science.

Research Questions #4a and #4b: The majority of teachers have negative attitudes regarding both reform in general and within their own classrooms. Ninety-two and seventy-six percent report that FCAT and SBR, respectively, have contributed to increased teacher stress. The majority, sixty-seven percent, report loss of control over what happens in their own classrooms. Many, about fifty-four percent, report loss of freedom and creativity over curriculum and lessons and many, about forty-four percent, are less satisfied with their teaching position than before reform efforts began.

Research Question #5: Seventy-seven percent of teachers report spending more time covering basic skills, and fifty-nine percent report spending more time on reading and math skills. Many teachers, ranging from thirty-five to sixty-two percent, report using more worksheets, requiring more memorization of students, taking fewer field trips and using fewer Internet and technology based activities as a result of SBR and FCAT. The vast majority of teachers, eighty-four percent, report having less freedom to allow

students to learn at their own pace. Twenty percent of teachers report that their principal has asked them to change the way they teach as a result of SBR, and twenty-seven report that their principal has asked them to change the way they teach as a result of FCAT.

Research Question #6: Every explanatory variable listed above from a through f was expected might influence teacher attitudes toward reform (Hewson, et al., 2001; Settlage and Meadows, 2002; Wideen et al., 1997). However, of all the explanatory variables examined, only the degree of support teachers receive from the administrators at their school had a consistent influence on the six factors of reform examined in question six. In all cases, the amount of support teachers received from administrators was associated with more positive attitudes toward the six factors of reform indicated in the response variables.

### **A Look at the Extremes, Part I: A Summary of Teachers' Most Positive Perceptions and Attitudes**

Some of the most positive findings in this study concern teachers' use of inquiry based science and their use of in-class assessments. Seventy-seven percent of teachers report that they are using an inquiry approach to science, and fifty-one percent report they spend more than twenty percent of class time on constructivist, student centered or inquiry based activities. It is reassuring to know that despite restrictions teachers may be encountering as a result of SBR and FCAT, inquiry based science seems to remain a priority to most of Florida's middle school science teachers.

Eighty-two percent of teachers report using assessments that are referred to as "authentic", "performance" or "alternative". Only thirty-four percent of teachers report using primarily multiple-choice tests. Seventy-nine percent say they sometimes give essay questions and forty-six percent say they sometimes use portfolio assessments.

Teachers' practice of utilizing alternative forms of in class assessment may be more effective in reinforcing student learning than multiple-choice types of assessment (Wiggins, 1998). This is particularly important as the emphasis on state-wide standardized testing increases.

### **A Look at the Extremes, Part II: A Summary of Teachers' Most Negative Perceptions and Attitudes**

One of the most alarming findings in this study was the amount of class time teachers report spending on preparing students for standardized tests. Forty-two percent of teachers report spending more than twenty-percent of class time exclusively for preparing students for FCAT. Eighty-three percent of teachers say that the increase in class time spent preparing students for the FCAT has come at the expense of other important curricular items. Seventy-eight percent of teachers say that reform efforts have resulted in less emphasis within the curriculum on items of interest to students, and eighty-four percent of teachers report they have less freedom to allow students to learn at their own pace. Sixty-nine percent of teachers report that preparing students for the FCAT has resulted in decreased quality of the science curriculum, and sixty percent of teachers say that at their school, less attention is given to the developmental needs of the early adolescent.

Other reports from teachers which are cause for concern are that sixty-one percent of teachers say that the Governor's A+ plan has caused a deterioration of their school's climate and eighty-four percent say that a negative aspect of the Governor's A+ Plan for Schools is that all schools do not have equal chances for success. Finally, forty-four percent of teachers say they are less satisfied with their teaching position as a result of

state mandated reforms and forty-two percent they may consider leaving the profession if their decrease in satisfaction continues.

### **Discussion of Research Findings**

While the majority of teachers expressed negative opinions about everything from changes they have been required to make in their classrooms to whether they think SBR and the science FCAT are having positive effects, a small but significant number expressed positive opinions. A consistent minority of teachers expressed beliefs that SBR had already or would soon bring about positive effects on student achievement, curriculum and or instruction in science. Some teachers also reported that reform is a growth and change process in which initial stress, frustration and workload must be expected.

In the regression analyses for question six, although each of the six explanatory variables was suspected to affect teachers' attitudes on reform as explained above, only teacher attitudes toward the administration at their school, had a consistent significant effect on each of the six response variables in the study. For each of the six response variables, teachers who had more positive attitudes toward administration also had a more positive attitude toward all aspects of reform assessed in the study. It is important to note that the teachers with more positive attitudes toward administrators at their school also reported that they received high levels of support from those administrators.

The other five explanatory variables: level of teacher seniority at current school; percentage of minority students; grade level taught; percentage of students on free and reduced lunch; and type of community: urban, rural or suburban, had no consistent significant effect. For one response variable, teacher attitudes toward SBR in science, urban teachers reported less positive attitudes toward reform than did rural and suburban

teachers. Examples of urban teachers reporting more negative attitudes toward reform were also found in previous studies (Hewson et al., 2001; Settlage & Meadows, 2002). However, in this study, urban teachers reported more negative attitudes only toward SBR in science, and not across all six of the response variables.

### **Interpretation of Results**

Because teachers who reported receiving high levels of support from administrators at their school also reported more positive attitudes toward all aspects of reform measured in the study, it follows that strong administrative support may be a particularly powerful tool in obtaining effective and lasting reform. Moreover, the teachers who reported that increased stress and workload are hallmarks of any growth and change process highlight an important fact: transition and change are difficult for most people. Even if changes are guaranteed to have positive effects in the long run, the change process itself can be expected to be difficult, particularly in the beginning. However, it seems clear that supportive administrators are more likely to have teachers who are more open minded about the reform process in general. Supportive administrators may also stimulate increased commitment and effort from teachers at their schools. If this is the case, increasing levels of support for teachers seems like a simple and relatively inexpensive tool to increase the effectiveness of the reform process at all schools. Clearly, it appears that success depends largely on the interest, effectiveness, and willingness of administrators to support their teachers in the demanding and complex process of implementing SBR.

A study by University of Chicago professor Anthony Bryk on institutional trust has also pointed to the importance of a supportive school community (Bryk & Schneider, 2002). Bryk uses the term "relational trust" to describe an atmosphere at schools where

everyone understands the roles and obligations of both themselves and others. A mutual interdependence fosters an atmosphere of co-operation and empowerment, whereby all share an improved vision of their school and all work together to achieve it. High levels of trust “reduce the risk associated with change” (Bryk & Schneider, 2002)

### **A Look at the Results Within the Context of Previous Studies on Reform**

As mentioned above, effect of teachers’ attitudes toward the administration at their school on their attitudes toward reform has been reinforced by Anthony Bryk in his study on Relational Trust (Bryk & Schneider, 2002). Other studies have also suggested the importance of building support among teachers, and including teachers and other stakeholders in the planning and implementation of reform (St. John & Pratt, 1997, Adelman, 1998) However, other findings from previous studies were not confirmed by this study.

For example, a Canadian study found that generally, teachers with higher levels of seniority and job security felt less or no sense of urgency regarding implementation of reforms (Wideen et al., 1997). In my experience as a teacher it was not uncommon to hear older teachers express opinions that reform efforts are just phases that will pass with time. Teachers would often comment on how many reform efforts they had already outlasted in their careers. But because many younger teachers have learned about standards based reform and FCAT in their university teacher education programs, it seems reasonable that younger teachers might be more accepting of SBR and FCAT. In this study, regression analyses of teachers’ responses showed no differences between the attitudes of younger and older teachers toward reform.

Two studies also showed that urban teachers may have less positive attitudes toward reform than do suburban and rural teachers (Hewson et al., 2001; Settlage &

Meadows, 2002). One study reported that increased racial tensions within the school undermined cooperative efforts and contributed to negative attitudes toward implementation of reforms (Hewson et al., 2001). Another study reported that teachers believe that reform efforts seriously decrease the quality of education inner-city children receive (Settlage & Meadows, 2002). Except for teacher attitudes toward SBR in science (ATSBRSCI), where urban teachers expressed more negative attitudes toward SBR in science, teacher attitudes toward reform did not differ across urban, rural and suburban areas.

In this study, neither of the other explanatory variables: percentage of students on free and reduced lunch, or grade level taught, was significant in terms of teacher attitudes. Percentage of students on free and reduced lunch was chosen as a variable because it seemed plausible that teachers who are already frustrated by limited resources might be further stressed by the demands of reform. Responses from the teachers did not confirm this. It was also speculated that teachers of eighth graders might feel more pressure to prepare students for the science FCAT since only eighth graders take the science FCAT at the middle school level. Teachers of different grade levels did not report different attitudes toward reform.

### **A Look at the Results Within the Context of Change Theory**

Although there is no guaranteed recipe for successful school reform, change theory outlines some factors that are present in schools that are successful in improvement. Building a new school culture of collaboration and support, or reculturing (Fullan, 2001) is an important step in facilitating change. There must also be a balance between top-down and bottom-up reform, and teachers must have freedom to implement reforms within the framework of their school's professional learning community (Fullan,

1999, 2001). The principles of change theory have been reinforced by the findings of this study. According to this study, Florida teachers who receive adequate support from the administrators at their school, who have been able to participate to some extent in the reform process, and who believe that a high quality science program is a priority to the administrators at their school, have positive attitudes toward reform.

### **Limiting Factors in the Study**

Response rates for this study, 50% for the pilot study and 38% for the Statewide study, were not as high as had been hoped. Timing is one factor that may have played a role in interfering with teachers' responses. Data collection took place in the spring of 2003, with pilot data collected in mid-March and State wide data collected in the first half of May. Unfortunately, the pilot mailings coincided with FCAT, and the State wide mailings coincided with the end of the school year for many counties. Both events are hectic for teachers and probably limited the amount of time available to spend responding to the survey.

Moreover, the coinciding of survey mailings with FCAT and the end of the school may affect the external validity of the study. The extent to which results can be generalized to other times of the year may be limited. The length of the survey, 113 questions, may also have been daunting to many teachers. If the study is repeated, a streamlined version of the survey may be easier and less time consuming for teachers to answer. On the other hand, the number of questions in the teacher attitude scale probably improved the reliability of the scale. Scales with higher numbers of questions typically have higher reliability.

### **Implications for Education and Future Research**

As discussed earlier, the single most important finding in this study is the powerful ameliorating effect supportive administrators can have on teachers who work with them. According to results from the regression analyses in question number six, teachers with positive attitudes toward administrators at their school also had more positive attitudes toward all aspects of reform assessed in this study. It is likely that these teachers are also more motivated and committed to making reform efforts work. The benefits of committed and motivated teachers can have tremendous effects not only on reform efforts but also on all areas of school function. It seems clear that increasing the level of support given to teachers by administrators is an effective means of enhancing the effectiveness of reform efforts and probably overall school function. No school should overlook the potential of a supportive administration in efforts to improve their school programs. Perhaps professional development opportunities can be created for administrators that focus on how best to support their teachers.

The primary focus of this study was the comprehensive assessment of SBR and its consequences in Florida's middle school science programs. As with all research that examines consequences of standardized testing aspects of reform, assessments must be made on an annual basis. Results must be monitored over a period of years in order to determine what is happening over time. This study involves only the first year of the science FCAT, and findings are only preliminary and not definitive on their own. It will be important to survey teachers again to see how and whether their perceptions have changed. With time teachers may become comfortable with the changes that are now so new and difficult. Their attitudes toward reform may become more favorable. It is also

possible that continued working with SBR and the science FCAT over a period of time may reinforce their negative attitudes toward reform.

Analysis of teacher responses from this study has given us a teachers' eye-view, so to speak, inside middle grades reform in Florida. There may be no other individuals in a better position to report knowledgably and accurately on reform than the teachers themselves. As such, any report on teachers' perceptions of reform must be taken seriously. The teachers who responded to this study have provided a treasure chest of information with significant potential for future benefit in education. They have articulated their perceptions on the myriad changes taking place in schools and the consequences of those changes on student learning and achievement. Even taking into consideration any biases teachers may have, their reports are still very enlightening.

### **Unanswered Questions**

After all the data have been analyzed, questions remain unanswered. As mentioned in Chapter 1, the science FCAT was given to all schools for the first time in 2003. Prior to 2003, the FCAT covered only reading and mathematics. It is unclear how inclusion of science in the standardized assessment has affected teachers. Do teachers feel relieved that science is now receiving more attention? Does this have an ameliorating effect on their attitudes toward reform as measured by this study? Another question is whether teacher attitudes toward the science FCAT are based only on the science FCAT. Could there be some preexisting negative attitudes toward the science FCAT based on the reading and math FCAT? Also, teacher perceptions of SBR in science seem to be somewhat more positive than their attitudes toward the science FCAT. Why is this? If a similar study is repeated in the future, the investigator can meet with teacher focus groups prior to mailing surveys in order to discuss the survey and receive feedback on the above

issues. In addition, questions can be included in the survey on what teachers perceive to be the effects of including science on the FCAT.

The amount of preparation teachers have had in science might also influence their attitudes toward SBR in science and preparing students for the science FCAT. A question could be included on the survey asking whether teachers have a college major or minor in science, and/ or a teaching certificate in science. It would also be interesting to discover how the perceptions of middle school science teachers compare to high school science teachers and to elementary teachers. In particular, since elementary teachers teach all subject areas, how has the inclusion of science on the FCAT affected them and their work? Are elementary teachers resentful or pleased to be spending more time covering science? Finally, it would be helpful to determine in more detail what teachers need in terms of support from administrators. What, according to teachers, are the characteristics of a supportive administrator or a supportive administration? If these characteristics can be documented it may be possible for principals to receive effective professional development in the area of supporting teachers.

### **Future Analysis**

As discussed above, research on standardized testing aspects of reform must be repeated on an annual basis in order to look for trends over time. The data collected in this study may become more meaningful when interpreted alongside data from similar studies completed in subsequent years. By looking at data from a period of several years side-by-side, implications can become clearer.

In addition to ongoing assessments on an annual or semi-annual basis, one possibility worthy of future study would be in-depth, in-person follow-up interviews with responding teachers. Individual interviews could be helpful in clarifying and elaborating

on teachers' perspectives of reform. If they are allowed to provide justifications and other details, teachers' responses may become more meaningful and insightful. Several teachers did include individual comments that were very illuminating. However, there may have been some degree of selection involved as these comments tended to come from teachers with very extreme views. Interviews with all teachers or a random selection of teachers would be helpful in providing balance.

APPENDIX A  
SURVEY INSTRUMENT:

AN ASSESSMENT OF STANDARDS BASED REFORM IN  
FLORIDA'S MIDDLE SCHOOL SCIENCE PROGRAMS

An Assessment of Standards Based Reform in Florida’s Middle School Science Programs

Instructions: The following survey is intended to assess your perceptions of changes occurring in your classroom and your school as a result of standards based reform. There are no right or wrong answers, simply choose the answers that seem the most appropriate for your classroom or school. Please enter your answers on the scantron sheet provided. On the scantron sheet please blacken choice A for all “yes” answers and choice B for all “no” answers. For the Strongly Disagree and Strongly Agree questions, please blacken A for Strongly Disagree ranging to choice E for Strongly Agree. For all other questions please blacken the bubble in the same order as the answer you chose.

For the purpose of this survey, standards based reform, or SBR, can be thought of as any changes made within the classroom, school, or school district in the State of Florida having to do with Sunshine State Standards (SSS), preparing students for FCAT, and /or the Governor’s A+ Plan for Schools.

If you have comments regarding any of the questions please do not hesitate to include them either on the survey itself or on a separate sheet of paper. Please do not write comments on the scantron form. Thank you for participating in this study. Your opinions and perceptions are extremely valuable. **Don’t forget to return your signed informed consent form in the envelope with your survey and scantron.**

<u>School Curriculum</u>		
1. What grade level do you primarily teach? If you teach more than one grade level, choose the one of which you have the most classes or are most familiar with.		
<input type="radio"/> Sixth grade	<input type="radio"/> Seventh grade	<input type="radio"/> Eighth grade
2. Does your school have a district science curriculum specialist?	<input type="radio"/> Yes	<input type="radio"/> No
3. If there is a science curriculum specialist working with your school, has that person been helpful to you in the area of standards based reform and /or FCAT preparation?	<input type="radio"/> Yes	<input type="radio"/> No
4. We have a traditional, subject based curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
5. We teach at least one interdisciplinary unit each year.	<input type="radio"/> Yes	<input type="radio"/> No
6. Our curriculum is fully interdisciplinary all year.	<input type="radio"/> Yes	<input type="radio"/> No

7. We use parallel curriculum where the same topic is covered simultaneously in two or more subjects. We do this for either part or all of the year.		<input type="radio"/> Yes	<input type="radio"/> No
8. What is the primary source of your curriculum?			
<input type="radio"/> Curriculum or textbook package.	<input type="radio"/> Our curriculum is created by our teachers	<input type="radio"/> Our curriculum is created by our school district	<input type="radio"/> FCAT
9. To what extent is your curriculum based on the Sunshine State Standards for science?			
<input type="radio"/> Completely	<input type="radio"/> Mostly	<input type="radio"/> Some	<input type="radio"/> Not at all
10. How long has your existing science curriculum been in place?			
<input type="radio"/> Brand new this year	<input type="radio"/> This is its second year	<input type="radio"/> 2.5 –4 years old	<input type="radio"/> More than four years old
11. My science curriculum uses National Science Education Standards' guidelines for assessment.		<input type="radio"/> Yes	<input type="radio"/> No
12. Our middle school science curriculum uses National Science Education Standards' guidelines for teaching with inquiry		<input type="radio"/> Yes	<input type="radio"/> No
13. My science curriculum uses an inquiry approach to science.		<input type="radio"/> Yes	<input type="radio"/> No
14. For my science curriculum a textbook or curriculum package is used as one of many resources.		<input type="radio"/> Yes	<input type="radio"/> No
15. My science curriculum allows flexibility and teacher discretion.		<input type="radio"/> Yes	<input type="radio"/> No
16. For assessment I use primarily multiple-choice tests.		<input type="radio"/> Yes	<input type="radio"/> No
17. For assessments I sometimes use a variety that are called "authentic" or "performance" or "alternative".		<input type="radio"/> Yes	<input type="radio"/> No
18. We create curriculum based on the Sunshine State Standards for science.		<input type="radio"/> Yes	<input type="radio"/> No
19. I sometimes use portfolio assessments.		<input type="radio"/> Yes	<input type="radio"/> No
20. When I give tests I sometimes use essay questions.		<input type="radio"/> Yes	<input type="radio"/> No
21. What percentage of classroom time is spent in the laboratory or doing laboratory activities?			
<input type="radio"/> <5%	<input type="radio"/> 6-20%	<input type="radio"/> 21-33%	<input type="radio"/> ≥33%
22. How much class time is spent on constructivist/ student centered or inquiry based activities?			
<input type="radio"/> <5%	<input type="radio"/> 6-20%	<input type="radio"/> 21-33%	<input type="radio"/> ≥33%

<u>Standards Based Reform</u>			
23. To what extent is your school engaged in standards based reform?			
<input type="radio"/> We are currently exploring possibilities for SBR at our school.	<input type="radio"/> We have begun the process of SBR at our school.	<input type="radio"/> Standards based reforms are already in place at our school.	<input type="radio"/> We have not yet begun the process of SBR at our school.
24. At your school, how many hours will you have spent this year in professional development in the area of standards based reform?			
<input type="radio"/> <1 hour	<input type="radio"/> 1-5 hours	<input type="radio"/> >5 hours	<input type="radio"/> Not sure
25. At your school, how many hours will you spend in the near future in professional development in the area of standards based reform?			
<input type="radio"/> <1 hour	<input type="radio"/> 1-5 hours	<input type="radio"/> >5 hours	<input type="radio"/> Not sure
26. We have a lot of pressure to prepare students for the FCAT.		<input type="radio"/> Yes	<input type="radio"/> No
27. I have felt pressure to alter my curriculum to prepare students for the science FCAT.		<input type="radio"/> Yes	<input type="radio"/> No
28. I feel confident that my curriculum and lesson plans reflect the Sunshine State Standards for science.		<input type="radio"/> Yes	<input type="radio"/> No
29. We are required to document the Sunshine State Standards for science in our lesson plans.		<input type="radio"/> Yes	<input type="radio"/> No
30. My principal requires the use of the Sunshine State Standards for science.		<input type="radio"/> Yes	<input type="radio"/> No
31. My superintendent requires the use of the Sunshine State Standards for science.		<input type="radio"/> Yes	<input type="radio"/> No
32. My department chair requires the use of the Sunshine State Standards for science.		<input type="radio"/> Yes	<input type="radio"/> No
33. How much of your instructional time is dedicated to standardized test preparations?			
<input type="radio"/> < 10%	<input type="radio"/> 10-20%	<input type="radio"/> 20-50%	<input type="radio"/> 50-75%
34. I believe that increased curriculum alignment in middle school science has occurred as a result of standards based reform.		<input type="radio"/> Yes	<input type="radio"/> No
35. I believe that increased curriculum alignment in middle school science has occurred as a result of FCAT.		<input type="radio"/> Yes	<input type="radio"/> No
36. I believe that increased standardization of the middle school science curriculum has occurred as a result of standards based reform.		<input type="radio"/> Yes	<input type="radio"/> No
37. I believe that increased standardization of the middle school science curriculum has occurred as a result of FCAT.		<input type="radio"/> Yes	<input type="radio"/> No
38. I believe that student achievement has increased as a result of standards based reform .		<input type="radio"/> Yes	<input type="radio"/> No

39. I believe that student achievement has increased as a result of FCAT.	<input type="radio"/> Yes	<input type="radio"/> No
40. I believe that standards based reform has resulted in increased teacher autonomy and control over the curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
41. I believe that standards based reform has resulted in increased effectiveness of our science curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
42. I believe that standards based reform has resulted in increased interdisciplinary teamwork among teachers of different subject areas.	<input type="radio"/> Yes	<input type="radio"/> No
43. I believe that standards based reform and/ or science FCAT preparation has increased science department collaboration.	<input type="radio"/> Yes	<input type="radio"/> No
44. I believe that standards based reform has contributed to decreased teacher autonomy and control over the science curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
45. I believe that standards based reform has contributed to increased teacher stress.	<input type="radio"/> Yes	<input type="radio"/> No
46. I believe that FCAT preparation has contributed to increased teacher stress.	<input type="radio"/> Yes	<input type="radio"/> No
47. I believe that standards based reform has contributed to less emphasis within the curriculum on student interests.	<input type="radio"/> Yes	<input type="radio"/> No
48. I believe that standards based reform has contributed to decreased quality of the science curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
49. I believe that preparation of students for the FCAT has contributed to decreased quality of the science curriculum.	<input type="radio"/> Yes	<input type="radio"/> No
50. As a result of standards based reform and the science FCAT I have used fewer Internet and/or technology based activities in my classroom.	<input type="radio"/> Yes	<input type="radio"/> No
51. As a result of standards based reform and the science FCAT the amount of worksheets I use in class has increased.	<input type="radio"/> Yes	<input type="radio"/> No
52. As a result of standards based reform and the science FCAT the amount of memorization I require of my students has increased.	<input type="radio"/> Yes	<input type="radio"/> No
53. As a result of standards based reform and FCAT, the amount of work my students do in small groups has decreased.	<input type="radio"/> Yes	<input type="radio"/> No
54. The "Middle School Concept", or in other words, our attention to the needs of the early adolescent, has suffered at our school as a result of FCAT and/ or SBR.	<input type="radio"/> Yes	<input type="radio"/> No
55. As a result of standards based reform and the science FCAT I have been encouraged to spend more class time covering basic skills.	<input type="radio"/> Yes	<input type="radio"/> No

56. As a result of standards based reform and the science FCAT I have less freedom to allow students to learn at their own pace.	<input type="radio"/> Yes	<input type="radio"/> No
57. Preparation for the science FCAT has resulted in more ability grouping or tracking at my school.	<input type="radio"/> Yes	<input type="radio"/> No
58. I believe increased school accountability has been a positive effect of the Governor's A+ Schools program.	<input type="radio"/> Yes	<input type="radio"/> No
59. I believe increased teacher accountability has been a positive effect of the Governor's A+ Schools program.	<input type="radio"/> Yes	<input type="radio"/> No
60. As a result of standards based reform and preparation for FCAT we have taken fewer field trips.	<input type="radio"/> Yes	<input type="radio"/> No
61. I believe increased parent involvement has been a positive effect of the Governor's A+ Schools program.	<input type="radio"/> Yes	<input type="radio"/> No
62. I believe increased student achievement has been a positive effect of the Governor's A+ Schools program.	<input type="radio"/> Yes	<input type="radio"/> No
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	<input type="radio"/> Yes	<input type="radio"/> No
64. I believe that a negative aspect of the Governor's A+ Schools Program is that all schools do not have equal chances for success.	<input type="radio"/> Yes	<input type="radio"/> No
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	<input type="radio"/> Yes	<input type="radio"/> No

<u>Teacher Attitudes Toward Standards Based Reform</u>	Please select the number corresponding to your answer choice.
	Strongly Disagree    Strongly Agree

66. I believe the methods of standards based reform our school is engaging in will improve our school.	1	2	3	4	5
67. Standards based reform efforts at our school have caused me to make changes in what I do in my classroom which are not entirely comfortable to me.	1	2	3	4	5
68. I believe there has been close linkage of the Standards Based Reform movement to the FCAT and I believe this has had an overall positive effect.	1	2	3	4	5
69. I believe standards based reform efforts at my school will improve student learning in science.	1	2	3	4	5
70. I believe that the FCAT for reading and math has improved curriculum at our school.	1	2	3	4	5

	Strongly Disagree		Strongly Agree		
71. I believe that the FCAT for reading and math has improved instruction at our school.	1	2	3	4	5
72. I believe that the FCAT for reading and math has improved student learning at our school.	1	2	3	4	5

73. I believe that the science FCAT will improve science curriculum at my school.	1	2	3	4	5
74. I believe that the science FCAT will improve science instruction at my school.	1	2	3	4	5
75. I believe that the science FCAT will improve student learning in science at my school.	1	2	3	4	5
76. I believe mandatory changes made at my school in the process of standards based reform have restricted my freedom and creativity as a teacher.	1	2	3	4	5
77. I believe that using the SSS for science to the extent required at our school has restricted my freedom and creativity as a teacher.	1	2	3	4	5
78. I believe the mandatory changes imposed on my teaching in the process of standards based reform have restricted my freedom and creativity beyond using the SSS for science.	1	2	3	4	5
79. My attitude toward standards based reform has changed for the better since reform efforts have begun at my school.	1	2	3	4	5
80. I believe a high quality science program is a priority to the administration at my school.	1	2	3	4	5
81. I believe the administration at my school has a good understanding of what makes a good science program.	1	2	3	4	5
82. I believe my administration is doing what it takes to create and/ or maintain a good science program.	1	2	3	4	5
83. I believe standards based reform is implemented only in response to the science FCAT.	1	2	3	4	5
84. I believe standards based reform in science is a good idea independently of the FCAT.	1	2	3	4	5

85. I believe the science FCAT has already had a positive influence on curriculum, instruction and/or student learning in science.	1	2	3	4	5
86. I believe the Governors A+ Schools program has helped improve student learning in Florida.	1	2	3	4	5

	Strongly Disagree Strongly Agree				
87. Teaching has become more stressful as a result of changes made in the process of standards based reform.	1	2	3	4	5
88. The amount of time my principal has spent talking to me about curriculum has increased as a result of standards based reform and the science FCAT.	1	2	3	4	5
89. My principal has asked me to change the way I teach as a result of standards based reform.	1	2	3	4	5
90. My principal has asked me to change the way I teach as a result of the science FCAT.	1	2	3	4	5
91. I feel very well prepared to engage in standards based reform at my school.	1	2	3	4	5
92. I feel very well prepared to prepare students for the science FCAT.	1	2	3	4	5
94. I am familiar with the Sunshine State Standards for science.	1	2	3	4	5
95. I am familiar with the differences between NSES and the Sunshine State Standards for science	1	2	3	4	5
96. In my experience there is a close association between high stakes testing such as FCAT and standards based reform in Florida.	1	2	3	4	5
97. At my school teachers were able to participate in discussions and /or decisions regarding standards based reform.	1	2	3	4	5
98. As a result of the reading and math FCAT I devote more attention to reading and math skills.	1	2	3	4	5
99. My college/university teacher prep program has adequately prepared me to deal with SBR.	1	2	3	4	5
100. In my opinion, I have had sufficient professional development in the area of standards based reform.	1	2	3	4	5
101. In my experience, standards based reform is a top-down state mandated effort in which teachers experience loss of autonomy and control over what goes on in their own classrooms.	1	2	3	4	5
102. At my school opinions and contributions from teachers regarding standards based reform are welcomed and considered in a serious manner.	1	2	3	4	5
103. I have a high level of trust toward the administration at my school.	1	2	3	4	5

	Strongly Disagree Strongly Agree				
104. My homework assignments have changed in a positive way as a result of standards based reform and the science FCAT.	1	2	3	4	5
105. I think my school is proceeding with standards based reform in an appropriate manner. in science in an appropriate manner.	1	2	3	4	5
106. I am less satisfied than I used to be with my teaching position due to state mandated reforms.	1	2	3	4	5
107. If my decrease in satisfaction with my teaching position continues I may consider leaving the profession.	1	2	3	4	5
<u>Teacher and School background and demographic information:</u>					
108. How many years have you been teaching?					
<input type="radio"/> <3	<input type="radio"/> 3-5	<input type="radio"/> 6-10	<input type="radio"/> >10		
109. How many years have you been teaching at your current school?					
<input type="radio"/> <3	<input type="radio"/> 3-5	<input type="radio"/> 6-10	<input type="radio"/> >10		
110. The average family income for the residential area surrounding the school where I teach is approximately:					
<input type="radio"/> ≤\$20,000	<input type="radio"/> \$20,500-39,999	<input type="radio"/> \$40,000-59,999	<input type="radio"/> \$60,000-80,000	<input type="radio"/> >\$80,000	
111. My gender is:		<input type="radio"/> Female		<input type="radio"/> Male	
112. My ethnicity is:					
<input type="radio"/> White	<input type="radio"/> African American	<input type="radio"/> Hispanic American	<input type="radio"/> Asian American		
<input type="radio"/> Native American	<input type="radio"/> Other				
113. I estimate that the percentage of students at my school on free and reduced lunch is:					
< 9.9%	10% - 39.9%	40% - 59.9%	>60%		

APPENDIX B  
FREQUENCY DATA

AN ASSESSMENT OF STANDARDS BASED REFORM IN  
FLORIDA'S MIDDLE SCHOOL SCIENCE PROGRAMS

An Assessment of Standards Based Reform in Florida's Middle School Science Programs

<u>School Curriculum</u>		
1. What grade level do you primarily teach? If you teach more than one grade level, choose the one of which you have more classes or are most familiar.		
Sixth grade: 29%	Seventh grade: 40%	Eighth grade: 30%

2. Does your school have a science curriculum specialist?	Yes 68%
3. If there is a science curriculum specialist working with your school, has that person been helpful to you in the area of SBR and/or FCAT preparation?	48%
4. We have a traditional subject based curriculum	78%
5. We teach one interdisciplinary unit each year.	59%
6. Our curriculum is fully interdisciplinary all year.	16%
7. We use parallel curriculum where the same topic is covered simultaneously in two or more subjects. We do this for either all or part of the year.	28%

8. What is the primary source of your curriculum?				
Curriculum or textbook package: 34%	Our curriculum is created by our teachers: 11%	Our curriculum is created by our school district: 37%	FCAT: 9%	Other: 4%
9. To what extent is your curriculum based on the Sunshine State Standards for science?				
Completely: 58%	Mostly: 30%	Some 8%	Not at all: 0%	
10. How long has your existing science curriculum been in place?				
Brand new this year: 4%	This is its second year: 13%	2.5 –4 years old: 57%	More than four years old: 21%	

11. My science curriculum uses National Science Education Standards' guidelines for assessment.	Yes 41%
12. Our middle school science curriculum uses National Science Education Standards' guidelines for teaching with inquiry	40%
13. My science curriculum uses an inquiry approach to science.	77%
14. For my science curriculum a textbook or curriculum package is used as one of many resources.	94%

15. My science curriculum allows flexibility and teacher discretion.	86%
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	Yes
16. For assessment I use primarily multiple-choice tests.	34%
17. For assessments I sometimes use a variety that are called "authentic" or "performance" or "alternative".	82%
18. We create curriculum based on the Sunshine State Standards for science.	91%
19. I sometimes use portfolio assessments.	46%
20. When I give tests I sometimes use essay questions.	79%

21. What percentage of classroom time is spent in the laboratory or doing laboratory activities?			
<5% (17%)	6-20% (40%)	21-33% (32%)	≥33% (10%)
22. How much class time is spent on constructivist/ student centered or inquiry based activities?			
<5% (7%)	6-20% (40%)	21-33% (32%)	≥33% (19%)

<u>Standards Based Reform</u>			
23. To what extent is your school engaged in standards based reform			
We are currently exploring possibilities for SBR at our school 3%	We have begun the process of SBR at our school. 24%	SBR is already in place at our school. 51%	We have not yet begun the process of SBR at our school 17%
24. At your school, how many hours will you have spent this year in professional development in the area of SBR?			
<1 hour 14%	1-5 hours 45%	< 5 hours 22%	Not sure
25. At your school, how many hours will be spent in the near future in professional development in the area of SBR?			
<1 hour 10%	1-5 hours 35%	>5 hours 30%	Not sure 24%

26. We have a lot of pressure to prepare students for the FCAT.	Yes 90%
27. I have felt pressure to alter my curriculum to prepare students for the science FCAT.	74%
28. I feel confident that my curriculum and lesson plans reflect the SSS for science.	96%
29. We are required to document the SSS for science in our lesson plans.	83%
30. My principal requires the use of the SSS for science.	93%
31. My superintendent requires the use of the SSS for science.	92%

32. My department chair requires the use of the SSS for science.	85%
33. How much of your instructional time is dedicated to standardized test preparations?	
< 10% (24%)	10-20% (32%)
20-50% (32%)	50-75% (9%)
>75% (1%)	
34. I believe that increased curriculum alignment in middle school science has occurred as a result of SBR	75%
35. I believe that increased curriculum alignment in middle school science has occurred as a result of FCAT.	77%
36. I believe that increased standardization of the middle school science curriculum has occurred as a result of SBR	73%
37. I believe that increased standardization of the middle school science curriculum has occurred as a result of FCAT.	76%
38. I believe that student achievement has increased as a result of SBR	38%
39. I believe that student achievement has increased as a result of FCAT.	34%
40. I believe that SBR has resulted in increased teacher autonomy and control over the curriculum.	14%
41. I believe that SBR has resulted in increased effectiveness of our science curriculum.	41%
42. I believe that standards based reform has resulted in increased interdisciplinary teamwork among teachers of different subject areas	22%
43. I believe that SBR and/ or science FCAT preparation has increased science department collaboration.	56%
44. I believe that SBR has contributed to decreased teacher autonomy and control over the science curriculum.	67%
45. I believe that SBR has contributed to increased teacher stress	76%
46. I believe that FCAT preparation has contributed to increased teacher stress.	92%
47. I believe that SBR has contributed to less emphasis within the curriculum on student interests.	78%
48. I believe that SBR has resulted in decreased quality of the science curriculum.	46%
49. I believe that preparation of students for the FCAT has resulted in decreased quality of the science curriculum.	69%

50. As a result of SBR and the science FCAT I have used fewer Internet and /or technology based activities in my classroom.	40%
51. As a result of standards based reform and the science FCAT the amount of worksheets I use in class has increased.	46%
52. As a result of standards based reform and the science FCAT the amount of memorization I require of my students has increased.	42%
53. As a result of standards based reform and the science FCAT the amount of work my students do in small groups has decreased.	35%
54. "The Middle School Concept", or in other words our attention to the needs of the early adolescent has suffered at our school.	60%
55. As a result of standards based reform and the science FCAT I have been encouraged to spend more class time covering basic skills.	77%

56. As a result of standards based reform and the science FCAT I have less freedom to allow students to learn at their own pace.	84%
57. Preparation for the science FCAT has resulted in more ability grouping or tracking at my school.	49%
58. I believe increased school accountability has been a positive effect of the Governor's A+ Schools program.	29%
59. I believe increased teacher accountability has been a positive effect of the Governor's A+ Schools program.	27%
60. As a result of standards based reform and preparation for FCAT we have taken fewer field trips.	62%
61. I believe increased parent involvement has been a positive effect of the Governor's A+ Schools program.	29%
62. I believe increased student achievement has been a positive effect of the Governor's A+ Schools program.	35%
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	83%
64. I believe that a negative aspect of the Governor's A+ Schools Program is that all schools do not have equal chances for success.	84%
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	61%

Teacher Attitudes Toward Standards Based Reform					
	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
66. I believe the methods of SBR our school is engaging in will improve our school.	13%	16%	44%	14%	11%
67. Standards based reform efforts at our school have caused me to make changes in what I do in my classroom which are not entirely comfortable to me.	10%	22%	33%	27%	5%
68. I believe there has been close linkage of the SBR movement to the FCAT and I believe this has had an overall positive effect.	20%	28%	29%	17%	5%
69. I believe SBR efforts at my school will improve student learning in science.	15%	21%	31%	25%	7%
70. I believe that the FCAT for reading and math has improved curriculum at our school.	16%	24%	25%	26%	8%
71. I believe that the FCAT for reading and math has improved instruction at our school.	16%	24%	25%	26%	8%
72. I believe that the FCAT for reading and math has improved student learning at our school.	19%	26%	28%	20%	6%
73. I believe that the science FCAT will improve science curriculum at my school.	21%	24%	27%	21%	6%
74. I believe that the science FCAT will improve science instruction at my school.	21%	29%	25%	18%	6%
75. I believe that the science FCAT will improve student learning in science at my school.	21%	19%	25%	18%	6%
76. I believe mandatory changes made at my school in the process of standards based reform have restricted my freedom and creativity as a teacher.	10%	18%	15%	33%	21%

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
77. I believe that using the SSS for science to the extent required at our school has restricted my freedom and creativity as a teacher.	11%	34%	24%	24%	6%
78. I believe that the mandatory changes imposed on my teaching in the process of SBR have restricted my freedom and creativity as a teacher beyond using the SSS for science.	10%	28%	25%	30%	6%
79. My attitude toward standards based reform has changed for the better since reform efforts have begun at my school.	12%	30%	37%	13%	20%
80. I believe a high quality science program is a priority to the administration at my school.	10%	16%	29%	24%	20%
81. I believe the administration at my school has a good understanding of what makes a good science program.	10%	20%	25%	27%	16%
82. I believe my administration is doing what it takes to create and/ or maintain a good science program.	13%	19%	27%	25%	15%
83. I believe standards based reform is implemented only in response to the science FCAT.	8%	25%	26%	31%	10%
84. I believe SBR in science is a good idea independently of the FCAT.	8%	13%	35%	28%	5%
85. I believe the science FCAT has already had a positive influence on curriculum, instruction and/or student learning in science.	17%	33%	30%	14%	5%
86. I believe the Governors A+ Schools program has helped improve student learning in Florida.	20%	36%	25%	13%	3%
87. Teaching has become more stressful as a result of changes made in the process of standards based reform.	13%	10%	14%	35%	26%

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
88. The amount of time my principal has spent talking to me about curriculum has increased as a result of standards based reform and the science FCAT.	16%	24%	19%	25%	15%
89. My principal has asked me to change the way I teach as a result of standards based reform.	32%	31%	16%	15%	5%
90. My principal has asked me to change the way I teach as a result of the science FCAT.	27%	31%	14%	19%	8%
91. I feel very well prepared to engage in standards based reform at my school.	9%	12%	27%	30%	4%
92. I feel very well prepared to prepare students for the science FCAT	12%	13%	22%	34%	17%
93. I am familiar with the National Science Education Standards (NSES).	17%	13%	21%	34%	15%
94. I am familiar with the Sunshine State Standards for science.	7%	1%	3%	28%	60%
95. I am familiar with the differences between NSES and the Sunshine State Standards for science	16%	20%	25%	30%	8%
96. In my experience there is a close association between high stakes testing such as FCAT and standards based reform in Florida.	9%	12%	32%	31%	13%
97. At my school teachers were able to participate in discussions and /or decisions regarding standards based reform.	21%	29%	27%	15%	6%
98. As a result of the reading and math FCAT I devote more attention to reading and math skills.	10%	13%	16%	45%	14%
99. My college/university teacher prep program has adequately prepared me to deal with SBR.	29%	29%	24%	11%	4%
100. In my opinion, I have had sufficient professional development in the area of standards based reform.	8%	25%	29%	28%	10%

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
101. In my experience, standards based reform is a top-down state mandated effort in which teachers experience loss of autonomy and control over what goes on in their own classrooms.	10%	11%	29%	30%	15%
102. At my school opinions and contributions from teachers regarding standards based reform are welcomed and considered in a serious manner.	10%	17%	34%	28%	6%
103. I have a high level of trust toward the administration at my school.	9%	10%	28%	29%	21%
104. My homework assignments have changed in a positive way as a result of standards based reform and the science FCAT.	11%	32%	36%	12%	5%
105. I think my school is proceeding with standards based reform in an appropriate manner.	10%	10%	35%	33%	9%
106. I am less satisfied than I used to be with my teaching position due to state mandated reforms.	9%	27%	19%	29%	15%
107. If my decrease in satisfaction with my teaching position continues I may consider leaving the profession.	18%	26%	11%	17%	25%
<u>Teacher and School background and demographic information:</u>					
108. How many years have you been teaching?					
<3 (3%)	3-5 (21%)	6-10 (11%)	>10 (60%)		
109. How many years have you been teaching at your current school?					
<3 (13%)	3-5 (31%)	6-10 (25%)	>10 (29%)		
110. The average family income for the residential area surrounding the school where I teach is approximately:					
≤\$20,000 (21%)	\$20,500-39,999 (43%)	\$40,000-59,999 (18%)	\$60,000-80,000 (6%)	>\$80,000 (6%)	
111. My gender is:		Female 54%		Male 44%	

112. My ethnicity is:			
White (81%)	African American (5%)	Hispanic American (8%)	Asian American (2%)
Native American (1%)	Other		
113. I estimate that the percentage of students at my school on free and reduced lunch is:			
< 9.9% (8%)	10% - 39.9% (33%)	40% - 59.9% (27%)	>60% (29%)

APPENDIX C  
INDIVIDUAL TEACHER COMMENTS

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**Alachua County**

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- One teacher, also a science department chair, said she has considered leaving teaching as a result of standards based reform and FCAT diminishing her professional freedom and creativity as a teachers. She will continue to teach the remaining five years until her retirement.

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  - “Before the “reforms” and FCAT driven mandates our school had an excellent science program. There were many projects, speakers and field trips. As the 8<sup>th</sup> grade teacher I included a unit on flight that culminated with students actually co-piloting a plane. I did a metric Olympics that involved parents and administrators. All that is over. You rush briefly over many topics and go into no depth.”

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  - While most teachers do feel additional stress as a result of SBR and preparing students for the science FCAT, it may lead to: “...better teaching and improved student performance. I personally feel that SBR will improve science curriculum, instruction and student learning. From experience, teachers need some professional development to learn how to meet requirements of the standards without sacrificing teachers’ creativity and autonomy.”
- 

**Orange County:**

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- Her team teaches at least one interdisciplinary unit per year, but this is not a regular practice at her school anymore.
  - This is the first year she has felt pressure to alter her curriculum to prepare her students for the science FCAT.

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  - His school does not use parallel or interdisciplinary curriculum per se. However, his team, which is part of a school within a school, moves topics around to support and reinforce each other throughout the year. Sometimes they have “team days’ with interdisciplinary activities.

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  - This is the first year he has felt pressure to alter her curriculum to prepare her students for the science FCAT.

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  - His principal has required him to add specific types of writing, reading and mathematics items that don’t always reflect his preferences.
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**Duval County:**

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- “In my opinion, in Duval County, the FCAT has broadened the gap between schools- the schools in lower socio groups do not succeed as well as middle and upper socio groups – the reason is obvious to everyone but all kinds of excuses are made as to why these schools fail. But poverty is the reason, and all the social and cultural problems that go along with it, hinder learning.”
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**Miami-Dade County:**


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- Dear Ms Hammer,  
My responses may appear maligned or even flippant, but be assured: I read each question and responded honestly. Please understand where I come from – a teacher in Miami-Dade where class sizes are absurd, coupling with mainstreaming of dysfunctional behavioral children, and lack of funds to even clean the floors! The board is incompetent, the bureaucracy is massive and completely unresponsive, the union is corrupt – and do you think the average teacher gives even five minutes of thought to anything you posted in your survey??

We receive surveys periodically, usually from some ivory-tower person, and if you get a teacher to confide, they always say the same thing: ‘I give them the answer they want to hear, because I am not a fool’ – such fear!

I realize the “education governor” has succeeded in fooling most people that his A+ plan is repairing the system; but I know when I look into the eyes of parents and students that he has failed.

Good luck with your Ph.D. – I’m sure a secure position will be waiting for you upon completion, especially if you do not rock the boat. Real reform? We are beyond that – only a fundamental revolution will alter our path.

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**Indian River County:**


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- “My school district hired a consultant from Arkansas without a science background to advise on how our curriculum should be set up. We also have a Florida consultant who is familiar with the FL SSS in science with very limited experience teaching. We now teach topics over a three year span 6-8 grade with the belief that the students will retain the knowledge over the years. I would like to see a curriculum with one science discipline covered each year.”
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**Volusia County:**


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- At my school the middle school concept has suffered “in a big way! Bye, Bye middle school concept!”
  - The Governor’s A+ Program “is ruining education and creating a loss of teachers.”
  - The Governor’s A+ Program has caused deterioration in our schools climate “in a big way!”
  - “You have to have some kind of standards for curriculum but Jeb Bush is going too far”
  - “The Governor’s A+ Plan has caused increases student pressure and stress.”
  - “The success of students and teachers should not be based on one high stakes test. It is important to have standards so everyone receives an equal education, but some of these FCAT standards across the curriculum are ridiculous. Student and teacher pressure has risen enormously. The joy of learning and teaching has greatly been reduced by Jeb bush’s plan. His plan is what needs reform. Good luck with the study. Sorry for the attitude, but I am drained!”
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**Bay County:**


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- “To whom it may concern,  
FCAT has only promoted students to be masters at trivia and does not allow for deep investigation, or for teachers to follow roads of student interests. We have no idea of what the powers that be deem to be important. We teach the Glencoe Science Voyages Series which has a bit of this and a bit of that; but unlike our former curriculum, it does not dive deep into the well of knowledge. I used to teach 7<sup>th</sup> grade life science and we could spend an unlimited time looking at the issues that were of concern. This is no longer an option. FCAT is a joke. It is a test that as a school we spend an enormous amount of time discussing and preparing for and the other issues be damned. I, now, run less labs and activities and spend more time in worksheets and rote activities. The idea of labeling a school, student or teacher based on the performance of a single test is insane. I can see using a standardized test to see how students perform certain skills, but to use that to determine a student’s ability, or a school’s ability does not take into account any SES parameters. My students received twice the education before FCAT and SSS dictatorship. The reason, ‘Academic Freedom’ to dive deep into knowledge.”

- “A bigger problem I foresee is the lack of leadership and guidelines for the teaching of various subject areas within the realm of “science”. That is, which specific subjects were to be taught at each grade level? Generally speaking, “subjects” means areas in science such as life science, physical science, etc. We have been told that local school districts are able to decide which specific areas of science will be emphasized at each grade level. We in Bay county have been given no such guidelines, and most schools “sort-of” decide what areas to emphasize per grade. I suspect that when FCAT science scores start to “count”, there will be huge differences in certain areas of science. It may be that other counties have better ways of making sure that all areas of science are covered.

See, what happens is that teachers basically teach what they are most comfortable with. They often emphasize topics that they like. Or they spend time doing labs and activities that are time consuming but may not be part of the curriculum. Also, many teachers just start with chapter one and just plow through the book. There is no definite reason for doing anything except to “get to the next chapter”. Bottom line is – only certain aspects of science will get covered, Many areas will go untouched and untaught.

I realize that at this time it’s left up to the individual schools, and that test scores will show huge gaps. But the shame of it is that it will take years and years for anyone to notice and design and implement a solid plan to address the problem.

We are always told that \$ funding is an issue. It always has been, but some schools get adequate \$ and others don’t, so statewide, there automatically exists a huge gap between the “haves and the have nots”.

Another point you should be aware of is that of the high schooler who fails the FCAT. Is it fair that high school students who have attended school for 13 or 14 years have nothing to show for it? Why should one test decide a person’s fate?

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Many doors are closed to students who otherwise had done all that had been asked of them for many years, and countless hours of study, agony and attending class?

To me it's a shame. Most of these are good people who just want to move on with their lives, but can't. They are constantly faced with someone else's perception of what a nice outstanding person should be. Holding a person's diploma based on a misguided notion such as the FCAT is one of the dumbest things our lawmakers/Dep't of Education has ever come up with. Having been a teacher for over 30 years, I have seen some stupid stuff come down to us, but this one and the HSCT before it are pretty much the worst of the lot.

Just think of the thousands and thousands of people who are destined to work in the lowest paying jobs forever because they have no diploma. It's a travesty and a shame. When you think about the big picture, sometimes it looks like it was designed that way. After all, where would big business get all of their minimum wage workers?

Its almost as if it is some sort of plot. I don't really believe that, but if you think about it, it really creates social problems for State and government bureaucrats to deal with. It just goes on and on.

I'm through, Probably I got off track too much. However, I do have a couple more ideas for someone.-

- 1) The effect of FCAT failures correlated to GED graduates.- The idea is that the number or % of GED is going to be affected.
- 2) The impact of requiring all students to pass algebra in order to graduate."

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### **Broward County:**

"Want to know the effect of FCAT and curriculum standards on teaching and learning? It's a mixed bag. They can be somewhat effective for teachers who are not entirely up to the task of teaching and they can be creativity dampening, stressful and ineffective for the other teachers and students alike.

Some teachers do not know how to teach. They are not knowledgeable in their subjects, maybe from teaching out-of-field, they may not be particularly well-versed in different methods of instruction, and they may just be unmotivated. For these teachers, a "recipe book" of "how to" can only help. Broward County has delivered that to the middle school science teacher in the form of a set curriculum, based on the Sunshine State Standards, and a text book that is complete from Bell Ringer and mini lab, to worksheets and chapter exams. The county would like everyone on the same page on the same day. These teacher's students will at least get the basics.

However, for the rest of the teachers, those looking for new ways to expand their students' minds, these curriculum requirements and FCAT science tests are just another way to make a challenging job more challenging. A good teacher can cover the curriculum and teach what is needed for the "test" and then some. However, many, if not most teachers take these pressures seriously. They would, and do, sacrifice their students doing inquiry based learning, or projects to ensure that they teach to the test. They save labs and projects for after the FCAT. As the FCAT is given in March, most of the year is geared to the test and not to "how to learn" or to foster and interest and a love of learning.

Do students learn better being taught a test? I don't think so. We can demonstrate that they get better at taking the test, but can we demonstrate that they can be real-world problem solvers? I don't think so. We stifle students' thirst for knowledge and their

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creativity teaching only a test and sticking so rigidly to not only a given curriculum, but also a timeline – complete with what page to be on what day. Rather than excite students about a subject, we are turning them off to math, science and language arts.

I am fortunate to teach in a magnet program with very bright students. I am not fearful of them failing the FCAT science test. Do I add to the curriculum? Yes, of Course. Do I try to do creative and innovative activities with my students? Oh yeah. Do they take a lot of time? Sure they do. Will my students be better off as a result? I think so. Does the State? Depends on what they score on the FCAT.

In my opinion, the increased emphasis on statewide, standardized tests will ultimately have a negative effect. Teachers will leave the field, either because they cannot handle the pressure, or they do not enjoy teaching in an atmosphere that squelches their enthusiasm and creativity. There is already a great shortage of teachers. Students, in addition to being stressed- out from 3<sup>rd</sup> grade through 10<sup>th</sup>, will be good at taking tests and nothing more. Students recognize what is considered important and that is what they will concentrate on. Sad.....isn't it?

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APPENDIX D  
PILOT DATA

**Research Questions 1-5, General Frequency Data**

1. How widespread are SBR efforts in Florida’s Middle School science programs?

Relevant Survey Questions and Responses For Research Question #1

23. To what extent is your school engaged in standards based reform N = 13			
We are currently exploring possibilities for SBR at our school 1/13	We have begun the process of SBR at our school. 3/13	SBR is already in place at our school. 8/13	We have not yet begun the process of SBR at our school 1/13
24. At your school, how many hours will you have spent this year in professional development in the area of SBR? (N = 13)			
<1 hour 1/13	1-5 hours 8/13	< 5 hours 0/13	Not sure 3/13
25. At your school, how many hours will be spent in the near future in professional development in the area of SBR? (N=13)			
<1 hour 2/13	1-5 hours 3/13	>5 hours 3/13	Not sure 4/13

Research Question #2: What kinds of changes have schools made in the process of reform efforts?

Relevant Survey Questions and Responses For Research Question #2

29. We are required to document the SSS for science in our lesson plans	YES
	11/13
34. I believe that increased curriculum alignment in middle school science has occurred as a result of SBR	10/13
35. I believe that increased curriculum alignment in middle school science has occurred as a result of FCAT.	11/13
36. I believe that increased standardization of the middle school science curriculum has occurred as a result of SBR	11/13
37. I believe that increased standardization of the middle school science curriculum has occurred as a result of FCAT.	12/13
42. I believe that standards based reform has resulted in increased interdisciplinary teamwork among teachers of different subject areas	4/13
43. I believe that SBR and/ or science FCAT preparation has increased science department collaboration.	4/13
54. The "Middle School Concept", or in other words, our attention to the needs of early adolescents, has suffered at my school as a result of FCAT and/or SBR.	9/13
57. Preparation for the science FCAT has resulted in more ability grouping or tracking at my school.	9/13
61. I believe increased parent involvement has been a positive effect of the Governor's A+ Schools program.	1/12

Research Question #3: How effective are current reform efforts based on teachers' perceptions?

Relevant Survey Questions and Responses For Research Question #3

38. I believe that student achievement has increased as a result of SBR	YES 4/12
39. I believe that student achievement has increased as a result of FCAT.	6/13
41. I believe that SBR has resulted in increased effectiveness of our science curriculum.	4/13
58. I believe increased school accountability has been a positive effect of the Governor's A+ Schools program.	5/12
59. I believe increased teacher accountability has been a positive effect of the Governor's A+ Schools program.	5/13
61. I believe increased parent involvement has been a positive effect of the Governor's A+ Schools program.	1/12
62. I believe increased student achievement has been a positive effect of the Governor's A+ Schools program.	4/13
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	11/13
64. I believe that a negative aspect of the Governor's A+ Schools Program is that all schools do not have equal chances for success	12/13
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	9/13

## Relevant Survey Questions and Responses For Research Question #3

	Strongly Disagree		3	Strongly Agree	
	1	2		4	5
66. I believe the methods of SBR our school is engaging in will improve our school.	23%	15%	31%	23%	8%
68. I believe there has been close linkage of the SBR movement to the FCAT and I believe this has had an overall positive effect.	23%	0%	62%	15%	0%
69. I believe SBR efforts at my school will improve student learning in science.	23%	15%	31%	23%	0%
70. I believe that the FCAT for reading and math has improved curriculum at our school.	15%	0%	46%	31%	8%
71. I believe that the FCAT for reading and math has improved instruction at our school.	15%	0%	39%	39%	0%
72. I believe that the FCAT for reading and math has improved student learning at our school.	15%	0%	39%	39%	8%
73. I believe that the science FCAT will improve science curriculum at my school.	31%	0%	46%	8%	15%
74. I believe that the science FCAT will improve science instruction at my school.	31%	0%	39%	23%	8%
75. I believe that the science FCAT will improve student learning in science at my school.	31%	8%	31%	31%	8%
85. I believe the science FCAT has already had a positive influence on curriculum, instruction and/or student learning in science.	39%	0%	23%	31%	8%
86. I believe that the Governors A+ Schools program has helped improve student learning in Florida.	46%	15%	8%	31%	5%

Research Question #4: What are teacher attitudes regarding current or upcoming reform efforts?

- a. How favorable are teachers' attitudes toward standards based reform?
- b. How favorable are teacher attitudes regarding changes they are making in their own classrooms?

Relevant Survey Questions and Responses For Research Question #4a

40. I believe that SBR has resulted in increased teacher autonomy and control over the curriculum	YES				
	3/13				
45. I believe that SBR has contributed to increased teacher stress	12/13				
46. I believe that FCAT preparation has contributed to increased teacher stress.	13/13				
47. I believe that SBR has contributed to less emphasis within the curriculum on student interests.	11/13				
65. I believe that the Governor's A+ Schools Program has caused a deterioration in our school's climate.	9/13				
	Strongly Disagree			Strongly Agree	
	1	2	3	4	5
79. My attitude toward SBR has changed for the better since reform efforts have begun at my school.	5/13	2/13	4/13	2/13	0/13
83. I believe SBR is implemented only in response to the science FCAT.	0/13	1/13	3/13	4/13	5/13
84. I believe SBR in science is a good idea independently of the FCAT.	1/13	0/13	7/13	3/13	2/13
96. In my experience there is a close association between high stakes testing such as FCAT and SBR in Florida.	1/13	1/13	5/13	2/13	4/13

## Relevant Survey Questions and Responses for Research Question #4b

44. I believe that SBR has contributed to decreased teacher autonomy and control over the science curriculum.	YES 23%				
49. I believe that preparation of students for the FCAT has contributed to decreased quality of the science curriculum.	92%				
	Strongly Disagree			Strongly Agree	
	1	2	3	4	5
76. I believe mandatory changes made at my school in the process of SBR have restricted my freedom and creativity as a teacher.	5/13	2/13	0/13	5/13	1/13
77. I believe that using the SSS for science to the extent required at our school has restricted my freedom and creativity as a teacher.	1/13	3/13	2/13	2/13	5/13
78. I believe that the mandatory changes imposed on my teaching in the process of SBR have restricted my freedom and creativity as a teacher beyond using the SSS for science.	1/13	3/13	2/13	2/13	5/13
67. SBR efforts at our school have caused me to make changes in what I do in my classroom that are not entirely comfortable to me.	2/13	3/13	3/13	2/13	3/13
101. In my experience, SBR is a top-down state mandated effort in which teachers experience loss of autonomy and control over what goes on in their own classrooms.	0/13	3/13	4/13	2/14	4/13
106. I am less satisfied than I used to be with my teaching position due to state mandated reforms.	0/13	5/13	2/13	2/13	4/13
107. If my decrease in satisfaction with my teaching position continues I may consider leaving the profession.	4/13	4/13	0/13	1/13	4/13

Research Question #5: What kind of changes have teachers made (or do they anticipate making) in their work as a result of standards based reform?

Relevant Survey Questions and Responses For Research Question #5

50. As a result of standards based reform and the science FCAT I have used fewer Internet and/or technology based activities in my	YES				
	6/13				
51. As a result of standards based reform and the science FCAT the amount of worksheets I use in class has increased.	6/13				
52. As a result of standards based reform and the science FCAT the amount of memorization I require of my students has increased.	6/13				
53. As a result of standards based reform and the science FCAT the amount of work my students do in small groups has decreased.	7/13				
55. As a result of standards based reform and the science FCAT I have been encouraged to spend more class time covering basic skills.	8/13				
56. As a result of SBR and the science FCAT I have less freedom to allow students to learn at their own pace	10/13				
60. As a result of standards based reform and preparation for FCAT we have taken fewer field trips.	9/13				
63. I believe that increased time spent on test preparation has come at the expense of other important curricular items.	11/13				
	Strongly Disagree			Strongly Agree	
	1	2	3	4	5
89. My principal has asked me to change the way I teach as a result of SBR.	5/13	5/13	2/13	1/13	0%
90. My principal has asked me to change the way I teach as a result of the science FCAT.	5/13	3/13	0%	4/13	1/13
98. As a result of the reading and math FCAT I devote more attention to reading and math skills.	0/13	3/13	0/13	7/13	3/13
104. My homework assignments have changed in a positive way as a result of SBR and the science FCAT.	4/13	5/13	2/13	2/13	0/13

APPENDIX E  
COVER LETTER SENT TO TEACHERS



# UNIVERSITY OF FLORIDA

College of Education  
School of Teaching and Learning

2403 Norman Hall  
PO Box 117048  
Gainesville, FL 32611-7048  
(352) 392-9191  
Fax (352) 392-9193

February 24, 2003

Dear Middle School Science Teacher,

As a science teacher, you are no doubt interested in the consequences of Standards Based Reform and FCAT on curriculum and instruction in Florida's middle school science programs. The enclosed questionnaires are part of a doctoral study in science education at the University of Florida designed to assess the changes taking place in middle school science programs in Florida as a result of Standards Based Reform and FCAT. The perspectives of teachers are of critical importance in the study of the standards based reform movement because they are in a position not only to know what is happening, but also to judge the effects of reform efforts. Interestingly, little research effort has been expended to date to discover the perceptions of teachers regarding standards based reform.

For the purpose of this study, the term standards based reform, or SBR is used to refer to changes made within the classroom, school, or school district in the State of Florida having to do with incorporating and/ or documenting the Sunshine State Standards and as a result of preparing students for the science FCAT. In order to learn what changes you see happening in your classrooms and your perspectives on standards based reform and FCAT I am asking you to reply to the enclosed questionnaires. Please follow the enclosed directions carefully. Your input will play a critical role in describing what is happening in Florida in terms of standards based reform. Complete confidentiality is assured.

Please return your survey and completed scantron form as soon as you can. If you have additional comments or suggestions, or if you would like to express your perspectives to a greater degree than the extent allowed on the scantron form, please do not hesitate to

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Protocol # 2003-4-200  
For Use Through 2/26/04

write on the survey itself, or enclose your own paper. I would like to know anything you would like to share.

Thank you very much,

*Kathryn Stuart Hammer*

Kathryn Stuart Hammer

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University of Florida  
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[University of Florida  
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Protocol # 2003-4-200  
For Use Through 2/26/04

APPENDIX F  
INFORMED CONSENT FOR TEACHERS

**Informed Consent for Teachers**

**Protocol Title:** An Assessment of Standards Based Reform in Florida Middle School Science Programs

**Please read this consent document carefully before you decide to participate in this study.**

**Purpose of this Research Study:**

to describe the status of standards based reform in Florida’s middle school science programs in terms of changes teachers have made in curriculum and instruction and teacher attitudes.

**What you will be asked to do in this study:**

You will be asked to complete a survey about changes you have made in your classroom as a result of the Sunshine State Standards for science and the science, reading and math FCAT. The survey also contains question about your perceptions of the process of Standards based Reform at your school and in general.

**Time required:**

30 minutes

**Risks and Benefits**

The benefits are that you will contribute to the discovery of important information regarding science education reform in the State of Florida. There are no anticipated risks.

**Confidentiality**

A combination of numbers will be assigned to each teacher consisting of the county, school and participating teacher for follow-up purposes only. Your identity will be kept confidential to the extent allowed by law. Your name will not appear on the survey.

**Voluntary participation:**

Your participation in this study is completely voluntary. There is no penalty for not participating.

**Right to withdraw from study:**

You have the right to withdraw from the study at any time without consequences.

**Whom to contact if you have any questions about the study:**

Kathryn Stuart Hammer, Ph.D. student, School of Teaching and Learning, 2403 Norman Hall (352) 392-9191, [ksh@coe.ufl.edu](mailto:ksh@coe.ufl.edu), or my supervisor, Dr. Paul S. George, (352) 392-9191 X 237, [pgeorge@coe.ufl.edu](mailto:pgeorge@coe.ufl.edu)

School of Teaching and Learning, 2403 Norman Hall, PO box 117048, University of Florida, Gainesville, FL, 32611

**Who to contact regarding your rights as a research participant in this study:**

UFIRB Office, box 112250, University of Florida, Gainesville, FL 32611-2250; ph(352) 392-0433

**Agreement:**

I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant \_\_\_\_\_ Date: \_\_\_\_\_

Principal Investigator: \_\_\_\_\_ Date: \_\_\_\_\_

2003-U-200  
2/26/04

APPENDIX G  
ITEM TOTAL CORRELATIONS FOR TEACHER ATTITUDE SCALE: QUESTIONS  
66-107

RELIABILITY ANALYSIS - SCALE (ALPHA)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
V67	122.3678	535.0492	.5790	.8147	.9090
V68	122.3448	552.4146	.2739	.6418	.9123
V69	122.7586	536.5108	.5509	.8142	.9093
V70	122.4828	537.4387	.5295	.8230	.9096
V71	122.4713	533.8335	.5688	.8893	.9090
V72	122.4713	532.9032	.5858	.9402	.9088
V73	122.4368	530.7605	.6200	.9336	.9084
V74	122.6322	533.9096	.5750	.9485	.9090
V75	122.6552	534.5076	.5483	.9286	.9093
V76	122.7356	536.6619	.5196	.9321	.9096
V77	121.8276	550.4467	.2527	.8494	.9129
V78	122.4023	551.0805	.2781	.8837	.9123
V79	122.2989	552.9794	.2479	.9176	.9126
V80	122.5977	545.5688	.4153	.6803	.9109
V81	122.0460	536.5095	.5030	.7610	.9098
V82	122.1724	539.0978	.4629	.8166	.9103
V83	122.2644	534.7781	.5283	.8175	.9095
V84	122.1609	553.1366	.2368	.7003	.9128
V85	122.0345	534.1965	.5916	.7008	.9089
V86	122.7701	545.6210	.3895	.8614	.9111
V87	122.9655	546.5918	.4058	.8328	.9110
V88	121.7586	542.4876	.3563	.6663	.9117
V89	122.3218	536.2906	.4542	.7353	.9104
V90	122.9080	547.8054	.3085	.8699	.9121
V91	122.6897	547.0537	.2986	.8149	.9124
V92	121.9195	537.9121	.4822	.8180	.9100
V93	122.0345	534.0337	.5288	.8194	.9094

V94	122.2069	539.4218	.4232	.8129	.9108
V95	120.9770	539.1623	.5066	.7680	.9098
V96	122.4253	542.7589	.3983	.8380	.9111
V97	122.0000	543.0000	.4222	.6385	.9108
V98	122.7816	543.2424	.4109	.7796	.9109
V99	121.8391	538.4389	.4868	.6683	.9100
V100	123.0575	549.0781	.3259	.6062	.9118
V101	122.2299	545.1093	.3955	.6376	.9111
V102	122.0115	545.6627	.3596	.8081	.9115
V103	122.2644	541.8712	.4687	.7366	.9103
V104	121.8506	539.1751	.4696	.6896	.9102
V105	122.6092	543.1013	.4754	.6138	.9103
V106	122.1264	530.4141	.6917	.7870	.9078
V107	122.1379	558.7017	.1169	.8620	.9145
V108	122.2069	560.9567	.0578	.7290	.9161

#### RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients 42 items

Alpha = .9127      Standardized item alpha = .9146

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## BIOGRAPHICAL SKETCH

Kathryn Elizabeth Stuart Hammer was born and raised in Chicago, Illinois. She attended the University of Chicago Laboratory Schools from nursery school through twelfth grade, the University of Rochester and the University of Illinois at Chicago for bachelor's degrees in English and the biological sciences, and Stanford University for a master's degree in education. She taught biology, chemistry, physical science and life science at the high school level in the San Francisco Bay Area, and physical science and earth and space sciences to middle school students at Oak Hall School in Gainesville, Florida .

In the fall of 1999 she began a full time doctoral program under the guidance of Dr. Paul George and received her Doctor of Philosophy degree in education in 2004. She lives in Gainesville, Florida with her husband and daughter.