The Effects of the Louisiana Systemic Initiative Project on Two Rural School Districts in Louisiana.

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THE EFFECTS OF THE LOUISIANA SYSTEMIC INITIATIVE PROJECT ON TWO RURAL SCHOOL DISTRICTS IN LOUISIANA

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in

The Department of Educational Leadership, Research and Counseling

by

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ABSTRACT

This study provides a description and analysis of the effects of a mathematics reform initiative on classrooms in two rural communities. It describes the sites, details interactions that take place in the classroom, and enumerates teachers' perceptions of the change. A mixed methodology was used to support the findings. Qualitative data were collected through classroom observations and interviews and quantitative data were gathered through questionnaires.

Quantitative results indicated that teachers who participate in the training have the opportunity to learn more about new teaching strategies in mathematics and are likely to change their teaching practices in mathematics. Findings reflected that teachers were implementing the initiative in the classroom and were primarily using manipulatives, open-ended questions and cooperative learning groups in instruction. Qualitative results indicated that teachers and principals render a key role in the implementation of the reform. Additionally, teachers need opportunities for regular collaboration. Implications for theory practice and future research are presented.
CHAPTER 1:
INTRODUCTION

Overview

Louisiana has the opportunity to increase the number of students participating in mathematics and science careers. The National Science Foundation (NSF) has embarked on several reform initiatives to ensure that all K-12 students have access to a quality education particularly in mathematics and science. Since 1991, NSF has funded four multi-million dollar reform initiatives within Louisiana. Each of the projects has a particular focus: the Louisiana Systemic Initiatives Project (LaSIP) focuses on statewide systemic change; the Urban Systemic Initiative (USI) focuses on reform within an urban setting; the Louisiana Collaborative for Excellence in the Preparation of Teachers (LaCEPT) involves faculty participation in teacher pre-service training, and the Rural Systemic Initiative (RSI) focuses on reform in rural communities. These initiatives have the potential to improve the learning outcomes of students in mathematics and science as well as in other areas. With an increase in student achievement, there is the potential to increase the number of students participating in Louisiana's post secondary higher education system.

Background

In 1991, the National Science Foundation established the Statewide Systemic Initiative (SSI) program to "encourage improvements in science, mathematics and engineering education through comprehensive systemic changes in the education systems of the states" (EDC, 1995). The SSI program represents a strategy aimed at
strengthening the infrastructure for science and mathematics education through the alignment of state policies and resources. Twenty-five states and Puerto Rico received five-year grants through the three competitive funding cycles of the SSI program. The Louisiana Systemic Initiative Program (LaSIP) was one of ten programs funded in the first (1991) cohort.

Funding for LaSIP has been provided by diverse resources. Initial five-year funding for LaSIP was provided $10,000,000 by the National Science Foundation, $5,000,000 by the Louisiana Board of Elementary and Secondary Education, and $5,000,000 by the Board of Regents. In addition, the Board of Regents committed higher education Eisenhower funds of about $1,000,000 (LEQSF). In June 1996, Louisiana was one of only two states from the first cohort selected to receive continued funding from NSF.

LaSIP was designed to reform mathematics and science education in order to prepare students for the rapidly changing age of technology. The primary focus of LaSIP has been professional development for classroom teachers. However, LaSIP has also embraced initiatives involving teacher preparation and certification, curricula and assessment, technology, community partnerships, equity and diversity, information dissemination and evaluation. Initially, professional development was aimed at mathematics and science teachers in grades 4–8. The program, however, has broadened its range and scope to encompass K-12. Since 1992, over five yearly cycles, a total of 129 mathematics and science projects involving over 4,100 teachers around the state, have been funded by LaSIP. It is estimated that in academic year
(AY) 1996-97, about 250,000 Louisiana students will be taught mathematics or science by current or former LaSIP participants. LaSIP estimates from state standardized test data that approximately 48% of the students served by the reform are from underserved racial and ethnic groups.

The Senior Advisor of the LaSIP staff stated that the philosophy of LaSIP in mathematics is based on the National Council of Teachers of Mathematics (NCTM) framework on reform in school mathematics. This framework covers Professional Standards for Teaching Mathematics, Curriculum and Evaluation Standards for Teaching Mathematics and Assessment Standards. Each group of standards is fully outlined and discussed in clear and easy-to-read texts with many detailed examples. The standards were prepared by a working team of NCTM members in 1989 and revised in the 1990-91 school year. The team consisted of classroom teachers, supervisors, educational researchers, professors of mathematics, and professors of mathematics education. Thousands of others, both NCTM members and nonmembers, including parents and business leaders, reviewed and critiqued each document. The Professional Standards offer a vision for mathematics teaching, the evaluation of mathematics teaching, and responsibilities for professional development and support of mathematics teachers. The Professional Standards are based on the assumptions that teachers are the key figures in changing the way math is taught in schools and that teachers need long-term support for these changes.

NCTM (1991) envisions five major shifts that must take place in the mathematics learning environment to move from current teaching practices to teaching.
for the empowerment of students. These include: “helping students work together to make sense of mathematics; helping students rely more on themselves to determine whether something is mathematically correct; helping students learn to reason mathematically; helping students conjecture, invent, and solve problems, and helping students to connect mathematics, its ideas and its applications” (p. 4). In addition, NCTM specifically outlines that every child should have the opportunity to learn mathematics and clearly defines every child as

   students who have been denied access in any way to educational opportunities as well as those who have not; students who are African American, Hispanic, American Indian and other minorities as well as those who are considered to be a part of the majority; and students who are female as well as those who are male; and students who have not been successful in school and in mathematics as well as those who have been successful (p. 4).

Beyond the focus of the student, NCTM guidelines also recognize that classrooms must be environments in which students take an active role in the learning process; and in which assessments are used to promote student learning and to assist teachers in making instructional decisions and in evaluating student achievement.

According to LaSIP Evaluation results, student test scores in the 5th and 7th grades on criterion referenced tests in mathematics reflect that students taught by LaSIP trained teachers scored higher on the 1996 exam than did students not taught by LaSIP trained mathematics teachers. It appears that the LaSIP intervention is positively affecting student achievement in mathematics and science. These positive results apparently extend to rural school districts, which historically, are difficult sites in which to bring about change. However, the need to more clearly understand the
effects of the program on students in rural communities still exists (LaSIP Executive Committee Meeting, 1996).

Using the NSF definition of 'rural' in the targeted delta region, Louisiana has 21 parishes that qualify under the proposed Rural Systemic Initiative (RSI). Understanding how the LaSIP program works in rural areas is important because educational problems in rural communities can be magnified due to the geographic isolation and limited resources within the area. Underemployment and unemployment, low wages and limited child care and transportation service capabilities are common to residents in rural settings (Institute for Educational Leadership, 1995). Unfortunately, these challenges can create great obstacles to improving the basic educational system for students and thus, inhibit efforts to strengthen the infrastructure for science and mathematics education in the state.

In 1994, the Louisiana Population Data Center at Louisiana State University prepared statistical data that reflected the magnitude of Louisiana's problems. In the two rural districts studied, the poverty rates were 36.8% and 30.6% respectively. The number of children below age 18 living in poverty was 47% and 40% respectively. The personal income level in one district averaged $7,862 annually with the unemployment rate at 9.5%. For the other district, the personal income level averaged $8,391 annually with a 12.8% unemployment rate.

LaSIP has funded three professional development projects involving the two parish school systems in this study. The first year of the project was held in 1994-95 for 4th through 8th grade teachers. The title of this project was called "Finding New
The project was designed to assist teachers in developing more student-centered teaching strategies and in developing their own mathematics skills. Teachers were guided by a variety of individuals and activities: two consulting teachers, graduate level mathematics faculty and mathematics education courses, and staff development meetings and conferences.

In a report submitted by the project staff to the LaSIP management personnel, data reflects that the project appeared to have some variety in the gender and race of the participants. The project staff included two Co-Project Directors: one white male and one white female and one Site Coordinator who was a white female. The summer training staff consisted of one white male mathematician, four white female math educators and one African American female and one white male from local schools. The number of teacher participants totaled 32 and included: two African American males, five white males, seven African American females and eighteen white females.

The schedule for the summer portion of the workshop appeared to be quite rigorous. Training lasted four weeks and approximately 13 days of the training began at 8:00 am and ended at 3:00 pm. Teacher participants were offered nine hours of graduate credit from Northeast University for their participation in the development project. Teachers took three on-site courses that included two mathematics skills courses and one course on mathematics methods. The two mathematics skills courses focused on probability, statistics, number concepts and techniques in problem solving. In addition, participants were required to complete a portfolio that included designing and field testing a series of lessons (See Appendix which includes Syllabus for Math
Math 411 and Math 412). The third course on math methods included instruction on the changing roles of teachers and learners in the mathematics classroom, innovative ways to think about curriculum and assessment and the management of manipulative materials.

In addition to the summer portion of the training, course requirements included assigned academic year assessments. These activities included: reading and reflecting on selected materials, teaching/team teaching a series of Family Math classes in the participant's local school district, participation in locally held professional development workshops and attendance at a mathematics conference.

Internal and external assessments were done throughout the program in order to determine whether the program was reaching its goals with the teacher/leader participants. The project staff led the internal assessment. They utilized different instruments to monitor and document the progress of the program. This entailed an anonymous pre and post test to assess mathematical skills, an evaluation survey used to assess changes in teacher attitudes, and evaluation of participant journal entries and site visits. The external assessment included visits by an Advisory Committee (made up of eight individuals) to observe classrooms and interview teachers in order to assess whether the program was meeting its goals. The Advisory Committee included three business leaders from the community, three parents and two LaSIP teachers.

The second year of the project was held in 1995-96 for teachers in grades K through 4. The title of this project was "We Make Connections." The goal of the project as noted in the project's portfolio (1994) was "to establish and nurture a cadre
of teachers and change agents who engage in reflective practice and develop the kinds of classroom communities and experiences that will promote mathematical literacy” (Section One-Goals). The project focused on three areas: increasing the mathematical knowledge of participants, reconsidering the roles of teachers and learners, and understanding the change process.

Specific information on the gender and the race of project staff and participants were not included in the project portfolio this year. However, information on the number of participants and types of activities offered during the program were reported. The project consisted of 43 teacher/leader participants and two principals from ten different schools. The development of teachers as leaders was important to ensure that teachers take on roles that keep them involved in the forefront of the project.

The activities were divided into two primary components: a three week summer class and an academic year follow-up. The summer class focused on using methods and materials related to patterns and relationships for K through 4 teachers. The four academic year follow-ups included site coordinator visits to participants’ classes and professional development days. Site coordinator visits included modeling or team teaching lessons, as well as planning future activities during the teacher’s planning time. The professional development days were workshops led by participants and the site coordinators and included topics suggested by participants. One of the goals of this activity was to establish a time for teachers to network and share their experiences with other teachers.
In the final year of the project, 1996-97, 17 teachers from previous local LaSIP training were selected to participate in a leadership project. The two other participants were a content specialist and a site coordinator. The third year mathematics leadership project involved 12 four hour day summer classes designed for K-8 grade teachers. The project emphasized: making connections between grade levels, making connections across the strands of mathematics, and assessing mathematical thinking and growth. In the second phase of the project, teacher-participants worked as teams to design, present, and assess classroom activities that were developmentally appropriate and reflected the new Louisiana Framework for Mathematics. During academic year 1996-97, this information was shared with approximately 120 mathematics teachers in the two parishes through five workshops presented by the teams. These workshops included oversight from either the project director, the co-project director, or one of the assistant directors.

In the academic year 1996-97, the school districts joined together to apply for a mathematics and science equipment grant sponsored by the United States Department of Education. The title of the project was Building Bridges, Breaking Down Walls: Making Connections in Elementary School Math and Science. The grant was funded for approximately $200,000. As a result, math and science materials were purchased in both parishes. This included site resources, system materials and $300 per teacher for individual items. This grant has added many resources to classrooms and has provided teachers with the necessary materials to teach students utilizing “hands-on” learning techniques.
Problem Statement

The issue addressed in this study was whether LaSIP in-service training has had an effect on classroom practices in mathematics classes in rural settings, and, if so, what the nature of that effect is.

Purpose of the Study

The purpose of this study was to determine how a federally funded reform initiative has affected classroom practices in two rural school districts in Louisiana. The charge for this study arose in light of LaSIP's recognition of special circumstances operating within rural communities. These special circumstances include limited financial and educational resources, as well as geographic isolation that inhibits communities from tapping into resources available within metropolitan centers (De Young, 1987). In addition, the findings of this study may be useful in formulating policies relevant to reform programs in rural areas.

This study was funded by the Educational Advancement Association in Houston, Texas. The Association makes annual grants in two primary spheres that represent its core interest: prevention and education efforts in the areas of alcoholism and drug dependence and in related mental health centers, and educational methods that foster the development of creativity and creative thinking in various fields. The Foundation was established in 1969 by Harry Lucas, Jr. The organization gives preference to innovative projects that offer new approaches in the two areas specified above. Grants are almost exclusively made to provide "seed money" for pilot or demonstration projects and programs. The Foundation believes that offering initial
funding to research projects will encourage innovation, ingenious approaches, and original ideas.

The Foundation has recently funded other research projects. Some of these include: 1) University of Texas - Austin, Discovery Learning Project; 2) Baylor College of Medicine - Houston, Pilot Project Linking Psychologists with Family Physicians; 3) Brown University - Providence, Rhode Island, Alcoholism Education For Physicians Utilizing Training Through Video Teleconferencing; and 4) Texas A&M Development Foundation - College Station, Texas, Mathematics/Science Teaching. In addition to this dissertation, a report will be written and submitted to the Foundation indicating the highlights of the study and key findings and conclusions.

This study does not address issues pertaining to race. There are some instances where race is mentioned due to the interests and cultural background of the researcher. Race and gender do evolve as important factors in this study and are recommended for future research.

Research Question

In what ways has LaSIP changed teaching practices in mathematics at the K-8 level in two rural school districts in Louisiana?

Significance

This study will help determine how federal and state reform initiatives might better affect student learning outcomes in mathematics in rural areas. There is a lack of published information on the implementation of federal reform programs in rural areas. Thus, it is possible that this research will enhance LaSIP and other activities in
rural areas through further documentation of the impact of the reform effort on teaching practices. In addition, the study can also help identify special needs of teachers and students in rural parts of the state.

Currently, there is some quantitative evidence from the Louisiana Educational Assessment Program (LEAP) that suggests that LaSIP is affecting student achievement at the 5th and 7th grade level. However, it is unclear how LaSIP is being implemented at the classroom level, particularly in rural settings. This study will help to determine whether LaSIP has affected classroom practices in mathematics in two rural school districts.

Findings from this study should also be helpful in planning projects for a Rural Systemic Initiative (RSI) that state representatives from Louisiana, Mississippi, and Arkansas are hopeful will be funded in the near future. The intent of the RSI in these three states is to improve access for students in rural areas through collaboration between schools, businesses, and the community. Thus, this study should be useful in guiding future RSI projects and activities.
CHAPTER 2: REVIEW OF RELATED LITERATURE

Background

The purpose of this study was to determine how a federally funded reform initiative has affected classroom practices in two rural school districts in Louisiana. The charge for this study arose in light of LaSIP's recognition of special circumstances operating within rural communities. These special circumstances include limited financial and educational resources, as well as geographic isolation that inhibits communities from tapping into resources available within metropolitan centers (De Young, 1987). Programs designed to increase student achievement in mathematics and science, as well as other subject areas, have the potential to increase the number of students graduating from high school and participating in post secondary education in Louisiana.

The literature review is organized in four sections. I first examine background information on rural communities. This includes analyzing the economic state of the communities, critiquing the various definitions of rural and discussing the rates of poverty in rural communities. In the second section, I examine assorted components of the schooling process in rural communities. This includes different challenges and strengths of rural schools, as well as a description of the pupils, the teachers/curriculum, funding issues, administration/decision making, and school culture. In the third section, I discuss different viewpoints on educational reform programs and the change process. In the final section, I look at diverse strategies used to improve mathematics and science achievement in rural schools. These practices
include curriculum renewal and computer technology, instructional strategies, teacher enhancement approaches, parental involvement methods and community partnerships.

I chose this organizational structure for the literature review in order to first understand the broader issues that are operating within rural communities and then to examine other more specific issues in further depth and with greater clarity.

Understanding the economic conditions that citizens are confronted with helped me understand the dynamics of the schooling process and its importance within the community. In addition, understanding how different components of the schooling process work helped me understand the rural school system and evaluate how the LaSIP training has affected the students in the rural school districts. I then examined educational reform movements and their effects on schools and teachers. How do educational change programs transform teachers? I also examined diverse classroom strategies recommended to improve mathematics and science achievement of students in rural schools. Examining the assorted approaches that have been useful in improving student achievement in rural communities helped me observe the classroom practices that have been implemented through the LaSIP project. It was important to determine the features of LaSIP as compared to other programs utilized in rural communities.

Introduction

Many issues challenge citizens in rural America. Residents are confronted with poor economic conditions, limited resources, assorted "backward" stereotypes from outside observers, and being commonly last on different political agendas. Although
some of these issues are relevant in urban communities, others are unique to rural settings. Recently, several researchers have started to look at rural communities and the challenges specific to these schools and their economy (DeYoung, 1992; Institute for Educational Leadership, 1995; Lomotey and Swanson, 1989; Royster, 1994). Unfortunately, it appears that the downward spiraling effect of the economy, limited resources, and limited access to local job opportunities become important issues. Thus, many of the youngest and the brightest within the communities move to metropolitan areas in order to seek suitable job opportunities. This leaves many of the poor and the older residents behind to maintain the community and seek ways to improve the poor economic conditions.

**Economic Context**

In rural communities, there are a large number of individuals who live at or below the poverty level (DeYoung 1991; Haas 1994). There are several reasons this has occurred. One reason is due to the restructuring of many of the industries that once served rural communities. With increased market competition from neighboring countries and decreasing market demand for certain products, the status of many thriving industries in rural settings has changed. Thus, industries that once employed many individuals within the community may have had to close their doors or eliminate positions.

At one time, agricultural opportunities were quite broad and widespread in rural communities. However, the U.S. Office of Technology Assessment (1986) reports that almost half of the nation's food is grown on 4% of the farms; one third is
produced by the largest 1%. According to Reimund and Petrulis (1988), the U.S. Department of Agriculture reports that the restructuring of the agricultural sector occurred due to falling international demand, high interest rates, and declining values of assets needed to finance debt. Others attribute the decline of the agricultural sector to long term forces at work (Haas, 1994). These forces include failed policies governing production, export, and cheap food; a commodity subsidy policy that attracted absentee landowners; inappropriate bank lending practices; and the vertical integration of the food processing industry. Some argue it is the convergence of these forces that have contributed to the loss of the family farm unit and the loss of jobs.

There are other industries that have offered employment opportunities to rural residents. However, many of these industries have scaled back as well. One industry is the manufacturing sector. According to Hady and Ross (1990), manufacturing in nonmetro communities slipped significantly between 1979 and 1986 and the construction industry scaled back due to minimum growth. Haas (1994) examined how the extractive industry slipped as well. The extractive sector includes oil and gas exploration, ore mining, forestry and fishing industries. Jobs in these enterprises have diminished for several reasons. In oil and gas exploration, the price of a barrel of oil dropped from $65 per barrel to a low of $18 per barrel which dramatically cut the profitability of this business. Ore mining is also a similarly depressed industry due to a combination of several forces such as owner stockpiles, market manipulation, and cheaper off-shore sources. However, the one area of business that has continued to expand in rural communities is the service industry. This industry persistently
provides the most employment opportunities for rural residents. Unfortunately, these jobs tend to pay the minimum wage and contribute to the poor living conditions of residents who are already living at or below the poverty level.

**Defining “Rural”**

There are different definitions used to characterize ‘rural’ communities. This results from a nonexistent nationally accepted definition for the term. Haas (1994) argues that the lack of a nationally recognized definition to describe rural communities often results in rural communities being left out of important political decision making matters. Sher (1988) states that until 1990, the U.S. Census used a residual definition that defined “urban” and “metropolitan” areas and declared other areas as rural. One definition widely used to define rural is from the U.S. Census Bureau. In Haas’ research (1994), she uses the term ‘rural’ when referring to locales with less than 2,500 people. She uses the term ‘nonmetropolitan’ when referring to counties with larger populations. According to the Institute for Educational Leadership (IEL) (1995), if population alone is used to differentiate between rural and nonrural areas, the number of communities considered rural is not accurately described. The authors of the (IEL) study report that dramatic differences were found by the National Center for Education Statistics when different population lines were used to describe rural areas. The Institute for Educational Leadership suggests that if a population level of 50,000 is used to describe rural communities, many suburban communities within larger metropolitan districts may actually be included in the definition of rural. Rural
Many rural advocates are troubled by the various definitions used to define rural (Sher, 1977; DeYoung, 1991; Haas, 1994). They believe that the many definitions used do not incorporate important factors outside of population guidelines. It appears that a more accurate definition of rural must take into account issues such as geography or social interaction patterns and contextual issues (Haas, 1994). In Gjelten's (1982) research, he accounts for the various economic and sociological characteristics that exist within rural communities. (Although Gjelten's research was published in 1982, it appears that most of his distinctions are relevant and significant today.) He suggests that there are five basic types of rural communities. These include: high growth, reborn, stable, depressed and isolated. In the “high growth” communities, there is economic expansion occurring in the community and/or very near due to expanding metropolitan areas. He refers to “reborn” communities as those that have been inundated with residents due to the flight of city dwellers to rural settings.

The other three categories refer to those communities that typically place residents in various challenging situations. The first is called the “stable rural” community which includes individuals who are quite connected to the agricultural sector. (This group is quite minimal today.) In the “depressed rural” community, where economic insecurity abounds, the local economy is underdeveloped and outmigration tends to be high. Many rural communities fit into this category. The
final category is the “isolated rural” community where residents are typically far removed from the transportation and cultural centers of the nation and generate an additional number of social and/or cultural differences.

DeYoung (1991) also considers the diverse conditions of residents in rural communities. He uses material from the Children’s Defense Fund (1992) to describe the diverse settings that children from rural communities live in:

Where do children live if not on farms? They live in many different types of communities: in trailer camps, mountain settlements, and back woods communities; on former farms and ranches; on reservations; along country roads; or in small villages. Some live in larger towns or small cities, including declining small manufacturing centers (p. 8).

Overall, rural communities are described in many different ways. It is important that the diversity of rural communities is recognized. However, with the lack of one definition to describe rural areas, some of these communities are overlooked in policy making decisions.

Poverty

As a result of the economic downturn in the 1980’s, many rural residents have inevitably faced unemployment, few new job opportunities, and lower salaries. This has served to increase the number of residents living in poverty. According to Haas (1994), by 1986, one out of every four children was living in poverty. O’Hare (1988) states that in 1986, the nonmetro poverty rate was 50% higher than the metro rate. Displaced rural workers were unemployed more than 50% longer than urban workers and when they did return to work, were more likely than urban workers to take pay cuts and lose insurance benefits (Podgursky, 1988). In addition, 29% of the rural poor
are individuals who are from different races and ethnicities who suffer more than either rural whites or urban people of color. Forty-four percent of rural African Americans were in poverty as compared to 33% of their urban counterparts in 1987 and the poverty rate of rural African Americans exceeded the poverty rate of rural whites by over 200% (CDF, 1992).

Reid (1989) asserts that all the industries that rural communities have depended upon for employment opportunities experienced economic decline in the 1980's. The author states that even if an individual is working for a manufacturing entity in a rural area, these companies primarily locate the low-wage and routine production operations in rural areas. In addition, most new jobs that are located in rural communities are through the service industries and pay at or near the minimum wage (Reid, 1990).

In this section of the literature review, I examined various broad issues and challenges that exist in rural communities. I began with an analysis of the economic situation of rural communities. Unfortunately, the major economic decline that occurred in the 1980s had a broad impact on the strength of many rural communities. I then looked at the term “rural” and examined various ways that term has been defined in the literature. I further discussed the negative implication of its uncertain definition. I also examined several other historical and philosophical issues that have challenged rural schools. In some communities, residents believe students should be prepared for positions that keep them connected to the community. However, there are others who believe that students should be prepared for positions in the community or outside of
the community. In the final part of this section, I analyzed the rates of poverty in rural communities and how poverty has greatly affected citizens in rural communities.

Rural Schools

Issues

There are many issues that confront rural schools. Schools are expected to maintain high academic standards with very limited resources. According to national standards, teachers are expected to teach according to the latest reform standards, use the latest assessment measures to evaluate student performance and incorporate technology into the classroom experience. Unfortunately, the reality of teaching in a rural school involves minimum resources, minimum accessibility or time to participate in quality in-service training or continuing education opportunities and minimum salary or reward benefits. In addition, teaching in a rural setting can be quite confusing due to the often contradictory opinions that exist on how students in rural schools should be prepared for the job market and by what design. Although these many challenges can influence the success of a school, it appears that rural schools have managed to positively affect student achievement in spite of the many challenges and deficiencies that exist (Haas, 1994).

Another issue that rural schools have been confronted with has been the attempt by early school reformers to “fix” rural schools. DeYoung (1987) cites work done by Bender (1975), Cubberly (1914), and Tyack (1974) on early school reform in the U.S. These researchers assert that early school reform was based on a notion that rural school models were insignificant. Rural life was and would increasingly become
archaic in an emerging urban and cosmopolitan America. They believed that an urban school model was more sufficient for these schools. DeYoung (1987) states that for many early American educators, the educational problem of the 20th century was an urban problem. The author asserts that many school reformers did not recognize that rural schools had their own unique problems and that the urban school model used to describe educational problems did not relate to many of the cultural and economic differences that exist between rural and urban entities (DeYoung, 1987). Thus, many of these reform efforts were unsuccessful for rural entities.

Another issue that has challenged rural education is the purpose of schools in rural communities. Historically, some believed rural schools were designed to provide students with basic literacy and vocational skills (Clarke & Hood, 1986). Others argued that the rural school should prepare students for successful outmigration. This includes providing students with the knowledge and skills necessary to get positions outside of the community. Theobald (1991) states that the choice of mental versus manual labor has always been an issue for rural residents. DeYoung (1994) asserts that "high school completion appears relatively low where graduation appears to bear little local utility due to large-scale unemployment and/or where low skilled extractive and/or service industries provide the major source of employment" (p. 26). As a result of the decline of various industries and the availability of positions in certain fields, the role of education in rural communities continues to evolve. Many students who once followed their parents' footsteps in the agriculture industry or who settled for unskilled jobs are no longer able to get these opportunities. Thus, providing students with a
broader range of new and different skills has become essential in order to prepare
students for a changing rural economy or to help them adapt to suburban or urban
areas. DeYoung (1991) states that these educational policies and practices can
conflict with the value structures and economic experiences of many rural
communities and can result in breaking the strong family/community bond that exists
within the vicinity.

Rural school consolidation is another major issue that rural schools have
confronted. As a result of the wave of school consolidations that have occurred, the
number of rural schools has dropped from approximately 200,000 to 10,000. Haas
(1994) argues that the first wave of school consolidations began in 1956. The author
states that the second wave of rural school consolidations evolved due to the belief that
school consolidations save money and give students in rural schools access to a higher
quality institution. There are many who disagree with this (DeYoung, 1987; Haas,
1991). Haas (1991) asserts that there is no evidence that these consolidations reduce
financial costs, and asserts that there is increasing evidence that they engender very
large social costs. Haas (1991) argues that historically, many rural communities placed
a high value on traditional family (and extended family) relationships, sense of
community, the importance of being close to the land, etc. As DeYoung (1991) states,
the current school reform efforts tend to undermine these traditional values via
“centralization and consolidation movements launched under the auspices of
professionalism, curricular diversity, and efficiency” (p.27).
There are other costs that result from school consolidation as well. Haas argues that students lose because classes become larger and the time a teacher spends with an individual student declines. She also disagrees with the argument that quality can only be achieved in large schools. Haas (1994) states that “generic policy to improve American education is doomed to fail and will have a negative effect on rural education because it overlooks the implication of scale, isolation, and diversity” (p.23).

Even though rural schools are faced with many challenges, there are also many strengths of the small rural school. For example, Queitzsch (1994) states that small schools allow teachers to give students more individualized attention and also allow teachers to get to know the needs of each student. In addition, small schools have been noted for creating a more enriching school experience for students and a more engaging learning atmosphere as well. Small schools also create a place for more student responsibility and more school and teacher accountability. Students in rural schools tend to be more engaged in the learning process in both curricular and extracurricular ways. In addition, small schools are also best suited to implement the kind of hands-on, problem-solving, context-specific pedagogical approaches that professional organizations such as the National Council of Teachers in Mathematics (NCTM) and the American Association for the Advancement of Science (AAAS) encourage (Haas 1994).

There are other strengths that have also been noted in rural schools. One includes the decision making process of rural schools. In most schools, many decisions are made at the school building level and exemplify a technique known as
site-based management. The argument for site-based management is that if teachers and staff become engaged in managing their own school then they will also be more enthusiastic about their job and teaching (Schmuck & Schmuck, 1992). Schmuck and Schmuck also refer to the work of two advocates of site-based management, White (1989) and Sarason (1990), who believe that students will be better served by teachers who collaborate in school improvement efforts.

**An Examination of Various Rural School Components**

**Students**

Students in rural settings have challenges similar to those of students in urban communities. DeYoung (1994) reports that in a 1990 survey done by the National Rural Development Institute, students in rural communities were at risk of substance abuse, depression/low self-esteem, child abuse, illiteracy, poverty, and early sexual activity. These are many of the societal pressures that students in metropolitan areas encounter as well. Unfortunately, these experiences can affect student retention rates, student achievement and student motivation levels in school.

Rural students are faced with other challenges as well. Hodges (1997) documents these challenges in her research. In rural communities, many students are from low socioeconomic backgrounds. The educational and income levels of the students’ parents may be somewhat lower than individuals from higher socioeconomic backgrounds. In addition, it is possible that the communities where students live may have high illiteracy rates, low high school graduation rates and few college graduates. It is quite possible for students to be unclear about the role of education in their lives.

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or the significance of a high school diploma or college degree. The economic conditions of many communities leave students with few role models and minimal access to individuals with college training and/or expertise in career fields that require post-high school training (Haas, 1994).

Students also encounter low career and school expectations from parents and teachers. The expectations of parents and teachers result from their own life experiences and also regional values that they have acquired. Students may not be encouraged to go to college or get a college degree if there is a family business or a local company that hires unskilled labor. In addition, students may be encouraged to stay nearer to home rather than leave the community for a higher paying job due to strong family values that exist (DeYoung, 1992).

**Teachers, Curriculum and Instruction**

The benefits and challenges of teaching in a rural community differ greatly from those in urban settings. Rural teachers are confronted with challenges that include low salaries, limited in-service and continuing education training opportunities, minimum financial rewards and/or incentives, minimum preparation for issues specific to rural communities, as well as multiple role demands (Queitsch 1992). Schmuck and Schmuck (1992) found that many teachers in rural communities were there because they were either local or antiurban in their preference for living arrangements. In addition, regardless of their gender or the grade level they taught, the teachers in rural districts portrayed a mixture of dedication, frustration, and hope toward teaching. The authors report that both the elementary teachers who spent more time enhancing
the appearance of their classrooms and the secondary teachers who spent more time involved in extracurricular activities were all dedicated to their students and to the values of small town life.

As a result of working within a small community with limited resources, teachers generally must take on many different roles at school (Hodges, 1997). In some schools, teachers are required to make administrative decisions or other decisions that may involve tracking students. Teachers are involved with extracurricular activities and must spend many additional hours with monitoring events, leading practices, or managing activities. In addition, teachers are expected to stay abreast of curriculum and pedagogical issues and are required to participate in in-service and continuing education opportunities when available. Teachers are also expected to maintain relationships with parents, schedule parent-teacher meetings and seek parental involvement in the classroom.

Minimal funding can also result in many challenges for teachers. Generally teachers in rural districts receive low salaries and rarely receive special rewards or incentives for excellent teaching or outstanding work (Ward, 1988). In addition, these teachers are regularly challenged with teaching with minimum instructional resources and support. This includes teaching with out-of-date textbooks, limited supplies, and inadequate instructional resources such as maps, lab equipment, films, etc. Schmuck and Schmuck (1992) state that most districts rely heavily upon the materials designed for urban and suburban populations that dominate commercial publishing and have little meaning for life in rural and small town America. The authors discussed one
incident where the students were reading a basal text that had a story about a boy living in an apartment building. The teacher reported that she was well into the comprehension section of the text before she realized most of her students did not know what an apartment building was. In addition to limited instructional materials, teachers are also confronted with limited access to equipment such as overhead projectors, VCRs, or tape recorders or they have equipment that is inoperable.

There are many reasons that teachers in rural communities lack the sophistication of those in other communities. Many new teachers begin their careers in small or rural schools and lack the knowledge of experienced teachers (Lomotey and Swanson, 1989). New teachers also lack the proper preparation due to minimum pre-service training on issues unique to rural areas. There are very few colleges that offer teacher preparation courses relevant to rural community matters (Sher, 1977; Queitsch 1992). Adjusting to teaching in a rural setting may be more challenging especially if a teacher is new to rural living. In addition, due to minimal resources, teachers are sometimes required to teach outside of their certification area. For example, this may require a secondary language arts teacher to teach a mathematics or science course. As a result, the instructor may not be as effective in her or his delivery of the subject matter. In addition, rural schools have difficulty in maintaining highly qualified teachers due to the low salaries offered.

Another challenge for teachers in rural areas is availability and access to in-service training and continuing education classes. At times, in-service training is offered. However, the content and the quality of the course may not be at a level that
the teacher needs. In addition, teachers are sometimes unable to take advantage of courses due to the course location. Some communities are located in relatively remote locations and driving to a university or city may be a quite cumbersome task after working all day. In addition, some teachers believe that the in-service training opportunities available are insufficient and are not relevant to their classroom issues. Thus, they sometimes view these additional courses as a waste of time. Unfortunately, quality in-service training opportunities could possibly be the panacea to help schools expand the talents of the teachers, as well as the administrators that they do have (Sher, 1977).

Schools are also confronted with curriculum offerings that are basic and lack diversity. Schmuck and Schmuck (1992) found that hard economic conditions had a direct effect on a school's curriculum particularly in English, foreign language, and science. The authors stated that several of the high school English teachers in their study complained bitterly of the strong pressures they were feeling from their administrators to assign more writing projects to students, even in the face of declining numbers of English teachers and insufficient curriculum materials. In addition, most small school districts could afford only one foreign language teacher and in some districts, the schools had to share their one foreign language teacher with other neighboring districts. They also found that out of the 25 districts they visited almost half of the districts were having difficulty keeping science teachers. In several instances, the teachers would teach for one or two years and then be drawn off to a more lucrative position in a metropolitan area.
Even though there are some disadvantages to teaching in rural schools, there are some positive aspects that exist as well. Barker (1986) looks at the instruction process in small schools. He argues that due to low pupil/teacher ratios, instruction in small schools is more likely to be learner centered with a strong emphasis placed on individualized and small group instruction. Small schools also have the opportunity to emphasize group discussion, individual oral reports, independent study, simulations, essay tests, etc. The potential for student self-identity, participation, and expression is enhanced in small school settings.

Schmuck and Schmuck (1992) documented that many teachers who chose to teach in rural communities had a love for the physical setting and the deep need for long-term, close, and personal relationships that one could obtain in rural communities. For those who felt frustrated, they attributed this to having to spend their own money to purchase instructional materials and supplies and low student achievement. In one instance, a teacher from Arkansas blurted out in frustration, "Teachers are being blamed for parent problems!" (p. 57). Unfortunately, these problems are encountered by teachers in urban communities as well. Sher (1977) asserts that "most rural schools have the capacity to become excellent and effective community institutions" (p. 290). The author asserts that schools need a combination of local initiatives, external assistance, a measure of creativity, and the will to provide rural children with the best education possible.
Funding

Funding is another major issue and challenge for rural schools. It is clear that rural schools have a major problem with funding. Some states have been sued due to the inequities that exist in the distribution of state resources to school districts. In Louisiana, the amount of resources a district receives is divided between state resources (40%), sales taxes (40%) and property taxes (20%). If a school district has a small or minimal tax base, then the amount of funds they receive is also small or minimal. As a result, many rural school districts have a small tax base due to low population rates and high poverty rates. This results in very low per pupil spending ratios which do not sufficiently cover basic expenses. Thus, many basic resources and needs of the school are not obtained.

There are three areas of finance reform that would be helpful to rural schools. Sher (1977) asserts that finance reform needs to occur at the state level and the federal level. In addition, the use of noninstructional education funds could be used more effectively in rural communities. There are many states that need to address their state aid programs and make special provisions to assist financially troubled rural school districts. There should be an overall increase in state support for public education equal to at least 70% of the operating costs of the public schools. States need statewide distribution aid formulas which, at a minimum, do not discriminate against rural citizens and rural school districts. Rural advocates should also seek ways to ensure that rural school districts are guaranteed their fair share of federal education funds that are controlled by the state. In addition, Sher recommends that rural school systems
seek a decrease in the utilization of regressive taxes (such as the property tax) to raise school revenues and an increase in the utilization of more progressive taxes (such as a graduated income tax).

Beyond state level finance reform, Sher (1988) also believes that federal level reform is necessary. Sher asserts that federal assistance to rural districts, though desperately needed, has remained disproportionately low. If anything, "federal assistance (which is primarily designed to assist disadvantaged students) should be highest in rural areas because rural populations have the nation's highest incidence of poverty, a marked absence of institutions and programs outside the public schools to meet the needs of disadvantaged children, and higher per pupil costs in such areas as special education because of sparse student populations" (p. 279). Sher (1988) continues to support that federal and state level reform is needed for rural communities. The author asserts that per capita funding bias in federal and state funding formulae results in minimal funding for rural schools. Sher notes that what is needed is a formula based upon need or one that provides a minimum level of resources no matter how small a school or district might be. Royster (1995), in a more recent work, states that the federal government has taken a renewed interest in rural areas due to a number of recent initiatives aimed at rural communities. These include the Rural Schools of America Act of 1992, the reauthorization of Title 1 that focuses on high poverty counties and the National Science Foundation's Rural Systemic Initiative.
Administration/Decision Making

The administration of a school can make a major difference in its success. Rural schools have several characteristics that make them unique. Administrative positions in rural schools have been described as training grounds for individuals before they go to larger school districts. Lomotey et al. (1989) state that since rural schools tend to be "training grounds for teachers and administrators in small cities and suburbs, professional leadership often has a fleeting quality and tends to be inexperienced" (p. 71). For some schools, school-based decision making and school-based budgeting are long standing traditions, especially if a school is the only one to serve a district. In addition, residents in rural towns tend to be more closely related to school board members due to the size of the town. Thus, individuals have closer access to school board members and can express any concerns directly to board members.

Barker (1986) asserts that the administration of small schools is more manageable than in larger ones. There tends to be less red tape and fewer regulations to abide by. The author also writes that administrators in small schools can be more flexible than those in larger schools, and can easily alter instructional activities in a school day if necessary. In addition, bureaucratic layering is at a minimum, allowing relatively easy interaction between students, teachers and administrators.

School Culture

The culture of a rural school is one that is closely related to the community culture. As a result, schools have a responsibility to the community and the
community is more closely related to what occurs in the school. In addition, schools in rural communities tend to be the central focus of community activities. Many residents are connected to the school since it may be one of the largest employers in town. Schools in rural communities also have strong bonds with many families. In some cases, it may be that several generations of a family have attended that school or that the principal and other employees of the school are related.

Schmuck and Schmuck (1992) studied rural schools in 25 school districts in 21 states. With reference to school and community identities, the authors state that small town schools are generally the entertainment centers of their communities. Most citizens participate at some time in some events at the school. People of all ages, from 2 to 92, were at school often for social life, to vote and hold community meetings, and from time to time for something academic. The authors assert that high schools in small districts are particularly busy places. Some high schools, especially during the winter months, had events every night of the week except Sundays. In addition, students spent a large portion of their day at school. Students would generally get to school about 30 minutes before classes began and get home around 5:30 p.m. in the evening. The students participated in many extracurricular activities, including sports, music, theater, and service and special interest clubs and approximately 40% of the teachers participated as coaches, sponsors, or advisers in after-school activities.

In this section, I took a more in-depth look at rural schools. I described some of the strengths and the weaknesses of rural schools and described several components of rural schools. I examined student challenges that include societal pressures, the
lack of role models, and the socioeconomic status of students. Then, I examined the role of the teacher and some of the challenges that teachers in rural schools encounter. I reviewed the many roles that teachers perform in rural schools, their low salaries and their lack of incentives and bonuses. I also examined some of the problems that teachers encounter with professional development and continuing education. I also touched upon some issues that include curriculum and instruction in the rural school setting as well as the problem of funding. In addition, I discussed rural school administration and decision making and the culture of rural educational entities.

Educational Reform and Change

In this section, I examine various views on educational reform and the change process. Fullan (1989), Cuban (1990, 1992), Darling-Hammond (1993) have studied various factors and flaws relevant to educational reform movements. Fullan (1991), Huberman & Miles (1984), and Louis & Miles (1990) have explored more specifically how teachers adapt to change efforts in reform movements. In some cases, change has had positive implications. However, there have been many reforms introduced that appear to maintain the status quo and have not made a significant difference in the American public education system.

Darling Hammond (1993) maintains that there is a need to change U.S. schools. The author contends that we are no longer living in an agrarian or industrial society. We are now living in a world that is focused on information and technology and we must have schools that reflect this. However, Darling-Hammond advances that
schools must be given the capacity to do this and that we cannot continue to repeat the same reforms over and over.

Darling-Hammond (1993) advances that there are two parallel reform efforts that are occurring presently. One theory states that schools need more direction, focus and effort and the other theory contends that teachers and schools need additional development. The author states that both models exist and compete against each other. She maintains that “solving the problem of contradictory policies is a prerequisite for solving the problems of student engagement and learning in schools” (p. 757).

Darling-Hammond states that we need a 21st century model that focuses on professional development, policy development and political development.

Fullan (1996) states that there are two main barriers that keep education reform from working: overload and fragmentation. “Overload is the continuous stream of planned and unplanned changes that affect the schools.... Fragmentation occurs when the pressures - and even the opportunities - for reform work at cross purposes or seem disjointed and incoherent” (p. 420). Fullan states that systemic reform movements designed to address these problems are also flawed. The author advances that these movements do not take into account the problem of nonlinearity that exists in our complex society. These efforts focus instead on how to make the system more coherent rather than focusing on what can help educators achieve greater coherence in their own minds and efforts. Fullan advances that more focus on bottom-up initiatives need to be taken. This includes what Fullan calls networking, reculturing and restructuring.
Cuban (1990, 1992), who has written extensively on educational reform movements, is very critical of educational change movements. He maintains that the same reform movements continue to be introduced again and again. In looking at curriculum reforms specifically, Cuban makes several points about what happens to curricula reforms. He points out that there are multiple curricula that exist in schools. He advances that the official curriculum is only one of four curricula in schools. Although there may be one state or district mandated curriculum, this curriculum results in various versions: the taught curriculum, the learned curriculum and the tested curriculum. Cuban contends that many curricula reforms ignore the power of pedagogy and focus primarily on the content of what is being taught. He maintains that characteristics such as a teacher's personal traits, experiences, attitude, knowledge and skills are very important to what and how things are taught in the classroom.

Fullan (1991), Huberman and Miles (1984) and Louis and Miles (1990) discuss the teacher change process and how it relates to educational change projects. Fullan (1991) discusses a model for the change process. He asserts that there are four broad phases in the change process: initiation, implementation, continuation, and outcome. In this study, I focus primarily on the implementation stage, although the continuation stage also becomes important as the implementation stage begins to progress. Fullan describes the implementation phase as the “process of putting into practice an idea, program, or set of activities and structures new to the people attempting or expected to change” (p. 65) Fullan advances that if implementation of a program in the classroom fully occurs some of the likely changes expected would be changes in curriculum.
materials, teaching practices, beliefs or understandings about the curriculum and learning practices. The author notes that the change process is a highly complex and subtle social process and the more factors that support the change, the more change will be accomplished. Additionally, the unit of analysis that the change is supposed to impact upon should be noted. Is the result of the change supposed to affect the teacher or the classroom or is the outcome supposed to be on the school or on the local school district?

In this research, Fullan has identified factors and themes that contribute to the successful implementation of a program. In the implementation phase, Fullan states that there are nine critical factors organized under three main categories that affect the execution of a project. The three main classifications that these factors are categorized under are characteristics of the change, local characteristics and external characteristics. The factors related to the characteristics of a change involve whether there is a need for change. If the change is focused toward teachers, do teachers understand why the change is required? Another important factor that is a characteristic of change is clarity. How clear are teachers about the goals and the means of the project? Complexity is the third factor related to the characteristics of change. Complexity refers to the difficulty and extent of change required of the individuals responsible for the implementation. The last factor associated with the characteristics of change concerns the quality and practicality of the change. Is the change effort a quality program and is it realistic and practical? Fullan advances that these factors are important to whether a change effort will be implemented or not.
The next set of factors important to the implementation process are related to local characteristics or social conditions that can affect change. The first factor under this category is the school district. How does the local school district affect change or support change? Fullan asserts that teachers now know that change should be taken seriously if the central administration is taking it seriously. Another factor related to local characteristics is how the board and the community relate to the change. The author notes that it is difficult to generalize about how boards and communities affect the implementation process. He asserts that in short these two entities can either act apathetically toward a change or they may get actively involved in a reform. This will determine how they will affect the change.

The next two factors are considered crucial to the change process and the implementation stage. They are the principal and the teacher. The principal and teacher play a key role in the change process. They can either successfully work to implement the change or they can act as the main blockers to the change. Fullan goes on to discuss that both the individual characteristics and collective or collegial factors play roles in determining implementation. With respect to the role of the teacher, Huberman (1988) discusses that the psychological state of a teacher can predispose a teacher to consider change or improvements. The researcher asserts that the teachers' personality, previous experiences or the stage of their career can lead to a greater sense of efficacy and an individual who is more self-actualized which can influence how they take part in the implementation of the change.
Another crucial factor that determines whether the teacher will implement the change or not has to do with peer influence. Fullan advances that peer relationships are very important to the theory of change that he advances. If a teacher is attempting to learn something new then peer interaction is very important. In addition, Fullan states the importance of the quality of working relationships. He asserts, "Collegiality, open communication, trust, support and help, learning on the job, getting results, and job satisfaction and morale are closely interrelated" (p.77).

The last category that Fullan discusses is external factors that can affect the implementation of change. The author refers to the influence of the government and other agencies on the change process and places the change process in a broader context. Fullan notes that the way the government prioritizes its education system can influence what happens within the system (e.g. various change reforms).

Fullan also advances several key themes that evolved out of his research. He discusses that these themes more fully conceptualize successfully implementing a project. Several of the initiatives discussed include: initiative taking and empowerment, staff development and resource assistance, and monitoring/problem coping. Initiative taking and empowerment is one area that the author advances. He asserts that the sharing of power in these settings as well as the development of collaborative work cultures can greatly influence the amount of initiative needed to get things done. Staff development and resource assistance have also emerged as a key theme to the implementation phase of the change process. The author states that, unfortunately, staff development often employed in these change efforts does not
provide the "ongoing, interactive, cumulative learning necessary to develop new conceptions, skills and behavior" (p. 85). The author states that in-service training is needed during implementation as well and that sustained interaction and staff development are crucial regardless of what the change is concerned with.

Huberman and Miles (1984) identified different types of assistance that teachers need at different levels of the implementation process. These different types of assistance were identified through ethnographic research that was done on 12 schools that were randomly sampled from 10 different states. The schools were selected from a larger sample of 146 schools that were studied by survey methods. The authors developed eight types of resources assistance from their research. Some assisters appeared to be the Control type whereas others appeared to be more of the Teacher/training type. Some assisters were identified as Solution givers or Resource adders whereas other evolved as Advocates or Facilitators. Finally, the last two assisters developed as the Inquiring type and the Supportive type.

The researchers found that the schools in their sample needed different types of assistance at different implementation levels. During the first year of implementation, resource adding was important for all of the sites. In addition, the assistance behaviors of control, facilitation, and training were present in almost all of the projects. However, solution giving appeared more at the sites that were considered high assistance sites and support was actually present at all of them. In the years of later implementation, resource adding remained important at the different sites; control remained prevalent at the sites identified as needing high assistance; and training
remained available as well as solution giving. Facilitation and support also decreased slightly in the later years.

Another theme that emerged is monitoring and problem-coping. Monitoring is important to the change process because it is important to know where problems are arising and to determine whether additional in-service is needed or whether modifications need to be made to the program. In addition, it appears that problem solving can help a project continue to advance or move forward. Without proper problem-solving techniques, teachers involved in change projects can lose their momentum or carrying out the guidelines of a program can become difficult.

Louis and Miles (1990) focus on the effects of leadership and management at the school level on the change process. The authors introduce a newer model that reflects how schools should be organized for change. The authors assert that an adaptive model is more appropriate for school change than the bureaucratic model that has been often used. Schools are more complex institutions and need a design to ensure that the day-to-day operations of implementing change take place. The authors advance that an adaptive model for change includes schools that are vision-driven, guided by judgement, not rules, accountability based, team-focused, network-based; semi-autonomous, multi-specialized, and involved with the “whole person” In addition, Louis and Miles address three forms of action that are important for leaders to motivate change in the school. The authors state that schools that are most effective in making changes have leaders who articulate a vision, establish shared ownership, and use evolutionary planning.
Louis and Miles also discuss other factors that make leadership and management successful in a school reform project. The researchers discuss the importance of analyzing the internal and external context. In the external context, factors related to the community, the school district and government are important. The internal context involves the school structure (authority, role clarity, and school autonomy) and staff cohesiveness.

**Summary**

In this section, I examined different arguments for and against educational reform movements. Darling-Hammond (1993) suggests that educational reform movements are necessary. However, there are parallel efforts that exist and compete against each other. These efforts ultimately contradict each other and inhibit change in schools. Fullan (1992) advances that more initiatives need to focus their efforts on bottom-up initiatives. These initiatives should include what Fullan calls networking, reculturing, and restructuring. Cuban (1990) argues that many reform movements aimed at curricula changes do not take into account that there is more than one official curriculum in schools and that change efforts must focus on the taught curriculum, the learned curriculum, and the tested curriculum.

I also examined the teacher change process and how it relates to educational change projects. Fullan (1990) argues that there are four broad components to the change process. He argues that implementation is one critical component of this process. Within the implementation phase, Fullan discusses nine critical factors that contribute to the implementation of a change project. The role of the teacher and the
principal were both very important to the implementation of a change effort.

Huberman and Miles (1984) discuss the various types of resource assistance available to teachers. They described the types of assistance teachers need during the early implementation phase of a change project and during the later phase of a project as well. Louis and Miles (1990) discuss that the leadership and management of a change project can be quite critical and that schools that are most effective in making changes have leaders who articulate a vision, establish shared ownership, and use evolutionary planning.

Strategies to Improve Mathematics and Science Achievement in Rural Schools

Introduction

There are many practices that have been recommended to improve mathematics achievement in schools. Some of these practices focus on teachers and teaching, while others focus on various collaborative efforts. Some of the practices have been applied in rural classes and others have been executed in urban schools. In this section, I focus on practices that have been recommended to improve mathematics achievement in rural schools. I examined literature on both mathematics and science due to the limited amount of information that exists for rural schools.

With the current school reforms focusing on the improvement of mathematics and science education and the expectation of high student performance in all schools, demands of mathematics and science teachers in rural areas are very high. Holey (1992) states that “students must be challenged to perform to high standards and teachers must be able to acquire a new repertoire of instructional strategies which
challenge all students to perform at these levels” (p. 6). In developing strategies for rural school instructional enhancement, teachers must be able to incorporate demanding and integrated curriculum with real-life meaning for students. There is also a need to have access to and be able to use technology, relate assessment to instruction, and have additional opportunities to participate in quality and relevant in-service staff development. In addition, teachers and schools must also learn how to include families in the schooling process in order to influence achievement for all students.

**Instructional Strategies**

There are several instructional practices that have been recommended in order to improve mathematics and science achievement in rural schools. In a report done by the Appalachia Educational Laboratory (AEL) (1990), two effective instructional practices were recommended for classroom teachers in small schools. Teachers were encouraged to take advantage of the many positive characteristics of small schools. This includes cultivating the student as the learner and including the collaborative learning process as an instructional strategy in the classroom as well. Cultivating the student as the learner involves developing meaningful learning experiences for students that engage them in the learning process. The collaborative learning process, the other strategy recommended, is useful because it utilizes the varied knowledge and backgrounds of a broad range of students. The AEL refers to findings from the North Central Regional Educational Laboratory (1990) that states “when students work collaboratively, they are more involved in setting their learning goals, choosing among
options and monitoring their own progress” (p. 2). However, the report concludes that even though these effective instructional strategies are recommended for small schools, educators must not assume that student achievement will automatically improve as a result of a change in these few variables. The authors state that “when combinations of effective practices become a regular part of teaching routines, however, they are much more likely to improve achievement.” In addition, “in a small school, one teacher using a variety of successful techniques, can exert influence across the entire range of variables that cumulatively lead students toward high achievement” (p. 2).

There are other instructional strategies that have been examined that positively influence student achievement particularly in mathematics and science. For example, Hartshorn and Nelson (1990) examined how utilizing hands-on instruction, particularly in science classes, affects students’ knowledge base and their attitudes toward school and science. The researchers looked at the Elementary Science Education Institute (ESEI) which was designed to increase the expertise of elementary teachers in their use of “hands-on-science” methodology and thereby provide better opportunities for their students to grow cognitively and affectively. The authors utilized a content instrument and an attitude instrument to study students having an ESEI teacher with students not having an ESEI teacher. In the first cycle of the study, 902 students were tested ranging from the first grade to the sixth grade. The study suggested that after one year of instruction, there was a significant gain (p<.01) in the content knowledge by both the first and second grade groups of students and the ESEI
students consistently performed better than the comparison students. In both the fourth and sixth grades, the ESEI students outperformed the comparison group at the end of the year even though there was no significant difference between the two at the beginning of the year. Overall, the study supports that there is a positive relationship between “hands-on” science instruction and achievement. In addition, with respect to measuring student attitudes, the study suggests that the science activities and “hands-on” instruction tend to slow down or restrict the erosion of favorable attitudes toward science in particular and toward school in general.

In New Jersey, several instructional practices that take place in rural schools have been identified as “exemplary” by the U.S. Department of Education’s Program Effectiveness Panel. Fitzmaurice (1991) identifies several characteristics common to all of the programs classified as exemplary. These include: attention to different styles of learning, involved families in children’s education, students’ responsibility for learning, involved flexible grouping practices and utilized efficient and comprehensive management systems. Two of the programs in particular appear to be very useful in improving student achievement in critical thinking and in science. One program is called the Higher Order Thinking Skills Project (HOTS). This project is an alternative approach to Chapter 1 for grades 4-6 in which compensatory services consist solely of higher order thinking activities. This project replaces traditional drill and practice activities with thinking activities designed to generate the gains in basic skills expected from Chapter 1 programs. Computers are used to enhance motivation and improve comprehension. Fitzmaurice adds that “a detailed curriculum provides dialogues to
improve the key thinking skills of metacognition, inference from context, decontextualization and information synthesis" (p. 21). In all, the program has proven to be effective in improving students' scores in reading and math, as well as improving their thinking ability as measured by the ROSS and the “Inference from Context” measures.

Another program identified as effective and exemplary in New Jersey rural schools is FAST: Foundation Approaches in Science Teaching. This is a course in the concepts and methods of the physical, biological and earth sciences and their relation to the environment. This program involves lab and field work designed for use with students who represent a full range of abilities and interests found in middle/junior high school classrooms. Instructional strategies are structurally sequenced to address differences in learning styles and to develop thinking skills. A student and teacher guide directs student investigations in the class. The Student Record Book enables students to log individual and class activities. The Teacher Guide includes teaching suggestions, advice on the classroom procedures, and detailed discussion for the conceptual and practical development of the students' investigations.

**Teacher Enhancement**

In many rural communities, mathematics teachers lack access to quality in-service training. Teachers who need assistance in various content areas and in using different instructional techniques often do not have access to useful teacher networking opportunities and quality in-service training. As a result, it is important that teacher enhancement programs for mathematics teachers in rural areas provide opportunities to
establish networks, collaborations and coalitions in order to encourage teacher experimentation, provide useful information and facilitate support. Different programs and practices have been established in order to overcome rural teacher isolation, the lack of relevant in-service training opportunities, as well as minimal continuing education opportunities. The goal of these programs is to increase teacher competence and confidence in teaching in areas such as mathematics and science.

The problem of professional isolation can affect mathematics teachers in various ways. Some teachers experience isolation when they are disconnected from colleagues who may be helpful to them in their particular teaching area. Other teachers experience isolation and teaching pressures when there are only a small numbers of teachers, specialists, substitutes, and administrators to share the work load. In a rural science and mathematics project called SMART (Science and Mathematics Academies for Rural Teachers), teachers are supported in ways that help them stay in the forefront of their professions. Batey and Hart-Landsberg (1993) state that teachers involved in SMART have the opportunity to forge professional ties and stimulate professional growth. They are encouraged to participate in local meetings for professional organizations such as the National Council of Teachers of Mathematics and network with the members. Teachers in the program also do team teaching, collaborative projects and other events that help them break down barriers and diminish isolation. Several of the teachers have also started to maintain contact with colleagues through reading and attending conferences. Batey and Harts-Landsberg (1993) also suggest that teachers should utilize extracurricular events as opportunities.
to meet other teachers. The authors quote one of the teachers interviewed who said, "The most interesting job I do is chaperoning a group of students to nearby villages for sports....Chaperoning is a great way to meet other teachers in the district" (p. 10).

Gill (1996) describes two programs developed by the Los Alamos National Laboratory to enhance training for rural teachers in science. The National Teacher Enhancement Program (NTEP) was a three-year, multi-laboratory program funded by the National Science Foundation and the Department of Energy and carried out by multiple national laboratories. The program involves elementary teachers in three-week summer sessions, three two-day workshops during the school year, on-going planning and implementation process and school administrators. Participants can earn seven semester hours of graduate credit and two hours for the academic year workshops from the University of New Mexico.

The project provides teacher training in many areas and a preliminary evaluation indicates that the project is having a positive effect on teachers. The goals of the project focus on increasing teachers' knowledge of science through (1) the science immersion experience, (2) enhancing teachers' skills teaching science, (3) providing teachers with hands-on science activities and materials, (4) exposing teachers to specific applications of math and science at national labs, (5) helping teachers encourage students to pursue careers in science, and (6) enabling teacher teams to assume leadership roles with colleagues for systemic change in 4th through 6th grade science. In order to evaluate the effectiveness of the project, program staff have conducted interviews, observations, and site visits and used questionnaires to
conducted a formative evaluation. Teacher participants appear to be increasing their science content knowledge, awareness of science applications, teaching methods, and skills for hands-on activities to use with their students. In addition, three-fourths of the teachers who responded increased their awareness of the kinds of research done at the Los Alamos and other Department of Energy laboratories.

The second program discussed by Gill (1995), Teacher Opportunities to Promote Science (TOPS), has also proven to be very successful. The program is a three-year teacher enhancement project aimed at 6th to 8th grade science and mathematics teachers from rural New Mexico communities with little access to technical resources and with predominantly Native American and Hispanic student populations. This project has goals similar to the NTEP program. In the TOPS program, themes and immersion experiences are designed to expose teachers to cutting edge science and to take advantage of laboratory facilities, materials, and expertise. In the 1995 summer institute, the TOPS teachers were involved in conducting storm tracking experiments and were taught various high performance computing techniques. An independent and external evaluation of the second cohort of TOPS participants, conducted by the National Center for Improving Science Education, indicates that teachers have made important changes in teaching because of TOPS. Teachers appear to be moving from more traditional teaching practices toward more progressive ones.

Baird (1994) examines another teacher development program that focuses on rural teacher development in mathematics and science. This program is the ENLIST-Micros project. ENLIST-Micros is an acronym for Encourage Literacy in Science Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Teachers’ use of Microcomputers. The program was funded through the Biological Sciences Curriculum Study grant from the National Science Foundation, the Dwight D. Eisenhower Mathematics and Science Education Program, Auburn University and The East Alabama Regional Inservice Center. Local schools also provided funds for each teacher. This project operated for a four-year period from the 1990-91 school year through the 1993-94 school year. Sixty-five schools and 103 teachers participated. The annual format consisted of a two-day workshop in mid-August and monthly, three hour workshops throughout the school year. Each participant had to receive support from his/her principal through approving an “action plan,” delineating the expectations of the school for the project, and providing each participating teacher with a microcomputer in his or her classroom. The project, using Eisenhower funds from NSF, provided meals, lodging and a stipend for the two-day workshops, $50 of software annually, and one day of release time annually for each participating teacher.

The first two years of the project focused on the training of the teachers, not only in the use of microcomputers, but also in the importance of and methods for sharing that knowledge with other teachers, especially in their own schools. During the third and fourth years, the focus of the project was on training other teachers and expanding the project to include mathematics teachers as well. The monthly workshops included informal discussions where the teachers shared successes and problems encountered during the month. The monthly journals that teachers wrote were helpful in providing material for a newsletter distributed to all participants.
Overall, the teachers' reaction to the program was overwhelmingly positive. Some teachers reported having higher self confidence. Others indicated that collegiality was a highlight of the program. Baird (1992) notes that one of the participants stated "Having peers to talk to as to how they got started and how they have used computers has strengthened my attitude toward computer usage" (p. 3).

Another project that focuses on the development of teachers in rural areas is called the Mathematics-Science Integration Project. Mecca (1991) states that this project was aimed at elementary school teachers and early secondary mathematics and science teachers in rural areas and was financed through the Dwight D. Eisenhower Title IIA Higher Education Competitive Inservice Grants Program. The region served by the project encompassed approximately 4,000 square miles in five counties with the majority of the schools having small student populations and small teacher faculties. The consortium was comprised of a college, a teacher center, and 37 public school districts.

The project provided a series of in-service workshops that emphasized mathematics and science training in the areas of problem solving, integration, and the use of technology in teaching math and science. The project also provided workshops that developed an awareness and a strategy for increasing student participation in science and mathematics. In addition, the project supported the professional development of teachers by providing small grants to teachers for the development of special projects and to attend professional conferences. Mecca (1991) studied the effectiveness of this project and found that the project was considered to be successful.
Teachers completed evaluation forms that indicated through their ratings and their written comments that the project was useful. There were many techniques that teachers acquired that appeared to be helpful and their interest in pursuing the topics was also further stimulated.

**Computer Technology**

Chow (1994) asserts that in order for teachers to make a difference in students' lives, they must learn to teach a more demanding and integrated curriculum. This is particularly true for mathematics teachers in rural communities. There have been various ways suggested for rural teachers to incorporate a more challenging curriculum in their classroom. One method is to use computer technology. Rogan (1995) looked at the use of the Internet by math and science teachers. He examined five programs funded by the Annenberg/CPB Math and Science project in order to determine the extent to which these projects have succeeded in fostering the renewal of teaching math and science. These projects include: the Teacher On-line Projects, Creating Connections: Rural Teachers and the Internet, Tennessee Valley Project, Reach for the Sky and Rural Community Alliance for Enhancing Science and Math Education. In Rogan's research, he found that the Internet has been quite helpful in providing teachers with broader curriculum resources especially in the area of math and science.

Distance education is another method of telecommunications technology suggested to enhance rural teaching and the curriculum of the schools. It is possible that this technology can be particularly useful for mathematics and science teachers due to the specialized nature of these curricula. Keegan (1990) describes "distance
education as training approaches characterized by the separation of instructor and students" (p. 289). At one time, correspondence courses were considered the only method of distance education. However, distance education has expanded to include interactive instruction via satellite. Barker (1991) asserts that distance education is becoming an inviting option for rural American schools because of state-sponsored school reforms, state fiscal reductions, potential teacher shortages, and progress in the development of telecommunications technology. Williams et. al. (1995) state that some of the benefits of telecommunications technology for rural schools teachers include: “support services to teachers and trainees, support for teacher inservice, support services for administrators; support services for parents; support services for support personnel; and direct services for students” (p. 292). The main disadvantage cited about distance education in this research is the effectiveness of this teaching method for all students. However, the authors recommend that educators embrace this resource because of its potential to enhance learning in rural and remote communities.

Williams, Gold and Russell (1995) describe one example of a preservice/in-service training program that uses distance education. The project is called Project Crest (Collaboration in Rural Education for Special Teachers). This project provides teachers with the opportunity to enhance their instructional skills and broaden their knowledge base as well. In addition, participants must demonstrate certain competencies and skills in practicum sites by the end of the project.

Computer technology can greatly enhance learning in rural communities. In order to use this technology, though, schools and teachers must have access to the
necessary computer equipment. Howley and Howley (1994) studied teachers' receptivity to telecommunications in the classroom and the school. They wanted to know the types of computer skills teachers have, resources available, and the background variables that contribute to West Virginia teachers' receptivity to using telecommunications technologies. The researchers found that West Virginia teachers are familiar with a variety of computer applications, particularly instructional applications and word processing. Teachers were generally receptive to possible applications of telecommunications. However, many of the teachers did not have the hardware or software necessary to make use of computer technology in their classes. In this study, only a small percentage of teachers had access to computers with hard drives and about 9% of the total teachers surveyed had a computer with a modem in their class. In order to develop a comprehensive curriculum renewal program or a sophisticated Internet program in order to enhance learning in rural schools, teachers and schools must have access to related technological equipment.

Many agree that computer technology is a very effective way to eliminate some of the isolation that rural teachers encounter and provide additional resources to teachers. Batey and Harts-Landsberg (1993) suggest that electronic mail (E-mail) can be very helpful in connecting rural teachers who are acquainted and those who are not acquainted. Stoops (1993) found that many rural school administrators supported teacher networking endeavors. However, some schools were not prepared to network electronically. Thus, they needed to rely upon the postal system, faxes and personal travel.
Computer technology has also been identified as a means to provide teachers with various educational resources to improve their pedagogical practices and content base. According to the Office of Technology Assessment (1995), technology has become a necessity for university outreach to rural schools due to insufficient funds and the number of faculty who would otherwise have to travel to the rural sites. Interactive compressed video, audio teleconferencing, and electronic mail on the Internet are means by which the College of Education and school districts connect. In another case, through a series of grants from the rural Electrification Program at Northern Montana University, teachers receive in-service training through interactive compressed video (Queitzsch, 1992).

Parental Involvement

Parental involvement has also been investigated as a way to improve math and science achievement of students in rural areas. Unfortunately, the concept of parent collaboration/involvement is most often discussed within the context of "at-risk" students. Often, many students in rural schools are considered at-risk because of the educational level of their parents and/or the income level of their families. However, the concept of parental involvement in rural schools is important for other reasons beyond the concept of at-risk. Parents can help to relieve some of the teacher's workload by volunteering in the classroom and thus, freeing some of the teacher's time for additional instructional time with students. Also, parents who are abreast of their child's learning activities at school can help to continue these activities at home and help the student's achievement in school. Green and Sancho (1990) state that "current
research demonstrates that programs designed with strong parent involvement produce students who perform better than identical programs that do not seek out parent participation” (p. 1). The authors state that children whose parents help them at home and stay in touch with their school score higher than children of similar aptitude and family background whose parents are not involved. Various strategies have been recommended to include parents in the schooling process of students, yet there is no one agreed upon best practice. However, there is an agreement that parental involvement is important to the educational process. Green and Sancho cite a study done in 1980 by the Southwest Educational Development Laboratory (SEDL) where approximately 4000 educators and 3000 parents from six states were included in a study that focused on the critical issues of teacher training and parental involvement. Results from the study indicated that parents favored parental involvement, principals expected it, and teachers wanted it. The study also reflected that parents were willing to assume a variety of meaningful roles at school, from tutor to classroom assistant to decision maker.

Green et al. (1990) state that there are several hypotheses that have been confirmed about the role of the family in a child's education. These include: the family provides the primary educational environment, particularly in social and language skills; involving parents in their children’s formal education improves student achievement; parental involvement is most effective when it is comprehensive, long lasting, and well planned; the benefits of parental involvement are not confined to early childhood, there are strong effects from involving parents continuously
throughout high school; and children from low income and minority families have the most to gain when schools involve parents. Parents do not have to be well educated to help. In addition, we cannot look at the school and the home in isolation; we must understand how they interconnect with each other and with the community at large (pp. 2-3).

Parents can be involved in the education of their children in at least three ways. These include parents acting in the role of a teacher, decision maker, and/or community representative (Green, et al., 1990). Green and others state that all parents play a teaching role with their kids. However, community-based education programs have brought about a new awareness of the parents’ teaching role and its effect on the learning process. The author states that “these new community-oriented partnerships have begun redefining teaching as far more than didactic instruction” (p. 5). Teaching now involves: setting the stage for learning, modeling appropriate behavior, managing the environment, sharing information, and engaging in direct and natural interaction with the learner (Green, et al.). The authors assert that according to this definition, parents are functioning daily as teachers. Parents also serve as a valuable resource to their kids because of their role as the decision maker. On a daily basis, parents make decisions that affect the welfare and growth of their children. As a result, if parents are informed of the functions and the goals of the school, the author asserts that parents should be able to work cooperatively with administrators and teachers in order to help shape the educational plan of the school and its effectiveness. This should be helpful in meeting the educational needs of the learner both at home and at school.
The authors also see the parent as a community representative. Thus, Green, et al. believe that the parent can provide the school with information about the community it serves. They assert that “schools can no longer afford to overlook the valuable community resources that parents can provide” (p. 6).

Several programs have been designed by various states in order to reach the national educational goals set forth by the National Governors’ Association in 1990. One of the goals deals with student readiness and stated that all children in America will start school ready to learn. As a result of this goal, several states in the Appalachia region developed programs that focused on early childhood activities and educational preparation. Approximately 25,000 at-risk parents were selected to participate in Tennessee’s Partnering with Parents for Successful Early Childhood Development project funded by the Appalachia Research Council (ARC). The goal of the project was to educate parents on how to best prepare their children for school. Hoffman (1993) writes “it doesn’t matter how stimulating and hands-on a class is if children arrive at school without the readiness skills that will enable them to learn” (p. 10). The Tennessee program project director suggests that kids who have not had visual, aural, and physical stimulation in their early years do not learn. In the first five years of a child’s life, their home experiences are very important for laying the foundation for much of what they will be able to learn in school later.

The ARC project included various components. First, parents were provided with information about caring for, playing with, and teaching their children. The information was written at a fifth grade reading level so that parents with minimum
reading skills were able to understand the literature. Packets of literature were sent to parents every three months. These included information that encouraged parents to talk often with their children in order to help develop their language skills. Other handouts encouraged parents of infants to talk to and smile at their babies as they moved their legs as if they were riding a bicycle and parents of children from 15-18 months old were recommended to read stories aloud to their kids before they went to bed. Lindsey Dunn, director of the project's Early Childhood Demonstration and Activity Center in Cocke County states that some of these ideas may sound like common sense. However, there are many parents who are starving for this type of information.

In a program produced by the Appalachia Educational Laboratory's Rural Excel Program called *Family Connections*, home-based pre-school education was also provided to families of children. In this program, parents were provided with a series of guides sent to the home on a weekly basis. In addition, teachers received a variety of instructional materials, including a user handbook and videotapes for use with parent groups. In the initial phase of the project, a multi-site field test of the program materials was done (Childers and Penn, 1992). Evaluation of the project through a weekly 'parent reaction form' reflected that parents were overwhelmingly positive about the program. Teachers involved in the program were also very enthusiastic. Research on the effectiveness of the project indicated that as a result of parents and teachers being involved together in activities, there was increased communication between school and home and in many instances improvements in the communications as well. As a result of the field test, project staff remained convinced that certain
premises are sound: “the majority of parents would like to help their children succeed in school; many, if not most, do not know how to help; and most will use materials provided to them if the materials are usable and not too time-consuming” (p. 37).  

Local Collaboration  

This is the final area that I examined that appears to be conducive to improving rural schools and student achievement in mathematics and science. Due to the culture and tradition of rural communities, establishing collaborations between rural schools and the community appears to be a positive step in improving rural student achievement. Royster (1995) recommends that schools form partnerships with industries particularly in the areas of mathematics, science and technology. This allows industries to inform schools about the necessary skills and knowledge that students should have in order to be prepared for a career within the industry.

Hoffman (1993) discusses a project that Auburn University's Economic Development Institute has developed. Under this project, leaders have brought together local secondary schools, industry, and community colleges to better match the schools' curricula with the needs of local industry. This project was funded by the Appalachia Research Council and was designed to analyze the knowledge, skills, and abilities necessary for certain groups of jobs. The name of the project is LEED - Linking Education with Economic Development. Project leaders hope that as a result of this work schools will be able to design curricula that will help prepare students for employment after six or seven years of secondary school. The project director states that the program is designed to build bridges between academics and training. One of
the project coordinators stated that "industry so often says, 'the school systems don't
give us what we need,' and the school system says, 'Well, you never tell us.' So we're
going to find out exactly what potential employees need. That has never been done
before around here" (p. 8).

Mulkey (1993) suggests in his research on Education in the Rural South that
there is ample evidence to support the idea that communities should play a role in
educational achievement. He quotes work by Chicoine and Ward (1987) and more
recent work by Smith (1992) arguing that economic opportunities existing in rural
communities may influence levels of support for education and the quality of school
systems. He suggests that when high level jobs become available in communities,
community expectations tend to evolve and the demand for a quality education system
evolves as well. As a result, there is greater support for school enhancements, as well
as teacher enhancements.

Queitzsch (1994) believes that university/school partnerships and
community/school partnerships would be helpful in enhancing rural teachers. The
author suggests that if rural schools were connected to universities, field and novice
teachers could get additional support from university faculty. Rural teachers could
also have the opportunity to participate in more continuing education programs as
well.

In this section, I analyzed practices that appear to be effective in improving
student performance in rural schools. I began by examining instructional strategies
that have been helpful in improving the classroom design of rural schools. These
practices included some general strategies and some strategies directed to improving student performance in mathematics and science. Next, I examined methods to enhance teacher development in rural schools and considered how computer technology can help to enhance teacher training. I also examined the effects of parental involvement in the school system and the effects of community participation in the school system as well.

Overall Summary

It appears that the schooling process and the economic conditions of the community are crucial to rural development. If a high performing school system is put in place, jobs must be available so that students have the opportunity to work in the community rather being forced to leave to find meaningful work. In addition, in order to attract different industries to rural communities, an educated populace needs to be in place. The economy and the school system go hand in hand. It appears that when schools are in touch with the needs of the community and can collaborate with local entities, the schools can be more effective for the students, as well as the community.

There are many programs that have been developed in order to improve the practice of schooling in rural communities. Computer technology has been identified as one method to enhance teacher development and provide teachers with additional curriculum resources. In addition, the Internet has been found to be very useful in addressing professional isolation and limited resources. Teachers must have access to computer equipment and appropriate support in order to utilize this resource. If this
practice is put into place effectively, it can be very useful for rural teachers and has the opportunity to affect the performance of students as well.

The literature also suggests that several instructional strategies are useful for rural school teachers to implement especially in the area of mathematics and science. Fortunately, rural school teachers are at an advantage in implementing many of these strategies due to some of the unique conditions present in the schools. Factors such as class size, student responsibility and teacher accountability allow teachers to implement strategies such as hands-on instruction, collaborative learning experiences, higher order thinking activities and assessment strategies that include journal writing.

There are many characteristics of rural schools that allow teachers to work effectively with students. Unfortunately, there are some factors including limited resources and geographic locale that can hinder effectiveness. By continuing to identify those processes that maximize student performance, reform programs implemented in rural districts can become more effective.

Conceptual Framework

Description of Relationships

The conceptual framework that explains this study includes six variables. (See Figure 2.1.) These are student background, school climate, the LaSIP intervention, teacher behavior and attitudes, classroom process, and student learning. The framework is primarily a linear model that consists of a direct relationship between student background and school climate, school climate and teacher behavior and attitudes, the LaSIP intervention and teacher behavior and attitudes. It also includes a direct
Figure 2.1. Conceptual Framework (Jones, T.M., 1997)
relationship between teacher behavior and attitudes and the classroom process and student learning. There are also indirect relationships that exist in the model. One indirect link is the relationship between the LaSIP intervention and the classroom process. Another indirect link includes the connection between teacher behavior and attitudes and student learning. This study is based on the indirect relationship between the LaSIP intervention and the classroom process.

**Definition of Variables**

**Student Background**

In order to define student background, I included several variables identified in the literature (Oakes, 1992; Hallihan, 1990): social class, ethnicity, race, gender and aptitude/ability. The literature supports the argument that certain student characteristics can influence a student's schooling experience.

**School Climate**

I defined the school climate variable utilizing data from Cruickshank's (1990) research. The variables used include: pupil formative experiences, pupil school experiences, pupil attributes, school and community contexts and classroom contexts. The author uses several variables related to the experiences and attributes of students to define school climate. Some of the variables include: student social class, age, gender, past school success, kinds of learning experienced, abilities, motivation, expectations for self and others, attitude toward school and awareness of and acceptance of learning objectives. Cruickshank's definition of school climate also includes variables that relate to the school and the community. Some of these
variables include: ethnic composition of the community, school size, principal's style, support for innovation and school organization structure. The author also uses variables related to classroom context to describe school context: class size, instructional media, instructional time and efficient use of it, similarity of learners' abilities and physical environments.

I chose the variables utilized by Cruickshank (1990) to describe school climate over those used in the effective schools literature due to the breadth and depth of the characteristics presented. The majority of the variables discussed by Cruickshank were also included in the Teddlie and Stringfield (1993) school climate instrument. Teddlie and Stringfield emphasize the role of the principal in school climate, as well as characteristics related to expectations and academic futility.

LaSIP Intervention

I defined the LaSIP intervention as an in-service training program that utilizes various methods and materials to train mathematics and science instructors in reform based teaching methods. Teachers participate in training during the summer and/or at various points throughout the academic year. Research done by Teddlie (1996) documents that participation in a LaSIP program influences teacher behavior and attitude.

Teacher Behavior and Attitudes

I defined teacher behavior and attitude as: teaching aptitudes and skills, knowledge of subject, knowledge of teaching, knowledge of learners in class,
expectations for self and students, motivations and time spent in classroom preparations (Koehler, V. 1984).

Classroom Process

I defined classroom process utilizing several variables identified by Cruickshank (1990). The author asserts that teacher classroom behavior/performance is one important characteristic of the classroom process. This includes the teacher's presentation style, teaching strategy, use of appropriate learning principles, and organization of content. In addition, the classroom process includes identifying pupil learning strategies and handling various types of pupil behavior (e.g. relaxed, motivated, unstructured, off task, etc.) As a result of the classroom process, student learning can be affected, particularly in the area of mathematics.

Student Learning

I defined student learning as the product or the outcomes of teaching. Cruickshank (1990) states that as a result of the learning experience, students grow in two ways: immediately and over the long term. Immediate growth involves subject matter learning, attitudes toward the subject matter, and growth in other skills. Long-term effects include personality effects and professional or occupational skills.

Justification for the Relationships

In this section, I explain the relationship between variables in the conceptual framework. In order to explain the relationship of the variables, I used supporting documentation based in educational theory.
In justifying how a student's background is related to school climate, Oakes (1992) studied how students are matched to different high school curriculum programs according to race, ethnicity, and social class characteristics. She asserts that immigrant, poor and minority youth are more often enrolled in low level academic and vocational programs, whereas middle and upper class whites are more often enrolled in academic, college preparatory programs. Oakes argues that differentiating curricula have typically been judged as a fair and appropriate way to accommodate differences in students' intellectual abilities, interests and aspirations in the American school system.

Hallihan (1990) also discusses how various student characteristics influence the student's schooling process. The author asserts that students' pre-determined aptitude or ability can influence the instructional group students are assigned to when they start school. The author argues that "assignment to instructional groups determines the content, rate and duration of instruction as well as the climate in which learning occurs" (p. 5). As a result, a system of tracking occurs within the school and can influence student achievement, motivation, aspirations, and self-esteem. Hallihan asserts that there is a fairly widespread belief that in some schools ability grouping and tracking is related to a student's social class and ethnicity.
LaSIP => Teacher Behavior & Attitude

From a formative evaluation report done by Teddlie and K.T. and Associates (1996), the researchers found that the LaSIP intervention affected teacher behavior and attitudes in several ways. According to the researchers, 95% of all the teachers agreed that the content portion of the training provided them with useful information that they could use in the classroom. In addition, the teachers agreed that the content portion helped them to understand more about mathematics/science so that they could teach with more confidence. A large portion of the teachers also believed that the LaSIP training improved their ability to help students gain experience with hands-on activities (e.g. science kits, math manipulatives). The researchers noted that participation in LaSIP also appears to have an effect in several other areas as well. This includes: increasing teachers’ knowledge of the applications of mathematics/science principles, helping teachers develop additional skills for improving student problem solving or critical thinking abilities and helping teachers update their teaching practices in order to take into account new methods and course contents.

School Climate => Teacher Behavior & Attitude

Effective schools research supports the assertion that school climate has an impact on teacher behavior and attitudes. In the Teddlie and Stringfield (1993) longitudinal study, the authors pose the question posed by Good and Brophy in 1986; are schools differentially effective in their ability to educate students? According to their research, classroom observations confirmed that better teaching was occurring at
effective schools. The researchers found that at the third grade level the expectation for student performance was higher for the students attending effective schools versus schools classified as ineffective.

Students at Adams were not allowed in the lowest track, while some at Fillmore were placed in that track. Adams teachers knew that the administration expected the highest performance from all students, with those eligible for the highest track participation in it and those slated for the lowest track instead placed in a higher track. The high expectation message from the administration was translated into higher expectations by teachers" (p. 192).

**Teacher Behavior & Attitude => Classroom Process**

There are several researchers who have examined the effects of teacher behavior and attitude on the classroom process. Medley (1977) reviewed 289 studies that purportedly dealt with how the behavior of effective teachers differs from that of ineffective teachers. Some of the general findings that the author identified indicated that teachers who were competent in their subject matter generally developed students with more positive attitudes toward school. The author also learned that teachers who achieve maximum pupil gains are also likely to improve pupils' self-concepts. In addition, Medley discovered that there were specific behaviors of effective teachers in upper elementary grades. These teachers: talk more, keep pupils on task, are less permissive, permit pupils to initiate more interchanges, ask easier questions, manage with less effort, are more selective with criticism, attend to pupils less closely, and favor less traditional materials.
Cruickshank (1990) examined various characteristics of teachers that influence the classroom process. The author identified several common teacher character traits that describe effective teachers. He asserts that effective teachers are enthusiastic, stimulating, encouraging, warm, task oriented and businesslike, tolerant-polite-tactful, trusting, flexible-adaptable, and democratic. The author suggests that when a teacher is knowledgeable and skilled in using information they are generally more effective with their students. In addition, he asserts that a teacher's pedagogical style also affects classroom practice. From the reviews of research that the author examined, he suggests that effective teachers demonstrate clarity, provide variety, establish and maintain momentum, make effective use of small groups, encourage more pupil participation, monitor and attend to pupils, and structure teaching and learning.

**Classroom Process => Student Learning**

Several authors have researched the effect of teachers on student learning. Cruickshank (1990) examines several models that support the relationship between teacher influences and student learning. The author asserts that the model of classroom teaching initially developed by Mitzel (1960) and expanded by Dunken and Biddle (1974) has been useful in explain the complex phenomenon of classroom teaching. The model delineates four major variable types. These variables include: presage variables, context variables, process variables, and product variables. The process variables include what teachers and students do in the classroom. The product variables reflect student learning outcomes. McDonald and Elias (1976) also
produced a model of teaching. Their model includes the work of Dunken and Biddle (1974), along with several refinements and some alternative works. Cruickshank (1990) reports that Walberg's (1984) research also supports the link between the classroom process and student learning.

Summary

In order to examine the relationship between the LaSIP intervention and the classroom process, I established a framework that includes six variables. These variables include student background, school climate, the LaSIP intervention, teacher behavior and attitudes, teacher/student interactions, and mathematics achievement. The direct and indirect relationships established in this framework are supported by previous educational research. This study is based on the indirect relationship between the LaSIP intervention and the classroom process. It was expected that LaSIP positively affects the classroom process due to its effect on teacher attitudes and behaviors.
The purpose of this study was to determine how the LaSIP initiative affected classroom practices in two rural school districts in Louisiana. The charge for the study arose in light of LaSIP’s recognition of special circumstances operating within rural communities. These special circumstances include limited financial and educational resources, as well as geographic isolation that inhibits communities from tapping into resources available within metropolitan centers (De Young, 1987).

Educational reform programs designed to increase student achievement in mathematics and science, as well as other subject areas have the potential to increase the number of students graduating from high school and participating in post secondary education in Louisiana.

In this chapter, I detail the research methods used in the study. These methods include a survey research component and case studies. Each method will be discussed in a separate section that will include a discussion on population, instrumentation, data collection and data analyses.

Survey Data

Surveys were selected for this study in order to examine how LaSIP has affected the classroom processes of rural teachers in two districts. Babbie (1990) states that surveys allow the researcher to obtain standardized information from a broad group of individuals. The author asserts that typically surveys are used to understand a large population from which a sample was selected. In this study, the
population was relatively small. Thus, the whole population was surveyed. Babbie asserts that there are three general purposes for conducting survey research: description, explanation, and exploration. The survey instrument used in this study was primarily descriptive and the unit of analysis for the survey was the LaSIP trained teacher. In addition, the survey design used in this study was a cross-sectional survey. Babbie states that cross-sectional survey data are collected at one point in time from a sample selected to describe some larger population at that time.

**Population**

The population for the study was all K-8 teachers in two rural parishes that have participated in the local LaSIP project. This included 10 schools and 70 teachers.

**Instrumentation**

The survey instrument used was called the 1997 LaSIP Survey. An initial draft version of the instrument was developed using the following procedures:

1. An initial item pool was developed as a result of my familiarity with the LaSIP project and through a review of the literature on classroom practices used in mathematics classes.

2. Discussions were then held with the LaSIP staff and the LaSIP Site Coordinators for two parishes. Program documents submitted to the LaSIP staff were also used to develop questionnaire items.

3. A review of the input, as well as important ideas that surfaced in the program documents, were examined to determine consistency of ideas about practices in LaSIP classes.
4. A revision of the content and format of the items to be included in the instrument was conducted utilizing input from various selected researchers.

5. The instrument was then pilot tested by three teachers who participated in LaSIP training.

The subject areas addressed on the survey included questions on the background information of the teacher, LaSIP training, reform based instruction, pedagogical techniques, and student learning outcomes. The questionnaire included open ended and closed-ended items.

Validity

Babbie (1990) states that validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. There are various types of validity. Content validity, as described by Borg and Gall (1989), is the degree to which each item on an instrument represents the content that it is supposed to measure. As mentioned in the description of instrument development activities for the LaSIP Survey, content validity was established through analyzing the research question for the study. I then developed the dependent and independent variables of the study. This included the effect of LaSIP on classroom practices. I then wrote survey items that measured each variable. After the items were written, I had discussions with the LaSIP management staff, local staff of the project and local teachers to discuss the relevance of each survey question in describing the variables. The final draft of the instrument was also reviewed by the LaSIP staff, two LaSIP
teachers and an expert on survey development for clarity of wording and item content and response formats.

Reliability

Babbie (1990) defines reliability as a matter of whether a particular technique, applied repeatedly to the same object, would yield the same result each time. He recommends several techniques to maximize the reliability of questionnaire items on a survey instrument. These techniques include asking questions that respondents would likely know the answers to, asking questions that are relevant to the respondents, and being clear about what you are asking. On the survey for this study, questionnaires were designed for LaSIP trained teachers and asked questions relevant to the LaSIP in-service training.

Data Collection Procedures

Surveys were distributed to all teachers who participated in the local LaSIP projects. A list of teachers that participated in the project was requested from the LaSIP project staff. The superintendent was contacted and principals were contacted to advise them on the school visits and the dates. A cover letter was developed in order to explain the purpose of the study to the teacher. The schools where the LaSIP trained teachers were currently teaching were identified and teachers were given the survey instrument directly by me or one of the local Site Coordinators. (The local Site Coordinator is a member of the LaSIP staff and coordinates local activities for teachers who have participated in LaSIP projects in the local area.) Respondents were given one week to complete the instrument and were asked to return the instrument to
the secretary in the school office. I, with the help of the Site Coordinator, picked up surveys from teachers. If teachers had not completed the survey, they mailed them later to the Site Coordinator.

**Data Analysis**

Univariate analysis was used to analyze the data from this survey. Babbie (1990) describes univariate analysis as the analysis of a single variable for purposes of description. This type of analysis was useful in describing how the total sample had distributed itself on the response alternatives for the various questionnaire items. In addition, this type of distribution, referred to as marginal tabulation by Borg and Gall (1989), is presented in raw numbers or in terms of percentages. Babbie states that the numbers can also be presented in frequency distributions, averages and measures of dispersion. This data was helpful in describing how LaSIP has affected the mathematics classes of LaSIP-trained teachers in two rural school districts.

**Case Study Data**

The case study strategy in this research was a multiple-case (holistic) design (Yin, 1996). Yin defines a multiple-case (holistic) design as a design that includes studying more than one case. In this study, I examined a total of four teachers at three different schools. The holistic component of the design includes studying one unit of analysis at a time. In this study, the teacher was the unit of analysis. Yin asserts that multiple case study designs are appropriate for situations that may include differences between different sites, schools, etc. In addition, the author states that multiple-case designs are often more compelling due to the richness of evidence that can be collected.
Sample

The case studies in this investigation include an in-depth analysis of four teachers that have successfully implemented LaSIP techniques in their classrooms. Teachers were selected by the local Site Coordinators based on the following criterion: 1) site coordinators determined who they believed had a grasp of implementing reform based techniques in their classroom; 2) since it was the end of the school year and teachers were about to start Spring testing, teachers were asked whether their teaching would be different and if not, this was taken into consideration; 3) the location of the school was considered in order to make it possible for me to get from one location to another location in time for the class; 4) the grade level that the teacher taught was considered in order to include observations and discussions with teachers from various grade levels; and 5) whether the principal would agree to the study or not was considered.

Instrumentation

An interview guide (Patton, 1989) was designed in order to direct the in-depth interviews with teachers. The questions for the interview guide included open-ended queries that served to provide direction for the interviewer. In addition, as stated in Bogdan and Biklen (1995), semistructured interviews allow the researcher to get comparable data across subjects. The questions in the guide began with general information about the teacher and their background in teaching and with teaching mathematics. Questions were then asked about the LaSIP training and classroom
practice. Questions developed for the instrument guide were pilot tested with one
teacher who had been trained through LaSIP in order to get feedback on the questions
that were asked.

Data Collection

The case studies in this work involved collecting data from four teachers in the
two parishes. Primary data collection was focused on the teacher and occurred through
interviews and classroom observations. Secondary data were collected as well to develop
the context of the study. All participants who agreed to participate in the study were
required to sign a consent form for participation in the study. (See Appendix A).

Primary Data

Interviews with teachers

Interviews were used to gather descriptive data about the subjects. These data
were used to analyze how the subjects interpret their experiences with the LaSIP
intervention. The interviews were conducted in an informal conversational manner with
the use of an interview guide (See Appendix B). These interviews focused on the
following broad areas: teacher background, the LaSIP training, and classroom practice.
The interviews were audio taped and the tapes were transcribed.

Two interviews were done; each lasted approximately one hour. The first
interview focused on general topics. The teachers were somewhat nervous, but appeared
to speak honestly about their experiences. Luckily, I had built a favorable rapport with
the teachers that allowed them to be open and honest about the program and their
experiences. The second interviews flowed much more easily. These were done at the
beginning of the teachers' summer vacation, so two of the teachers appeared to be more laxed and distracted. They both answered questions, but one was not as thorough as she was in the first interview.

Classroom observations

The classroom observations included visits to the teachers' mathematics classes for one week, five consecutive days. Notes were taken during the class and informal discussions were held after the class meetings. The discussions served to clarify and explain some of the observations made in the class. In the first week, two teachers were observed in Coleman parish and the next week two teachers were observed in Calais.

Spradley's technique for descriptive observations was used to collect data in the classroom (1980). Spradley recommends going to the setting and doing a grand tour observation to get an overview of the setting. Spradley recommends that the researcher use nine major dimensions to guide the grand tour observation. This includes asking questions about each of the dimensions relevant to the study: space, actor, activity, object, act, event, time, goal, and feeling. A mini-tour observation follows. The questions used to guide a mini-tour deal with a much smaller unit of experience. In order to follow the Spradley technique in my study, I first did a grand tour observation in my classes. I then followed this up by doing mini-tour observations in order to look at smaller units. Spradley recommends using a descriptive question matrix in order to check the thoroughness of the questions that the researcher is using. This matrix was used to ensure that all pertinent questions were covered in the observations.
Field notes were taken during the observations. Notes taken from the classroom observations were handwritten. The interviews were audio taped and transcribed and were included as field notes. Patton (1990) states that the field notes should be descriptive, detailed and concrete. In addition, Patton asserts that field notes should include direct quotations or as near as possible recall of direct quotations. Patton states that these quotations are very important at capturing the insider’s perspective on reality. The field notes should also include the observer’s own feelings, reactions to the experience, and reflections about the personal meaning and significance of what has occurred. Patton also states that the field notes should include the observer’s insights, interpretations, and beginning analyses. Patton believes that it is only natural that the observer will get insights on why things are happening. However, the author notes that interpretations should be clearly marked with some standard symbols.

Secondary Data

Interviews with principals

These interviews were done in order to add to the contextual information that was gathered about the teacher. These interviews were brief and included gathering information that addressed these questions:

- Describe the impact of LaSIP on teachers?
  Follow-up question: Has there been an effect on other teachers?
- Describe the type of support you are getting for change?
- What are the strengths and the weaknesses of LaSIP?
- How is the program making a difference at your school? Why has it or why has it not?
Data Analysis

Data analysis was minimal during data collection. The primary analysis occurred after the data collection was completed and involved an inductive approach. The primary analysis included, as discussed by Bogdan and Biklen (1992), working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what was important and what was to be learned, and writing the report.

Bogdan and Biklen recommend several steps that should be taken in order to make analysis an ongoing part of data collection. The authors state that the researcher should develop analytic questions that give focus to data collection and help organize it as one proceeds. This study began with several research questions that focus data collection efforts. One question, for example, states in what ways has the LaSIP intervention affected the classroom practices of four teachers in two rural parishes. The authors assert that when the researcher develops answers to these questions as they move through the field they are "engaging in what has been called the generation of formal grounded theory" (p. 156).

The authors recommend other approaches the researcher should include during data collection. Bogdan, et al. advises that scheduled data collection sessions should continue in light of what the researcher learns in previous observations. If new information is uncovered during the data collection process, these leads should be pursued in future data collection sessions. The authors also recommend that researchers write many "observer's comments" about ideas that are generated during the data
collection. The authors suggest that the researcher spend some time speculating and formulating hunches when recording field notes. This work involved taking time to write field notes to include insights that evolved while I collected data.

Spradley's method was used to analyze the data after it was collected. This included organizing field notes, developing a domain analysis and a taxonomic analysis. Miles and Huberman (1994) suggest that a filing system be developed for the raw field notes, hard copies of transcriptions, audiotapes, memos, etc. as well. Spradley recommends analyzing data through a domain analysis in order to discover the cultural patterns of a social situation. The first step in doing a domain analysis includes developing cultural domains. This includes going through the field notes and searching for cover terms, included terms and semantic relationships. It may be necessary to go through the field notes several times to search for hidden domains. Once the domains have been identified, a list of the domains should be made. This will help the researcher identify cultural categories and secondly, it will help the researcher gain an overview of the cultural scene that is being studied. In this study, a domain analysis was done to gain additional information about the cultural scene of LaSIP trained mathematics teachers in rural communities.

The next part of the analysis included a taxonomic analysis (Spradley, 1980). Spradley states that a taxonomy is like a cultural domain, but a taxonomy looks at a subset of categories and shows their relationship to the whole scene. Spradley states that a taxonomy is different from a domain because it shows more of the relationships among
the things inside the cultural domain. A taxonomic analysis was used in this study in order to discover added meaning in the settings.

The final part of analyzing the data includes writing the report. Marshall and Rossman (1995) state that writing about the qualitative data cannot be separated from the analytic process. Writing the report involves interpreting and giving meaning to massive amounts of raw data. This report includes a descriptive account of the participants’ perspectives. Ely, Anzul, Friedman, Garner and McCormack (1991) describe three distinct ethnographic writing styles developed by John Van Maanen. In this study, the realist tale approach was used. This includes writing about various descriptive accounts from participants in the study.
CHAPTER FOUR:
DATA ANALYSIS AND FINDINGS

LaSIP Survey

The data from the 20-item survey that was distributed to the 70 LaSIP participants in the two parish area were used to analyze the results. The subject areas addressed on the survey included background information on the teacher, LaSIP training, reform based instruction, pedagogical techniques, and student learning outcomes. Out of the 70 participants in the two parishes, 52 surveys were returned. This resulted in a return rate of 74% which constituted an excellent return rate for a one time distribution (Borg and Gall, 1989). The closed-ended items were analyzed using descriptive statistics generated from SAS statistical programs.

Analysis of Closed-Ended Items

Background Data

In the first part of the survey, teachers were asked to respond to questions about their teaching background. The teachers who responded to the survey either had a moderate amount of experience teaching in the classroom or they had a lot of experience teaching in the classroom. Twenty-seven percent of the teachers marked that they had taught between five and ten years. About 25% of the teachers marked that they had taught over 20 years. In the question that followed, the responses were similar. This question related to the number of years the teacher had taught mathematics. Close to 29% of the teachers stated that they had taught mathematics between five to ten years. About 23.1% stated that they had taught mathematics for
over 20 years. These data follow from the first question and reflect that those teachers that have taught mathematics have taught this subject for most of their career. The highest level of education obtained by respondents was a Bachelor’s degree and the next highest level of educations was the Plus 30. Sixty-three percent of the teachers had received their Bachelor’s degree and close to 20% of the teachers had completed their Plus 30.

Table 4.1. Frequency of Grade Levels Survey Respondents Taught (from the most common to least common)

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>K</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

The grade levels that teachers taught was widely dispersed. (See Table 4.1 for the grade levels that the survey respondents taught.) The majority of the survey respondents taught at the elementary level, kindergarten through fifth grade. A smaller percentage taught at the junior high level, sixth through eighth grades. The majority of the teachers only taught one section of mathematics. Thus, many of the
teachers probably taught in self-contained situations. Sixty-seven percent of the teachers responded that they only taught one section of math. This makes sense since the two training projects sponsored by LaSIP were for elementary teachers (K-8).

**Pedagogical Techniques**

In the second section of the survey, teachers were asked about the teaching strategies that they used in the class and how they used different techniques. The majority of the teachers who participated in the survey believed they significantly changed the way they taught mathematics because of their involvement in LaSIP. Only one respondent indicated that they did not change the way they taught mathematics. In the next set of questions, teachers' responses were measured on a four point Likert scale. This resulted in determining how positive teachers were about the skills they acquired in the training. The responses from the survey were positive. (See Table 4.2 for a breakdown on the responses to these items.) Even though many of the teachers' responses were close to the strongest response. It appears that teachers are working at making changes in the classroom even if they are not completely comfortable with all of the changes that were introduced in the training. Seventy-one percent of the teachers responded that they disagreed that their teaching skills in mathematics had remained the same since their involvement in the LaSIP training and 25% strongly disagreed. It appears that the training has had a positive impact on influencing changes in teachers' skills.
Table 4.2. Percentage of Total Responses to Items Concerning Changes in Teacher's Instructional Strategies

<table>
<thead>
<tr>
<th>Items</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>I teach more confidently since my involvement with LaSIP.</td>
<td>51.9%</td>
</tr>
<tr>
<td>My teaching skills in math have remained the same.</td>
<td>1.9%</td>
</tr>
<tr>
<td>I have difficulty seeing how the reform based teaching methods I learned at LaSIP can be directly applied in my class.</td>
<td>-</td>
</tr>
<tr>
<td>I have developed additional skills for improving student problem solving or critical thinking abilities.</td>
<td>40.4%</td>
</tr>
<tr>
<td>I have become more of a facilitator of student learning rather than a dispenser of knowledge.</td>
<td>25%</td>
</tr>
<tr>
<td>I am more confident in my knowledge of mathematics content because of my involvement in LaSIP.</td>
<td>42.3%</td>
</tr>
<tr>
<td>I am unable to use the materials or lessons that I learned about in LaSIP in my math classes.</td>
<td>5.8%</td>
</tr>
<tr>
<td>My classroom assessment strategies have remained the same since my involvement in LaSIP.</td>
<td>1.9%</td>
</tr>
</tbody>
</table>
The next set of questions measured how often teachers used diverse reform-based teaching techniques in their classrooms. The three responses to these questions were *often, sometimes* and *not at all*. The responses to these items revealed that there is a certain group of the teachers who really have been able to implement the techniques in their classrooms and there are others who only implement the techniques sometimes. (Responses to the items are included in Table 4.3.)

### Table 4.3. Percentage of Responses to Items Estimating the Use of Various Teaching Strategies

<table>
<thead>
<tr>
<th>Items</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Often</td>
</tr>
<tr>
<td>Cooperative Learning Groups</td>
<td>57.7%</td>
</tr>
<tr>
<td>Calculators</td>
<td>19.2%</td>
</tr>
<tr>
<td>Manipulatives</td>
<td>84.6%</td>
</tr>
<tr>
<td>Discovery-Based or Inquiry-Based Learning</td>
<td>42.3%</td>
</tr>
<tr>
<td>Open-Ended Questions</td>
<td>59.6%</td>
</tr>
<tr>
<td>Expanded Teacher/Student Dialogue</td>
<td>51.9%</td>
</tr>
<tr>
<td>Expanded Student/Student Dialogue</td>
<td>48.1%</td>
</tr>
</tbody>
</table>
As indicated in Table 4.3, overall teachers do appear to be implementing the techniques in their mathematics classes. Close to 85% of the respondents indicated that they used manipulatives in their classes on a regular basis. Only 19% of the teachers indicated that they were using calculators in the class on a regular basis, while 25% actually indicated that they were not using them at all. This could be a result of the teachers not having calculators for the students to use in the classroom, the possibility of not having enough calculators to teach a lesson or the calculator not being age appropriate to the grade level taught.

Reform Based Instruction

In the next set of questions, teachers were asked how important different teaching techniques were to reform-based instruction in mathematics. The purpose of this question was to assess teachers' understanding of reform-based teaching. The response alternatives to this question were very important, important, not important and have not used this technique. (Table 4.4 contains responses to the items.) As indicated in Table 4.4, the responses reflect that the teachers do feel strongly that the reform includes the use of manipulatives in teaching. In addition, 57.7% of the teachers marked that cooperative learning groups are also very important to the process. These two strong responses to these categories were expected. The responses to these items do indicate that a sizable portion of the teachers recognize the importance of all the techniques.
Table 4.4. Percentage of Responses to Items Describing the Importance of Various Teaching Techniques to Reform-Based Instruction

<table>
<thead>
<tr>
<th>Items</th>
<th>Very Important</th>
<th>Important</th>
<th>Not Important</th>
<th>Have not used this technique</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative Learning Groups</td>
<td>57.7%</td>
<td>34.6%</td>
<td>3.8%</td>
<td>-</td>
<td>1.9%</td>
</tr>
<tr>
<td>Calculator Use</td>
<td>21.2%</td>
<td>48.1%</td>
<td>9.6%</td>
<td>19.2%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Other Manipulatives</td>
<td>73.1%</td>
<td>25%</td>
<td>-</td>
<td>-</td>
<td>1.9%</td>
</tr>
<tr>
<td>Discovery-Based or Inquiry-Based Learning</td>
<td>40.4%</td>
<td>57.7%</td>
<td>-</td>
<td>-</td>
<td>1.9%</td>
</tr>
<tr>
<td>Open-Ended Questions</td>
<td>44.2%</td>
<td>46.2%</td>
<td>5.8%</td>
<td>1.9%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Expanded Teacher/Student Dialogue</td>
<td>42.3%</td>
<td>53.8%</td>
<td>-</td>
<td>-</td>
<td>3.8%</td>
</tr>
<tr>
<td>Expanded Student/Student Dialogue</td>
<td>50%</td>
<td>46.2%</td>
<td>-</td>
<td>-</td>
<td>3.8%</td>
</tr>
<tr>
<td>Computer-Based Tools</td>
<td>38.5%</td>
<td>38.5%</td>
<td>3.8%</td>
<td>15.4%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Journals</td>
<td>21.2%</td>
<td>57.7%</td>
<td>5.8%</td>
<td>13.5%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Alternative Assessments</td>
<td>23.1%</td>
<td>55.8%</td>
<td>-</td>
<td>19.2%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Portfolios</td>
<td>11.5%</td>
<td>53.8%</td>
<td>1.9%</td>
<td>30.8%</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

According to Gail Burrill, the President of the National Council of Teachers in Mathematics (April, 1997), many teachers think of reform based teaching as using manipulatives in the classroom and cooperative learning groups. In a recent speech at Louisiana State University, Burrill remarked that there are some misperceptions by teachers about the basis of reform. She stated that many teachers believe that the
basis of reform involves group activities and manipulatives. She stated that the most important techniques that mathematics teachers can use in the classroom are those that enable students to learn mathematics.

The next question deals with the barriers of implementing the reform-based strategies in the classroom. Table 4.5 reflects the barriers that most inhibited the use of the LaSIP strategies in the classroom. As indicated in Table 4.5, the top three choices that emerged were student discipline, emphasis of performance on standardized tests, and lack of planning time. Two of these three responses follow what the teachers in the case studies indicated. Student discipline and planning time also emerged as important to the implementation of the techniques in the classroom.

**Table 4.5. Frequency of Responses to the Barriers that Most Inhibit the Implementation of Reform-Based Strategies (from the most common to least common)**

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Discipline</td>
<td>24</td>
</tr>
<tr>
<td>Emphasis on Performance on Standardized Tests</td>
<td>21</td>
</tr>
<tr>
<td>Lack of Planning Time</td>
<td>19</td>
</tr>
<tr>
<td>Class Size</td>
<td>17</td>
</tr>
<tr>
<td>Student Abilities</td>
<td>14</td>
</tr>
<tr>
<td>Teacher Peer Pressure</td>
<td>12</td>
</tr>
<tr>
<td>Facilities</td>
<td>9</td>
</tr>
<tr>
<td>Lack of funds</td>
<td>9</td>
</tr>
<tr>
<td>Lack of administrative support</td>
<td>8</td>
</tr>
</tbody>
</table>
The influence of standardized tests did not emerge as an inhibitor for the teachers selected in the case studies. However, the teachers did note that this could be a problem for some. I suspect that this was not as important for the teachers who were selected for the case studies due to their high confidence level in their ability to teach students using the reform based teaching techniques and their confidence in their students' abilities.

**Student Outcomes**

The next group of questions focuses on how students respond to the changes in the mathematics classroom. (Table 4.6 displays the responses of the teachers.) As indicated in the table, close to half of the respondents answered that they strongly agree that students are more actively involved in learning and that students seem to enjoy math more.

**Table 4.6. Percentage of Responses Concerning Student Outcomes**

<table>
<thead>
<tr>
<th>Items</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Since I have implemented LaSIP techniques in the classroom,...&quot;</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td></td>
<td>No Response</td>
</tr>
<tr>
<td>Student understanding in mathematics seems to have increased.</td>
<td>32.7%</td>
</tr>
<tr>
<td></td>
<td>63.5%</td>
</tr>
<tr>
<td></td>
<td>1.9%</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.9%</td>
</tr>
<tr>
<td>Students are more actively involved in learning.</td>
<td>51.9%</td>
</tr>
<tr>
<td></td>
<td>46.2%</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.9%</td>
</tr>
<tr>
<td>Students look forward to taking more math.</td>
<td>40.4%</td>
</tr>
<tr>
<td></td>
<td>53.8%</td>
</tr>
<tr>
<td></td>
<td>3.8%</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.9%</td>
</tr>
<tr>
<td>Students seem to enjoy math more.</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>46.2%</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3.8%</td>
</tr>
</tbody>
</table>
A smaller percentage indicated that the new teaching strategies have made a difference in student understanding of mathematics. Close to 33% of the teachers responded that they strongly agreed that this type of teaching made a difference in student understanding of mathematics, while 63.5% marked that they agreed with the statement.

Training

The final part of the questionnaire measured the teachers’ choice to participate in the program and their reaction to the content of the training. Teachers were asked to select the three most important factors which affected their decision to participate in LaSIP. Frequency of the responses indicated that the four most common answers to this question were receipt of classroom materials, gain experience with hands-on activities, develop ways to enhance students’ interest in mathematics and learn new ways to motivate all students toward greater achievement in mathematics. Receipt of stipend and to update teaching practices incorporating new methods and course contents were the next most commonly selected items. Unlike some of the other items, the responses to this item did not follow what the teachers in the case study indicated as important to the reason why they participated in the training. The four teachers who were observed more in-depthly for the case studies indicated that the financial incentive was the real reason that they participated in the training. The teachers did indicate that the receipt of the classroom materials was a nice incentive,
Table 4.8. Percentage of Responses to Items Concerning Teachers’ Reaction to the Training

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learned new ways to motivate female, minority, or disabled students toward greater achievement in math.</td>
<td>17.3%</td>
<td>61.5%</td>
<td>7.7%</td>
<td>-</td>
<td>13.5%</td>
</tr>
<tr>
<td>I improved my ability to help students gain experience with hands-on activities.</td>
<td>65.4%</td>
<td>25%</td>
<td>-</td>
<td>-</td>
<td>9.6%</td>
</tr>
<tr>
<td>I learned a lot from working with other teachers.</td>
<td>50%</td>
<td>40.4%</td>
<td>-</td>
<td>-</td>
<td>9.6%</td>
</tr>
<tr>
<td>I disseminated LaSIP methods by giving presentations at professional meetings.</td>
<td>21.2%</td>
<td>21.2%</td>
<td>36.5%</td>
<td>1.9%</td>
<td>19.2%</td>
</tr>
<tr>
<td>I have remained in contact with other LaSIP participants to discuss teaching strategies or methods.</td>
<td>32.7%</td>
<td>48.1%</td>
<td>9.6%</td>
<td>-</td>
<td>9.6%</td>
</tr>
<tr>
<td>I have been unable to establish working partnerships with local math resources.</td>
<td>1.9%</td>
<td>7.7%</td>
<td>55.8%</td>
<td>23.1%</td>
<td>11.5%</td>
</tr>
<tr>
<td>I changed my ideas about what students must know and be able to do in the 21st century.</td>
<td>32.7%</td>
<td>46.2%</td>
<td>7.7%</td>
<td>-</td>
<td>13.5%</td>
</tr>
<tr>
<td>I would not recommend LaSIP to another teacher.</td>
<td>1.9%</td>
<td>13.5%</td>
<td>-</td>
<td>75%</td>
<td>9.6%</td>
</tr>
</tbody>
</table>
as well as learning more about the reform movement. I suspect that these teachers' responses differed from the other teachers who responded to this questionnaire because I had built a relationship with the teachers and they believed that they could be totally honest with me.

Teachers' responses to the content of the training were measured on a four point Likert scale (strongly agree, agree, disagree, strongly disagree). The results are presented in Table 4.8. Overall, the teachers felt very strongly about the training they received to teach hands-on activities and the importance of working and learning from other teachers. These were also points emphasized by the teachers in the interviews.

**Summary of Findings for Closed Ended Items**

In all, the teachers who responded to the survey were experienced in teaching and in teaching mathematics. The majority of the teachers had Bachelor's degrees and taught students at the elementary level. There were some teachers who taught at the junior high level. Overall, the teachers agreed that they had significantly changed the way they taught mathematics because of their training from LaSIP. They noted that they now use more manipulatives in their classes and cooperative learning groups. There was also a group of the teachers who indicated that they had utilized other techniques such as discovery-based learning, open-ended questions, and expanded teacher/student dialogue, as well as expanded student/student dialogue. The teachers indicated that many different techniques were important to student learning in reform-based instruction. However, they did strongly note that the use of manipulatives and cooperative learning groups were very important to this process.
Teachers also noted that some of the barriers to being able to implement the reform based techniques in the classroom were student discipline, emphasis on performance on standardized tests and lack of planning time. Even though teachers identified these barriers, responses to the other items on the questionnaire indicated that teachers were utilizing different techniques in the classroom. The teachers also indicated that the most useful part of the training was learning how to use the hands-on activities and working with other teachers. With respect to student outcomes, the teachers believed that students were more actively involved in learning and that students seemed to enjoy math more, but the teachers were not fully convinced that student understanding in mathematics had increased.

**Analysis of Open-Ended Items**

In this section, I will analyze five open-ended questions on the LaSIP survey. Overall, the majority of survey respondents answered the open-ended questions. Some of the surveys had more complete responses than others. The responses to the surveys are summarized below. Spradley’s method of domain analysis and taxonomic analysis was used to derive units of information that were coded. These responses were then transcribed and analyzed.

The first open-ended item was a follow-up to this question, "I have changed the way I teach mathematics because of my involvement in LaSIP." The open-ended question stated, "If yes, please describe the three most significant things that have changed. If not, please describe what made it difficult to change." Almost all of the teachers replied to this open-ended item. All of the teachers who did respond,
responded positively to this item. On the average, most teachers responded with more than just one answer. By far the most common response had to do with the use of manipulatives and hands-on activities in the classroom. One teacher commented, "Buying and using manipulatives in class to explain math skills and concepts has been the most significant change I have made." It appears that the teachers are using the manipulatives that they received through the training.

The next most common response to this question was the use of cooperative learning groups in the class. This evolved as an important change. Other common changes that were mentioned in the survey were the use of problem solving and the use of discovery based learning techniques. A smaller percentage of teachers responded that they used critical thinking skills in their classes and had started to relate their math lessons to real world situations.

The next open-ended question on the survey was a follow-up to the closed ended query, "My classroom assessment strategies have remained the same since my involvement in LaSIP." The open ended part of the question stated, "If you have changed any of your classroom assessment practices in mathematics because of your involvement with LaSIP, please describe." The majority of respondents also completed this query. However, the responses to this item were not as clear as those for the first question and the responses varied broadly. Teachers appear to be more certain about the changes that should be made to classroom assessments. In addition, the teachers appear to want to ensure that parents will understand any changes that are made.
The most common response to the above question was the use of teacher observation for assessments. A couple of teachers mentioned that they can see if a skill is mastered by watching children use manipulatives. The next change that emerged as very common was the teachers’ use of hands-on activities with assessments. It appears that the teachers are allowing the students to use manipulatives to work on problems during tests. The next most common assessment change mentioned by teachers was including items on tests that address higher level thinking skills. This includes more open-ended items. The next question addressed the training itself. "What was the most useful part of the LaSIP training?" The most common response to this question related to how teachers have most significantly changed the way they teach. Teachers responded that the most useful feature of the training was learning how to use the manipulatives and receiving the materials (the manipulatives) through participation in the training. One teacher commented that the way the training was done was very useful. "The leaders first introduced you to the manipulative; then you were given a chance to do it yourself; then we were given the manipulative and instructions on how to do it in our class." Several of the teachers mentioned the importance of having the chance to use the materials in order to learn about them first hand.

The next most common response to this question was having the opportunity to interact and share ideas with other teachers. As the site coordinator for this project indicated on one occasion, teachers are taught in the traditional way that they are supposed to be the expert and in this realm teachers are encouraged to talk with their
peers and share ideas for what works and what does not work in the classroom. Another common response to this question was having the opportunity to learn new instructional methods to teach math. As indicated in the qualitative section of this study, teachers are quite pleased with learning new strategies that make learning fun for the kids, which makes their job easier and more pleasurable.

The next question addressed some of the weaknesses of the training, "What was the least useful part of the training?" This question was the least answered out of all of the open-ended responses. Many who did answer the question stated that everything was useful in the training. There was a small percentage of teachers who did respond to this item. Overall, the teachers indicated that some of the activities they were taught in the training were too advanced for their grade level. One teacher commented in her survey that the lessons were taught at older grade levels and teachers at the lower grade levels were told to adapt the lessons to their age group. This apparently appeared to be a problem for mainly the early elementary education teachers, primarily kindergarten and first grade. Some teachers commented that the assessment part of the training needed to be stronger. A couple of teachers believed that the assessments must be designed so that parents understand what is happening in the classroom as well. Two other teachers commented that they did not find the outside readings useful. However, this was only two out of the 52 teachers who responded to the questionnaire.

The final open ended question that was analyzed was broad. "List any suggestions you may have to make LaSIP projects in rural communities more
successful." The responses to this item were quite varied. Some of the items mentioned most often and that were the most useful are listed in Table 4.6. As indicated in Table 4.6, teachers commented that it is important that they are taught activities for students at their grade level. In addition, there were several teachers who noted that all mathematics teachers should be required to participate in LaSIP training. Another response that came up a couple of times was that teachers needed a way to store the materials and organize all the different papers and information that they received.

Table 4.6. Common Suggestions Recommended to Improve LaSIP Projects in Rural Communities

<table>
<thead>
<tr>
<th>Question</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>List any suggestions you may have to make LaSIP projects in rural communities more successful.</td>
<td>1. Break teachers into different grade levels when teaching hands-on activities or use of the manipulatives.</td>
</tr>
<tr>
<td></td>
<td>2. Make it mandatory for all math teachers to participate in the LaSIP project.</td>
</tr>
<tr>
<td></td>
<td>3. Find ways for teacher to organize and store the materials once they have obtained them.</td>
</tr>
<tr>
<td></td>
<td>4. Have training for parents or some type of parental involvement.</td>
</tr>
<tr>
<td></td>
<td>5. More planning time is needed to implement the techniques.</td>
</tr>
<tr>
<td></td>
<td>6. Get the local school system to commit to assessment changes.</td>
</tr>
</tbody>
</table>
Summary of Findings for Open-Ended Responses

The analysis of the data in this section revealed that teachers feel very strongly that they have learned a lot about using hands-on activities in the classroom and that using hands-on activities is the most significant change that they have made in their classrooms. The teachers also mention other ways that they have changed their mathematics teaching strategies as well. They note that they use cooperative learning groups more since they have been involved in LaSIP and problem solving techniques with their students. The responses to the questions on assessment and some of the responses that suggest that one of the least useful parts of the training was assessment reflect that teachers apparently do not feel as comfortable with assessment activities. There are some teachers who have started to grade students based on their observation. Some other teachers have started to allow students to use manipulatives along with their test and have started to incorporate more higher level thinking questions in to their tests as a result of participation in LaSIP.

The teachers responded that the most useful part of the training was learning the hands-on activities. The least useful part of the training according to a smaller group of respondents was learning activities that were not at their grade level. The majority of the respondents either did not answer this question or indicated that everything about the training was useful. This may have occurred because they feared answering the question. Many of the teachers made suggestions to improve the program. The responses, however, were quite broad and scattered. There were some areas of commonality that emerged. Some of the teachers recommended that
instruction should be divided by age group so that the activities taught are age appropriate to all of the participants. Some other respondents suggested that all math teachers in the parish should be required to attend the LaSIP workshops and there were some others that believed that if the project was teaching about new assessment activities, they should make sure that the local school system has committed to and approved these changes.

At School:
Four Stories of LaSIP Teachers

Introduction

In this section each of the teachers who were selected for the case studies were described in detail and the impact of LaSIP on classroom practices was analyzed. All names of the teachers, the parishes and the schools were changed in order to maintain anonymity promised to participants in the study. Denise and Selena, two of the teachers who participated in the study, teach in the same parish. However, they teach at different schools. Denise teaches fifth grade and Selena teaches first grade. The other two teachers, Angela and Nona, teach at the same school. Angela teaches fifth grade and Nona teaches eighth. All of the teachers were white women. Angela, Denise and Selena were in their early to mid-thirties. Nona was in her early forties. For each teacher in this section, I will describe the setting, the school, the classroom, the teacher and the students. I will first describe Selena and Denise's stories and then I will discuss Angela and Nona.
There are times during this analysis that I mention the behavior or the attitudes of African American students specifically. This was done to recognize how the program affected students who were not considered white. I have not acknowledged Asian Americans or Latinos because there were no Asian Americans in the classes I observed and there were also no openly recognizable Latino students in the classes.

Denise

Setting

Denise teaches fifth grade at Victory Upper Elementary in Victory, Louisiana. Victory, Louisiana is separated from the city of Nobel, Mississippi by the Mississippi River. There are many students that attend Victory schools and live in Nobel. The site coordinator of the project told me that this happens because some people want their kids to attend a school in a smaller community where there are fewer problems. Apparently, Nobel has some of the similar problems that other city schools have. Students encounter drugs, weapons and more fights at the public schools in Nobel, whereas in Victory, these problems are minimal.

Residents in Victory, Louisiana are involved in many types of employment including plants, factories and service positions. Residents are offered many services in this community. The town has different options for eateries and entertainment as well. There are several fast food restaurants, a couple of nickel and dime stores, many gas stations, and other small businesses. Residents who want to go to larger shopping areas can cross the Mississippi River and shop in Nobel. Nobel has a small
shopping mall, a Super Wal-Mart, various hotels/motels and other eating and entertainment facilities.

With respect to colleges and universities, the closest school that is located to the town is Amazon State University's main facility for their nursing school located in Mississippi. The closest major universities are located in places like Baton Rouge, Monroe, and Alexandria, Louisiana. The distance causes a problem for teachers and administrators who want to participate in additional training or seek further credentials. These areas all entail a drive of one and one-half to two hours which can be quite a long time after a full day of work. The principal at Victory Upper noted that even if the teachers were able to go to Nobel to take classes, they would not get reimbursed for the classes since this is another state.

The School

The school is located along the Mississippi River. It includes only the fourth and fifth grades and in academic year 1995-96, there were approximately 300 students in the school. In addition, in this same year there were about 19 faculty members at the school. This includes: the teachers, the principal, the librarian and the counselor. A large number of teachers have their Master's degree or higher. The majority of classes average between 21-26 students per class. Student and teacher diversity is much more apparent at this school than at the other school in Hamilton, Louisiana. There are several African American teachers at the school and it appeared that there were African American students in all of the classes. There were no Asian American students at the school.
The physical condition of the school and the school grounds are very adequate and the school environment is pleasant. There are some classrooms where teachers choose to have tables in the class and there are others that have desks. Some of the teachers who have tables in their classes have not been trained through LaSIP. However, the site coordinator and other teachers who have participated in LaSIP state that many teachers have been influenced by the strategies and techniques that LaSIP teachers use in their classes.

The Classroom

Denise had limited space. If any more students or items were added to the class, it would have been cramped. The classroom had many colorful bulletin board displays and was a very stimulating environment. Students sat at long tables and had large containers on top of their tables filled with supplies. There were three computers along one of the long walls in the class. The noise level in this class was high just like in the other LaSIP classes. However, this was to be expected since the teacher used a lot of open dialogue with the students, used hands-on activities, and asked them open-ended questions.

The Teacher

Denise has taught for nine years. She taught fourth grade for six years and fifth grade for three years. She stated that what got her involved in teaching was that "I love children and I love the relationship between teachers and children and I was in another field, and I decided, I thought I would like to teach . . . I like kids and I like to motivate them." She stated that what she likes most about teaching is the children. "I
love being able to teach them something new that they haven’t seen before. I love their motivation, their innocence; they just want to please you and they always want to do something for you.” Denise remarked that what she likes least about teaching is "the paperwork and all the forms, this form and that form and the testing . . . that is required."

**The Students**

Denise has a lot of confidence in her students and has high expectations for their success. She believes that her students are quite competent in mathematics and, in particular, the students this year were quite bright. She noted that the majority of the students had parents who were employed in professional positions which was different from her usual classes. This teacher noted that she could see a difference in the level of the students’ abilities in the class versus those in some of her past classes.

Denise has a special connection with her students and is quite skilled in keeping her students disciplined. She uses the method of giving students tickets as a reward for good behavior and takes them away if they play too much or if they are too disruptive. Generally, the students were quite well behaved when I visited the class, although they had their moments of misbehavior. They listened to her directions and guidance.

Denise had about 22 students in her class. The students were from different racial backgrounds and were comprised mostly of boys. There were six African American students in the class, four boys and two girls. Denise had her nephew in the class as well.
The students in Denise’s class appeared to enjoy using the manipulatives and looked quite comfortable with them. The students would do the math activities that they were directed to do. On occasion, when the students would finish the assignments, they might play with the blocks or the tangrams. However, they generally did what they were assigned to do. The teacher shared with me, in previous conversations, that she let the students have play time with the materials in order for them to get any play out of their system. She also stated that the students enjoyed using the various manipulatives a lot. They even asked to play with the manipulatives during rainy day recess periods. In many cases, the students would use them to play the math games they had learned in class.

Selena

The Setting

Selena teaches in the same parish where Denise teaches so the discussion on setting will follow the section on Denise’s description.

The School

Selena teaches first grade at Victory Lower Elementary which includes grades K through 3. There were about 635 students at this school in the 1996-97 academic year and the principal commented that the school enrollment had increased up to 651 in previous years. The school is in good physical condition and a large number of its teachers have participated in the LaSIP program. The principal states that the number of students on free and reduced lunch is about 64%.
The Classroom

Selena had a large classroom. There were eight tables where the students sat, a carpeted area where the teacher read to the students and another table used for special assignments. The teacher had many posters and students’ artwork affixed to the walls. Along one side of the wall, there was storage area for students to keep their supplies and on the other side, there was a dry erase board with bulletin boards on the side.

The Teacher

Selena has been teaching about 10 years. Selena states that she got involved in teaching because, "My mother is a teacher and I had an English teacher in high school that really influenced me to think about the teaching profession because I was a leader in high school and he just could see and thought that was a good career for me." Selena believes that she is definitely in the right career field. She stated that her dad was retired. "My dad is retired from South Central Bell. He retired about 10 years ago, about the time I started teaching."

Selena states that what she likes best about teaching is "working with kids. I have always felt like I was capable of communicating with them; I enjoy children and just my love for the kids. It’s definitely (laughing) not the pay." Selena jokes about the pay being one of the things that she likes least about teaching. She goes on to state, "No, least of all is probably the amount of paper work and things that we have to do that keep us from working directly with the kids; that takes time out of my day that I could spend with individual students."
Selena expressed that she enjoys teaching math and began her career in education teaching 5th grade math at Victory Upper Elementary. She was transferred to the junior high school to teach sixth grade for one year. Later, she was transferred to Victory Lower Elementary and has been teaching first grade since her arrival. Selena holds a Bachelor's degree in elementary education. Though she expresses a desire to return to school, she has chosen to delay that return. Her son suffers from a severe disability which requires much of her time and attention. This circumstance leaves little opportunity for her to pursue additional academic endeavors.

The Students

In the 1996-97 class, Selena had about 25 students. There were seven African American students in the class, four girls and three boys. Overall, the class was approximately 50% girls and 50% boys.

Selena is quite a creative teacher and has a great love and concern for her students. The caring that she exudes for her students goes beyond what happens in the classroom. There was one student who she allowed to stay in her class who was supposed to go to a special education class, but she decided that she would take the extra time to have her in the class. Selena commented that she knew that the student would get a lot more out of being in her class than in a special education class. Selena has a lot of love and concern for her students and takes time with each student. This may be partially due to having a son who has a disability and demands a lot of her time.
Angela

The Setting

Hamilton, Louisiana is the location of Angela's fifth grade class. Hamilton is a very small community in Louisiana located in Calais Parish. According to the principal, Hamilton has about 450 residents. The majority of the citizens are farmers or they work at plants or in other industries outside of town. There are two eateries in the town: one is inside the Exxon gas station and the other is called the Confederate Kitchen and it is open only on the weekends. In this town, many residents are comfortable with leaving their cars and even their homes unlocked. I was even told that I could leave my purse on the car seat without the car locked.

The School

At Hamilton Elementary, there were about 280 students at the school in academic year 1996-97. The diversity of the students at this school was minimal. The majority of teachers and students at the school were white. Recently, the school went through a million dollar renovation project. The local community voted for a tax millage that provided funds to update the school. This million dollar project resulted in a very contemporary school with school grounds that were maintained at a very high level. It is unfortunate that all students are not able to go to school with facilities like these. The school itself was kept very clean by an elderly African-American woman named Ms. Mae. Her duties were to clean the teachers' lounges, the bathrooms, the windows, the floors in the hallways, etc. Ms. Mae's duties were more like a maid than a janitor or a repair person. The floors in the main corridors of
the building are made of hardwood and the walls are painted a pleasant shade of blue at the top half of the wall and dark red on the lower portion of the wall. The outside of the building has off-white bricks. The grass was edged and cut neatly and there was a long line of azalea bushes planted along the front of the building. There is no trash around the school at all. The school has three different buildings. The main building is where the K-8 classes are held. There are two different wings in this building, one side is K-5 and the other is 6-8. The other two buildings are where the cafeteria and gym are located.

Hamilton Elementary is different from schools that are located in big cities. It is not atypical to see a student leave her or his dog outside the school building until the end of the day so that the student and the dog can walk home together. In addition, it is not uncommon for teachers to have their own kids or other relatives in their classrooms. It is also not unusual to see students who have dropped out of school to work on the family farm come back to school to try to catch up or to try to graduate.

From the moment I walked into the school, I noticed the silence in the halls. The school was quiet like a library except for the sounds of shuffling feet, the laughter found during recess, and the changing of classes. According to the site coordinator, this serenity was attributed to the principal. She told me that he was a very strict disciplinarian. Nona, one of the teachers I interviewed for this study, pointed out that the design of the school attributed to some of the silence. The school building was constructed with wood floors in the hallways and carpet in the classroom which
helped to absorb some of the noise. As I spent more time at the school, I observed that the construction of the building did have something to do with the low noise level. However, it was the strict discipline of the principal that really kept the school quiet. Every morning when the bell rang the principal stood in the main corridor with paper gripped tightly in his hand. He normally had a very stern look on his face and watched the students as they walked to class. He would loudly tell students with his gruff voice, "Good morning" or "Hello." Two times while I was at the school, I saw him walking down the hall with a paddle in his hand. The site coordinator did tell me that students were paddled if they misbehaved.

The principal had been at the school for two years and describes himself as a very fair person. He participated in the LaSIP program the first year it was offered. The principal asserts that the school is close to Title 1 status; however, there were many families who did not claim free and reduced lunch status because of their "pride." The principal explained that the parents did not believe in participating in these types of programs.

The Classroom

Angela's classroom is long and narrow with about six rows of desks. Books were lined along the dry erase board which was the main focal point in the classroom. The desks were cramped and a computer and overhead projector were squeezed in a tight space in the back of the class between two rows of desks. Bookshelves and cabinets were along the two other sides of the room. There were a few posters attached to the wall; however, these posters and drawings were all temporary since
the principal forbids teachers to post or pin anything on their walls. The principal made this decision to keep the walls of the classrooms from being destroyed. As a result, the walls were almost bare.

Even though the noise level in the school was quite low overall, the noise level within this class was a bit higher than in other classes. This occurred because students were either busy working in small groups or because of the teaching methods that were used in the class.

The Teacher

Angela has been teaching for about 14 years and says that she loves it. Angela noted in her interview that part of the reason she chose teaching as a career was because, "It was this or an architect. And I wanted to come back to my hometown and there were limited job opportunities for women so I chose this." In addition, Angela commented that she chose teaching because, "If you have children, . . . you've got more time to spend with them than if you were in nursing or something."

Angela's parents were not in the teaching profession. Angela's mom did some part time work at a bank and was primarily a homemaker. Angela asserted that her father has been self-employed as a farmer since she was young and started with the Wildlife and Fisheries Office as an enforcement agent when she was nine or ten.

Angela states that what she likes best about teaching is "when you start something and they [her students] don't know anything about [that] something, and you can tell when they're learning, and they're getting excited about learning, and when they finally understand . . . or when they make connections between things,
that's neat." Angela notes that certain restrictions and paperwork are what she likes least. She commented that the paperwork requirements were just a hassle, "It's not very practical sometimes, but it looks good on paper, but it doesn't work out in actuality." Angela referred to a teacher assessment program called STAR that required a lot of paperwork and the program, she asserted, was very useless to teachers.

According to one of the site coordinators of the project, Angela was one of the teacher participants who questioned many aspects of the program from the beginning. Angela stated that one of the main reasons she got involved with the LaSIP in-service training program was for the financial incentive plus the $300 resource materials bonus.

The Students

Angela has 30 students in her fifth grade class. This teacher tells me that she has several students on Ritalin for their hyperactivity. She notes that she has some students who are classified as 504. The teacher explains that these students have been identified as having some learning problems, but they are best suited for a regular class. She states that the size of her class and the mixture of ability levels is a challenge, especially when trying to bring reform to the classroom. She expresses that it is very demanding to grade test papers for such a large number of students, especially when the tests allow students to give many different answers. Additionally, when working with large numbers of students, it is challenging to give students individualized attention and use techniques such as cooperative groups.
effectively. Also, Angela talks about the challenges of disciplining the students, although she realizes that her challenges with discipline are not comparable to what is happening in urban settings. She states, "I don’t have a lot of discipline trouble, but I don’t like it." The teacher comments that discipline is not a major problem in her class, but she notes that she does not like dealing with discipline issues.

The students were very cordial to me when I visited Angela’s fifth grade class. The teacher remarked that the students were used to people visiting the class and had many questions to ask me. One boy asked, "Are you Hawaiian?" I politely and sarcastically said, "No, are you?" Not realizing that this may have been the student’s first time seeing someone with my complexion and features, I was a bit apologetic. Once the kids figured out my race, they teased the only African American boy in the class about liking me.

Nona

The Setting and The School

Nona and Angela teach at the same school so the setting description, as well as the description of the school will follow what was written in Angela’s section.

The Classroom

Nona had ample space in her classroom. The students were seated at six large round tables. There were about five students sitting at each table and the tables had a mixture of girls and boys. There was a wall of closets on one end of the room and a dry erase marker board along one of the long walls. The shape of the room was similar to a rectangle. Nona does not have a regular teacher’s desk. Her desk was
oval with no drawers and she had a large, cushioned chair with a high seat back.

Behind her desk was the computer station. The computer was connected to the Internet and the students used the computer from time to time for various math activities. There were few posters on the walls. There was one bulletin board on the wall where the teacher had student seating assignments and various reminder notes posted. The room actually looked somewhat bare because of the rule. However, it was very neat.

**The Teacher**

Nona teaches sixth, seventh and eighth grade mathematics at Hamilton Elementary. She stated that she was not originally in teaching. She started out in banking. "I just didn’t want to do that for the rest of my life; it wasn’t much future in it. I thought about all my options and I had small children; so, I decided I would go into teaching because it would be great hours for my children." Nona has now been teaching for 14 years.

Nona's parents were not teachers. Nona stated, "My father farmed and my mother, she just stayed at home .... Well, she worked in a dress shop for several years while we were in high school."

Nona discussed things she likes about teaching and things that she does not like. She stated that what she likes best about teaching is "get[ting] along well with the kids, and I enjoy trying to motivate them, and the interaction with the student."
On the other hand, what she likes least is

...all the changes and the paperwork and the different assessments. One year we had this mound of paperwork to do and nothing ever comes of it. And the next year they change it completely and we have another mound of paperwork to do and nothing ever changes it....I don’t like the political aspects, doing the changes....Anything they come up with . . . teachers have to comply with it . . . We have to change, and I guess what I don’t like about it is , by the time you do so much planning, by the time you take up so much of your time doing, planning a different way, documenting everything a different way, your assessment is completely different. By the time you change all that, where’s time to teach? We’ve forgotten that we only have 50 minutes to teach these children.

Nona is confident about her mathematics skills and recognizes that she knows her math. She is certified to teach math from the first grade through the twelfth grade level. Nona also teaches physical education, an enrichment course for the eighth grade, and is the girls’ junior high basketball coach. She also compiles the yearbook and is quite active in shaping the district’s new curriculum guide for mathematics.

Nona was quite positive about the LaSIP initiative from the beginning. She believed that reform was needed in the mathematics classroom. Nona stated that she got involved in the LaSIP program for several reasons. She was interested in learning more about what the program had to offer teachers in mathematics. She also thought the money was a good deal. Teachers received $1,500 for their participation in the summer class and four academic workshops. Additionally, they received $300 for materials for their classrooms. Finally, Nona got involved in the program because she wanted to see how teachers could use calculators in the classroom.

*
The Students

There were 19 students in the eighth grade class Nona taught. The students were very disruptive, at times, and had many of their own conversations during class. Nona stated that this class was one of her more independent classes and this was typical behavior for the class. In a conversation with the principal and Nona, the principal, Mr. Cater, noted that there were some students in this class whose parents already let them drive the family car and the tractor on the family farm.

The students called their teacher Ms. Nona and addressed me as Ms. Tanya. The students were very polite to me, even though they did not listen very well. If the teacher or I asked them a question, they always responded, "Yes, ma'am" or "No, ma'am." After the students were reprimanded by the principal at the beginning of the week for their disruptive behavior, they became even more polite. They began to meet me at my car in the morning, take my bags, open doors for me, and get me coffee or water.

There were no African American students in this class. Nona commented that the number of African American students in her class varied from year to year. Some years, she has had one or two African American students in her class. In total, there were 13 boys and six girls in the eighth grade class.

Analysis of Classroom Observations

Classroom observations were analyzed by reading through the fieldnotes, "chunking" important ideas, and finding common themes. There were three common themes that evolved from the data analysis. These were student interactions,
pedagogical techniques and teacher interactions. In this section, I define each theme. I then discuss each theme and how it related to each teacher and her class.

Student interactions is the students’ response to the classroom environment and the instruction. Student interactions are analyzed at several different levels. This includes the amount of interactions, participation, type of interactions, the affective involvement of the student and student conduct. The amount of interactions is a measure of how much student interaction occurred in the classroom: high, moderate, or low. Participation is the number of students that took part in the activities and lessons in the class: none, one, some, majority, or all. The type of interaction includes whether the student was engaged in student-student or student-teacher communication or whether the student was involved with instructional materials. Affective involvement consisted of the emotional involvement of the student with the instruction (interested, patient, excited, impatient, unsure, bored) and and student conduct was a description on how the students acted during class. This ranged from cooperative to disruptive.

Pedagogical techniques was the second theme that evolved from the data. This includes the different types of teaching methods used in the classroom. These could be drills, cooperative learning groups, calculators, manipulatives, discovery-based or inquiry-based learning, open-ended questions, pencil and paper activities, textbooks, etc. The amount of use is also examined and includes how often the teacher used each technique daily: none, one to two times, three to four times, five to
six times or more than six times. Noise level in the classroom was also important. This ranged from high, moderate to low.

Teacher interactions is the process of how the teacher relates to the student in the classroom. This includes the amount of interaction, the type of interaction, and the affective involvement of the teacher with the students and the instruction. The amount of interaction is defined by high, moderate and low exchange with the students. The type of interaction entails whether the teacher is involved in instruction, discipline or facilitation. The affective involvement includes the emotional involvement of the teacher with the students and with the instruction (confident, patient, enthusiastic, impatient, unsure, energetic).

In the Classroom with Denise

Student Interactions

Amount of interaction

Interaction between the students and the teacher were high. Denise asked the students many questions which gave them the opportunity to interact with the teacher. Student-student interaction was also high. Many group activities required the students to interact with each other. When the students worked in groups, they asked the teacher lots of questions. Most of the interaction between students was purposeful and not playful. Interactions between students and the instructional materials were moderate. There were some students who worked more individually to figure out certain group tasks. However, this did not occur when the students were playing a game together.
Participation

The majority of the students participated in most of the hands-on group activities. When Denise asked the students different open-ended questions, many students raised their hands. In the cooperative learning groups, the majority of the students in the groups were participating. Also, the majority of the African American students in this class appeared to be involved and active in group activities and teacher-led activities.

Type of interaction

There was student-student interaction, student-teacher interaction and student interaction with the instructional materials. Student-student interaction involved students discussing an assignment, talking with another about matters not pertaining to class, playing with the manipulatives and teasing one another. Student-teacher interaction involved both the students talking to the teacher and the teacher talking to the student. Denise would ask students questions, affirm students' work, answer students' questions, or ask the teacher if they could help. Sometimes the students were more focused on the classroom assignments than the other students or the teacher. This might include concentration on the manipulatives or focus on a worksheet or other activity.

Affective involvement

In all, the different hands-on activities that the teacher assigned, seemed to keep the majority of the students interested and engaged. Students were also quite cooperative and orderly when it came time to participate in assignments. There were
times when they were very excited to go to the board, or write their answer on the overhead projector. The teacher would ask for one volunteer and all the hands in the class would go up. Normally the teacher would have to let several students go up to the board or the overhead to explain their answer.

The majority of the time the students did well with following the instructor's directions. There were times when the teacher would ask the students a question and some students would become impatient and blurt out the response instead of getting permission to speak. There were others who were more patient and would hold up their hand until they were called on.

**Student conduct**

There were different days when the students were more orderly than others. On the first day I visited the class, the students were quite cooperative and quiet. By the middle of the week, the students were quite fidgety and talkative. The following day, however, they were more settled and cooperative again.

**Pedagogical Techniques**

The number of different activities and different teaching strategies that were used during the class was amazing. Every day the teacher employed several techniques with manipulatives and she also employed open-ended questions, problem solving techniques, and related information to real world situations. There was no lecturing in this class and the teacher stated that students only used their textbook for homework or for punishment assignments. Homework, however, was very rarely given.
Every morning the first activity that started the class was the ‘conundrum.’ This was a mathematical word problem that involved a lot of thinking. This would be written on the board. Students would write the answer to the activity in their journal and then they would be given the opportunity to share their answer with the class. The journal was another method that was used daily. The teacher would give the students different assignments to complete in their journal. For example, students were given an assignment to describe one-half to a Martian. Another assignment was to describe the fraction, four-ninths in words or pictures.

Many activities students did involved group work. Group work was easy to do since the students were already sitting at tables and they were with their groups. Group activities involved worksheet activities or different games where students would pair off with a partner.

The teacher also did a great job of linking material that the students were currently learning to concepts the students had learned in the past. In addition, she would begin the class by restating what had been done the day before and would end the class with an informative summary. At the beginning of the class the teacher would state, "Is there something that you know today that you didn’t know yesterday?" She would have the students talk about the concepts that they were learning and have them explain what they thought about them.

The teacher was very skilled in using manipulatives in the class. When I observed the class, the teacher did at least 4 or 5 hands-on activities with the manipulatives per day. One game that the students played was called Action
Fractions. The kids would have a game piece that was in the shape of three hexagons. The students would play in pairs; each person would take a turn drawing a card. The students would play with pattern blocks and each block would be equivalent to a certain fraction. For example, the red piece would be equal to one-half, a blue piece would be equal to one-third and a yellow piece would be equal to one whole. The fraction on the card would determine what piece the student could place on his or her game board. The person that filled his or her game would win. This game was teaching students how to add fractions.

Another game that the students played that was a bit more challenging was called Fraction Exchange. In this game, students had a game board which was called the fraction bar. The bar was filled with smaller fractional parts that were made out of construction paper. In this game, the students would roll a die that had different fractions on it. If the student rolled the die and got 1/16 then they would have to figure out what pieces they would need to put on the bar so that they could take the fractional piece 1/16 off the bar. This game was a bit complex and is easier to understand when you actually see it.

Another activity was with a group of manipulatives called multi-links. Multi-links are square blocks that attach to one another and come in many different colors. In this activity, students worked in pairs and grabbed a handful of the yellow and red pieces. At that point, they would have to come up with the fractional number for each color and then reduce the fraction.
Noise level

The noise level was important because due to the open communication in the class and the group work that was done, there was the opportunity for the classroom to get loud. The noise in this class varied from low to high. The teacher was comfortable with noise in the classroom. However, when the noise level got too loud or if the students began to play, she would start to discipline the students.

Teacher Interactions

Amount of interaction

This teacher was very highly interactive with her students during the class. She answered questions; she encouraged; she listened; and she joked.

Type of interaction

Denise was involved in primarily facilitation. She moved around the classroom very often and observed what the students were doing in their assignments. If she saw someone doing a good job, she would tell them that they were doing a good job. If she saw a student or a group struggling, she would ask them questions about what they were doing. There was no lecturing taking place in this class. The teacher would often pose questions and sometimes situations to students and have the students respond.

The teacher handled student conduct matters well. The students would listen to her when she would say "Freeze!" which meant stop where you are and put everything down. She also had other techniques that appeared to be very helpful. She gave students tickets that were good for certain prizes, if they listened and
cooperated. If students were noisy and uncooperative, she would take their tickets away. The teacher was surprised how well this technique worked with the students. The teacher stated, "they really want those prizes." Students could use tickets for a movie day, a 100 on a class assignment, or a free homework assignment. When the students would get disruptive, she would have everyone put their hands in their laps to ensure that they were not playing with the manipulatives or disturbing others.

In her teaching strategies she used methods to encourage the students. If the students were responding to a conundrum (a mathematical word problem) on the board, she would count the number of times it would take the students to respond. She would state, "Let's get the answer correct to this problem in less than seven responses."

She would also encourage them when they played tough games that they were not familiar with. She would tell them, "It does get easier the more you play the game."

She was also very conscious of telling the student they were doing well. She stated, "You see, you know a lot!" or "Great job!"

**Affective Involvement**

Denise was very confident about her students' abilities. She stated, "Ya'll are doing wonderful work." This teacher told me that she had even greater confidence in the students this year since this group was quite sharp. The teacher also had a very high energy level and put in extra for the students. She was also very patient with the students and emphasized that there were no right answers. She stressed that everyone
had a correct answer. Many students were allowed to respond to questions and the teacher would patiently listen and let them explain their answer fully.

In the Classroom with Selena

Student Interactions

Amount of interaction

Interactions between the student and the teacher were high. Student-student interaction was moderately high. The students were more engaged with learning and listening to the teacher. The interaction between student and instructional materials was also moderately high. The students were intent on figuring out how to do things or the answer to certain problems.

Participation

All students participated in most of the activities. In most instances, the teacher would go around the class and give each student a turn to respond. The manipulative activities were a great way to get a larger number of students thinking and participating at one time. When the students worked in groups, the majority of the students in the group would participate. At times, there would be one or two students not paying attention.

Type of interaction

There were interactions between student-teacher, student-student, and student-instructional materials. The interaction between the student and the teacher consisted of the student listening to the teacher give instructions for activities; asking the teacher whether they could participate or giving an answer. Other interaction included
comments that students made between each other. Students would whisper stories to one another, share answers with other students, or explain how to work problems to others. There was some interaction with the instructional materials as well. Some used the materials to learn and some students played with them. In one instance, students were making a house to learn about shapes and three dimensional figures. Some of the boys wanted to focus on a garage so that they could park their car in it; while some of the girls focused on a kitchen and what they were going to cook.

Affective involvement

The students' enthusiasm for learning kept them involved in the classwork. Some students showed this excitement by standing and continuously asking the teacher to call on them. The majority of the students appeared to be engaged in the activities. One time, the teacher told the students a story and there was total silence. The students were sitting patiently and listening intently. The teacher shared with the students that they would be building Mr. Snuffles a home. The students were thrilled about the idea of building Mr. Snuffles a home. On other occasions, the activities created some disruption; however, the students were involved and active and appeared to be having fun.

Student Conduct

Overall, the students were well behaved and very cooperative. When they came into class after recess, they were quiet and attentive. Sometimes during different activities, the teacher would have to remind them to listen to others and not to talk when it was not their turn. There were mainly one or two students who were
disruptive, but the teacher would talk to them and remind them about what they were supposed to be doing.

**Pedagogical Techniques**

The teacher played games with the students and used manipulatives one to two times daily to help them figure out different mathematical concepts. In one game, the teacher had different shapes posted on the board (square, triangle, circle and rectangle). The students had to name the shape and different characteristics about the shape. In the next activity, the teacher gave each student a shape that varied in size. Each student took a turn to post their shape on the board and explain the characteristics of their shape. In addition, the teacher used a manipulative called a geoboard to illustrate the differences between shapes. The students took the board and rubberbands to make different shapes themselves.

Other activities were also used to illustrate the differences in shapes. In one activity, the teacher used a cup and had various shapes inside the cup. The student had to put her or his hand inside and feel a shape and describe it to the class. When the student had used the same descriptor for a shape three times, she or he had to come up with another way to describe the shape. One student said, "It is round, like a blow-pop." Another student said, "It is like a Christmas tree." Another said, "Both sides are long." This activity made the students think because they had to explain to the other students what the shapes looked like.

The teacher also used real world examples one to two times daily in the class. She brought different items from home and asked the students to name the shape of
these items. For example, a kite was used to represent a triangle; a shoebox was used to represent a rectangle; a cooking pan was used to represent a square; a top of a canned good was used to represent a circle. The teacher also used real world examples to link the flat shapes to three-dimensional shapes. To illustrate a circle as a ball the teacher used an orange and to illustrate a cylinder, the teacher used a cranberry sauce can. The teacher did realize that some of the students would get the connection and others would not.

The teacher summarized the events from the previous day's class at the beginning of each class. She also regularly linked what students were learning to other mathematical concepts that they had learned previously.

Students worked together in group activities at least once per class. The teacher began group activities by reminding the students of the rules for group work. She stated, "Is there one person that does everything?" The students responded simultaneously, "No." She continued, "Is there one person with all the right answers?" The students again responded, "No." She stated, "Do we ask another person who is not participating what is wrong?" The students answered, "Yes." The teacher let the students work together independently, but made sure that they understood what they were supposed to be doing. In one activity, every group was given a piece of yarn. Pupils were told to form a circle with the yarn. The students were then instructed to form other shapes as well.

In another activity the teacher told the students a story about Mr. Snuffles, a hedgehog. This story was the introduction to an activity that the students would do
later in the week. The pupils would work together to build Mr. Snuffles a home. This activity required that the students bring different shaped items from home: a shoe box, a regular shaped box, a paper towel holder, etc. The students first drew a house for Mr. Snuffles on flat paper and by the end of the week, they built him a home.

**Noise level**

The noise in this class was high at times and moderate at others. Students wanted to talk at the same time as others.

**Teacher Interactions**

**Amount**

The amount of interaction was moderately high. The teacher asked the students lots of questions and led the instruction.

**Type of interactions**

The main type of interaction between Selena and the students was facilitation of learning through the use of manipulatives. She also modeled activities and told them a story. She did have to remind the students to be quiet from time to time because they all wanted to answer questions at the same time. There was some disciplining that took place, but this was minimal. The teacher would signal the students to listen by saying, "Freeze!" Students would stop doing whatever they were doing and wait for their teacher to speak.
Affective involvement

Selena was very enthusiastic about her instruction. Her lessons were quite thoughtful. In several informal conversations, it appeared that she thought well of her students and cared for all of them. She pointed out two students who were supposed to be in special education courses. Selena asked the principal if she could keep them in her class because she knew they would not have the same learning opportunities in the special education courses and she believed that she could manage it. Selena commented that both students made tremendous progress this year. Although one of the little girls did cause some disruption, the teacher said the students began to learn how to work with her and, eventually, started to help her out. I am sure that she helped them out as well.

Selena encouraged each student to give a response and reminded the class that there were no wrong answers. It appeared that it was important that all students learn in their own way. The teacher made sure to give all students a chance to respond to activities. In addition, she made sure that all the students understood directions. This teacher was also energetic and her lessons were taught confidently.

In the Classroom with Angela

Student Interactions

Amount

Students were highly interactive with the other students in their group work. The teacher remarked that when students did not participate actively in the learning groups, this normally showed on their tests. The thinking activities normally resulted
in moderate interaction and more thought among the students. The math games that the students played as a class also created a lot of intense interest among the students. However, only one student could speak at a time.

**Participation**

The group work resulted in the greatest amount of participation at one time. Students could talk among the other students in their group. The majority of the students were also highly involved when they played math games as well. Only one person could speak at a time, but the students were listening and trying to figure out the answer themselves. Several thinking activities that the teacher gave the students resulted in some of the students responding and participating. However, this occurred because these were more individualized student situations.

The three African American students in this class were not as involved in the learning activities as the other students in the class. When the African American students were involved with activities with the whole class, two of them did raise their hand from time to time. In cooperative group situations, one of the other African American girls did participate in her group. I did notice, however, that she would step back and not hold to her answers. One African American girl and the African American boy did not really pay attention in their groups. I thought it was rather apparent that they were not getting a lot from this learning situation. Later, I found out that these same two students failed mathematics this year.
Type of interaction

As mentioned previously, there was a lot of student-student interaction. However, this was expected. The teaching strategies used were definitely more likely to create more interaction between students. The student interaction involved some students discussing the activities; some working together to figure out the answers; some trying to copy the answers from others in the group; and at times, some of the stronger students in the group acting as an instructor to other students in the group. In one occurrence, there were four students in a group: two white boys, one white girl, and one African-American girl. The two white boys were paired together. One of the boys was joking around and the other boy was attempting to tutor the other boy who was playing. The two other students who were girls worked independently. The white girl did her work by herself and the African American girl stared into space. In another group I observed, there were two white girls and one African American boy and one white boy. The African American boy joked around and copied the answers from the others. The white boy was sometimes playing with the other boy and sometimes involved with the group. The girls did their work and there was one girl, in particular, who figured out all of the answers very quickly. Some interaction between students involved playing with the manipulatives, wrestling, telling stories, etc. There were one or two groups with students who were disruptive to the group and who inhibited the learning in the group. One student was punished and had to leave his group on two occasions. This young male was very uncooperative in the group setting and would not listen when the teacher would ask him to pay attention.
Many different types of student-teacher interactions occurred as well. If the students did not understand, they would ask the teacher. The teacher would normally ask the students questions to help them figure out answers for themselves. In some cases, students would call on the teacher just to tell her something or tell on another student that was disturbing them. Students would also interact with the teacher when they wanted to be selected to participate in a game or when they wanted the teacher to give them permission to give their answer to the class.

Beyond interaction between individuals, there was also interaction between the student and the instructional material. Some students were honestly trying to figure problems out and were thinking deeply. Some students stared blankly at the manipulatives, while others figured out how to build with them.

Affective involvement

At times, I saw excitement in the students. At these times the students either wanted to share their work with the class, or they appeared to be very interested in the work that they were doing. Some of the students were quite anxious to share their work with the other students in the class. Some of the students who were not engaged in the group activities appeared to be bored. At times, I saw students staring blankly into space or just sitting down doing nothing. When it came time for a game, students were quite alert and active. Most appeared to be engaged and listening.

Student Conduct

Student conduct in Angela’s class was not a problem. There was one main trouble maker that the teacher handled well. Overall, the students were quite
cooperative and well-behaved. From time to time there would be some disruptiveness in the class, but the teacher would call certain students' names and they would stop talking or playing.

**Pedagogical Techniques**

Angela used several different techniques in the classroom. She started the class daily with a thinking activity written on the board. The students were supposed to write the answer in their journal. One day, Angela asked the students to draw a picture to show what the fraction four-thirds meant. Another day she asked the students to respond to this statement: A recipe calls for one-third cup flour, you have one-fourth cup and a one-half cup measuring cup. How could you measure one-third cup of flour?

Other activities included the use of worksheets with pattern blocks. This was normally done in groups. These activities took place once on a daily basis, but the students would have several worksheets to complete. Students broke up into their collaborative learning groups. There were about four students to a group and there were seven different groups. Each group had a set of pattern blocks to work with. The teacher explained the activity to the students first. One of the worksheets required that the students explain all the different ways to write a whole.

One day that I observed the class, the teacher administered an exam and the students were allowed to use their own construction paper patterns they had made. On the final day of the visit, the teacher played two games with the kids. The first game involved every student in the class. Each person was given a card with a
number on one side and a statement on the other side. For example, I am three less than ten. If a person had the card with the number seven then he or she would have to read the statement on his or her card. The other game that the students played involved a deck of cards. The teacher had a set of cards that she used with the overhead projector. Four cards were placed on the overhead projector and the students used all four cards to make a mathematical sentence that made sense.

Noise level

The noise level in this class was relatively moderate overall. Students were involved in activities. The noise level went up when the students started to play math games.

Teacher Interactions

Amount

The teacher was highly interactive with the students. She did talk less than some of the other teachers. However, she was quite involved with the students in the class and encouraged them to participate and respond.

Type of interaction

Angela’s main involvement with the students was through facilitation. However, she sometimes had to play the role of disciplinarian. Discipline was not something that she had to do very often. There was some disruptiveness in the classroom, but the teacher appeared to be comfortable with that. The teacher took her time with explaining things to individual students and to the whole class.


**Affective involvement**

The teacher was very encouraging and interested in the students. She spoke confidently about the students' math skills and believed the students would do well on the LEAP exam they would be taking the following week. The teacher showed interest for her students by going to each group to make sure that they were progressing with their work. If the students were having trouble with the work, she would take time to understand what was going on in the group and then she would ask a series of questions to help them clarify the situation. "Explain this..." or "Why did you do this." Unfortunately, it was obvious that some of the students were still not getting it.

**In the Classroom with Nona**

**Student Interactions**

**Amount of interaction**

These students were moderately involved with class activities. They became more involved with the activities after the principal came in and scolded them for their behavior. They were, however, very involved in interactions with other students. This was mostly through miscellaneous conversations that had nothing to do with the lesson. They were also moderately involved with the teacher. This interaction came from not listening to instructions and their playfulness. They did respond to the teacher's questions when she asked them different mathematical questions.
Participation

Some of the students participated more than others in class activities. About half of the students in the groups were involved in the activities. The teacher played a review game where the whole class was involved.

Type of interaction

Heavy student-student interaction took place in this class. Some students were having conversations about outside events. They talked about cults and how a group had killed themselves in order to find their spaceship behind the Hale-Bopp comet. Several students sat through activities and constantly teased and bothered the others. Some students asked each other the answers for the activities or they copied directly from the notebook or worksheet of another student. It seemed some students did this so they did not have to think of the answer themselves.

Students initiated contact with the teacher mainly to have her explain a class assignment again or to get instructions on how to do an activity correctly. Some students would elicit the teacher when they wanted her to see what they had done in their group. The students would also joke with the teacher about the materials as well. One time the students were playing a game with a deck of cards and one of the students asked, “Can we play poker, Ms. Nona?”

Teacher initiated interaction occurred when the teacher asked a student a question or if the teacher asked the student to explain what they had done for a certain activity. Some of the students appeared interested in responding to the questions that were posed.
Affective involvement

Students did not appear to be very interested and excited about the work especially when they were playing certain games or doing certain activities individually. The students did become more interested when they got involved in certain activities that involved manipulatives or using their calculators. There were two games that got more of them excited and enthusiastic. There were times that some group activities became competitive for the students.

Student Conduct

Student conduct was problematic the first two days in the classroom. The students were not very cooperative. They made many sarcastic comments and remarks. The teacher continuously had to tell them about their conduct and reminded them to pay attention. Students were more orderly after the principal reprimanded them on the third day. However, they did continue to talk among each other at a moderate level.

Pedagogical Techniques

There were several different teaching methods that this teacher used throughout the week. The teacher was reviewing with the students for the California Achievement Tests that they were going to take the next week. The teacher would begin the class with some review of materials that had been taught in the past. This would be done through the teacher identifying different topics and then asking students certain questions about the topic. She would then introduce an activity that would be used to review a mathematical concept.
Different teaching strategies were used to review different concepts. The teacher told me that she did many activities that required students to use their calculator. In one activity, students used their calculators to compute five repeating fractions and five terminating fractions. Group learning was another method that was regularly used in the class. This technique was used every day that I was in the class. The students sit at large round tables so they can easily work together on different projects. Students were encouraged to share information and work together to figure problems out. Open-ended questions were also used regularly. The teacher would ask the students lots of questions such as, "How do you know if a number is divisible by another number?" She also asked, "How do you know if six goes into a number?"

Another teaching strategy used was to link mathematical concepts to real world situations. The teacher does this once or twice during the week. When the students were learning about tesselations, another mathematical concept, the teacher reminded students of different items that have tesselations. She named wallpaper as one example.

Manipulatives were another teaching strategy used daily through the observations. Several different manipulatives were used. The teacher used a deck of cards to play a game so that the students could review fractions. All of the face cards were taken out of the deck. Each student had to draw two cards. The student had to make a fraction that was higher than their partner’s fraction.

In another instance, students used color tiles to represent different tesselations on a worksheet. The teacher’s role in many of these activities was to make sure that
students understood what they were doing and to answer questions. The teacher normally modeled the instructions for the activity first and the students were then expected to do it. Another activity was done to review probability; this game used four brown paper bags marked A, B, C, or D. Each student in a group had to draw a piece of paper from a bag 15 consecutive times. The paper had one color on it. One student in the group would have to keep a record of what color each student would pick. At that point, the students would have to predict which bag fit a certain probability statement. It is more likely to draw red than blue. It is more likely to draw blue than red. It is more likely to draw green than red or blue. It is more likely to draw red or blue.

**Noise level**

The noise in the class was sometimes loud particularly during some hands-on activities that took place. Overall, there was constant talking in the class.

**Teacher Interactions**

**Amount of interaction**

This teacher was highly involved with the students and the instruction in the class. She was constantly moving around the classroom responding to student questions and making sure all the students were on task. She was also involved in keeping the students quiet. I never saw the teacher sit at her desk during the math class even when the students were participating in independent group activities. The teacher initiated dialogue with the students on a regular basis.
Type of interaction

Facilitation mainly took place in Nona's classroom. There was some instruction that took place when the teacher reviewed different concepts with the students at the beginning of the class. The teacher had to constantly correct certain student behaviors throughout the class. She had to ask the students to pay attention regularly. Nona stated, "Pay close attention" and "No silly comments, I want thinking."

Affective involvement

Nona had a good rapport with the students. She appeared to be more of a buddy than an instructor. She joked with them and they also joked and teased with her. The students call her Ms. Nona. The teacher maintained a high energy level with the students even though they were very fidgety and, at times, challenging to motivate. In addition, the teacher spent a lot of time repeating instructions and getting students to listen. This resulted in wasted time and the teacher losing her patience with students. There were many times in the class when the teacher gave instructions and a student would ask the same thing right after she had just stated it. The student would say, "Ms. Nona, what are we supposed to be doing?"

Conversation between students was normal in this class. However, it became a problem when students were constantly talking and not listening to instructions or paying attention when material was being reviewed. On some days, student chit-chat was louder than others. One day when I was visiting the class, the principal stopped by the classroom door and saw that students were being very disruptive. I found out
that later he came back to the classroom and disciplined the kids very stringently.

The next day there was a definite difference in the way students participated in class activities and interacted with the teacher and myself.

There were several possible explanations offered as to why the students were so uncooperative. The teacher stated that this was one of her most independent classes and they liked doing things on their own. She also stated that it was getting close to the end of the semester and students were thinking about graduation and summer. In addition, the age level may have also impacted upon some of the ‘coolness’ of the students. The students were around 13 years old and were going through their adolescent years.

This teacher was very confident in the way that she taught her class. She was also very confident with the games that she used in the class. She stated that sometimes some of the games do not work in what you are trying to teach so you either have to try something else or possibly ask another teacher about it. However, Ms. Nona is limited in the number of people that she can talk to about teaching 7th and 8th grade mathematics since she is the only 7th and 8th grade math teacher in the town.

**Summary of Findings**

The analysis of the classroom observation data revealed several important points. Teachers have been able to implement many different types of teaching strategies in the classroom. They are using hands-on activities with manipulatives, thinking activities and games to teach students mathematical concepts. Discipline
emerged as an important component in implementing the various reform-based techniques in the classroom. In order for the activities to be successful and for student learning to occur, teachers must be in control of their classes, especially when they have students working in group activities and working with manipulative-based activities. Lack of control in the classroom can cause students to play amongst themselves as was evident in the 8th grade class that I observed. In addition, teachers must be aware of what the students are actually doing with the manipulatives. Teachers that laid out the rules for working in groups and working with the hands-on activities appeared to be more successful with student listening and participation.

Teachers were very active with the students. They were leading activities, addressing student problems and thinking of ways to best help students address their problems. The teachers I observed were on the move constantly in the class. They were handing out manipulatives, asking students questions, encouraging students and helping to facilitate learning rather than dispensing knowledge. There was no time for teachers to sit at their desk and tend to other activities.

Another area that emerged from the analysis was student engagement in the lessons. In the two fifth grade classes that I observed and in the first grade class, the majority of the students were actively involved in learning. The group learning activities allowed more students to be actively involved. In two of the classes, the African American students were quite involved in lessons as well. Unfortunately, in one of these classes where the African American students were actively involved, the African American boys were also the ones that were constantly sitting in the
punishment seat when I would come in to observe the class. The eighth grade students did not seem as engaged with the activities as the younger students. There were particular games or activities that appeared to engage them more than others.

Analysis of Interview Data

This section describes the experiences of the four teachers selected for the case studies with LaSIP. Data were gathered through two in-depth interviews with the participants about their experiences with the program. Audio tapes from the interviews were transcribed and analyzed. After a domain analysis and a taxonomic analysis were done, two main categories evolved from the data: effects of the LaSIP intervention and factors necessary to implement LaSIP. In this section, I first define the categories that evolved. I then discuss the categories and include the participating teachers' reactions to each.

Interviews with LaSIP teachers revealed that there were several effects of the program that were important. First, classroom process was one broad area that the interviewees noted change. Various aspects evolved under this category. These included pedagogy, content of the lessons, discipline and assessment. Teacher attitudes, student outcomes and peer influence were other categories that evolved. With respect to factors necessary for implementation and continuation of the program, attitudes toward reform and change, resources, assessment, planning time and training were major themes that emerged.
Variables Defined

In this section, I define each variable that describes the effects of the LaSIP projects. I define classroom process as activities occurring within the classroom. This includes pedagogy, content of the lessons, discipline, and assessment. Teacher attitudes are defined as the way teachers feel toward the profession of teaching and their job as a teacher. Student outcomes are those effects on student learning and attitudes toward learning that have occurred since the new teaching techniques have been implemented in the classroom. Peer Influence is how the teacher's new teaching methods have affected other teachers that have not gone through the training.

The factors that were relevant to implementation and continuation of the project were resources, training and attitudes toward reform and change. Resources were those materials given to teachers to implement the techniques in the classroom as well as peer interaction and support from other teachers. Training was the type of skills the teacher acquired as well as the teachers' attitude toward the whole experience. Training also included whether there were other follow-up experiences for teachers to participate in. The final variable was teachers' attitude toward reform and change. This variable included how teachers viewed the reform and change process. Were they more susceptible to change? Was the reform in mathematics needed?
Effects of the Program

Classroom Process

Pedagogy

No textbooks, please!

All of the teachers recognize the changes they have made in their pedagogical techniques. Many of the teachers agree that they rarely use their textbooks anymore and very rarely use the accompanying workbook as well. Angela stated, "We didn't even give workbooks out this year, I didn't; we pass them out every once in a while and we tear out a page that we like...You know that's a major change." She goes on to state, "Well, I think change was needed, because, as they come from grade to grade, there is so much you have to re-teach...Now, I think they'll remember what they're taught because they've done it, they've touched it, and they'll remember that more than if they were just doing it out of a book." Selena commented, "I may have used a fourth of my workbook and three fourths of it I will probably throw in the trash can." She also commented, "I thought that you had to teach every page in the workbook...I have learned that it's okay to just throw that workbook away, if it is not needed, don't use it."

Group work is the answer.

Nona stated that one of the big changes that she has made was changing from desks to tables in her classroom. This allowed her to do group work activities with more ease. Three of the four teacher interviewees had tables in their classrooms.
because of their emphasis on cooperative learning groups. Angela commented that the reason she had desks in her class was that the tables would not fit for the number of students who were in her class this year. However, the students still do group activities, but on the floor. Nona asserted, "I got rid of my desk, and I put them in groups at tables, which was a big change for me, because five years ago, I would have said that was crazy. They would cheat. . .but if you listen to the students, they want to learn, they don't want to be behind. . .they're pretty good; they'll come up with some interesting ideas."

Denise commented that when they are in groups, "they have to work together and they have to share and they have to tolerate each other and that's been good for them." She also stated that letting the students work directly together was good for them. "I do peer tutoring a lot where the other students help them out if they have a problem. They seem to catch on better. They're more receptive to the kids telling them than me." Nona also agrees that peer tutoring is quite effective for the students. "...I didn't realize the value of it [peer tutoring]. . .it's just really neat now for me to just sit, just walk around the room quietly, without saying anything, and listening to each group."

Listening to students and recognizing their learning styles

The teachers also commented on how they have changed their approach to teaching and the importance of listening to their students more. Nona stated, "I am more open in my classroom to student discussion. I'm much more flexible when it comes to student/student talking and student/teacher...I allow them to vocalize more
than I used to." Selena asserted that "one of our things in LaSIP was that we were not always the teacher, that we needed to be the student because our kids can teach us a lot if we just take time to listen." In addition recognizing the different learning styles of students has also become important. Selena remarks, "...you have 22 kids in there and you may not have two that learn things the same way. So, you have to learn to get on their level and figure out what do I need to do or how do I need to approach this to get them to understand it. And that’s pretty hard."

**Manipulatives forever!**

The teachers say that they use manipulatives regularly in their classrooms. Nona, the 8th grade teacher, however, stated that she uses them about once a week. She believes that they are good when she is introducing a topic or reviewing a topic. She does use the calculator on a regular basis. Nona comments, "There are some great calculator activities out there." The other teachers assert that they use the manipulatives quite frequently. Denise says, "Most of the time I do four activities a week, at least. Some days I might do two short ones." In another part of the interview, she asserts, "...If I do anything out of the book, they do it for homework or for an extra thinking practice... Otherwise, I use manipulatives-based activities. It’s always something that they can put their hands on."

**Real world connections...**

All of the teachers spoke about the importance of making connections to the real world and include in their lessons outside speakers who would come in and relate what the student was learning to what that speaker did in their business. Some of the
teachers spoke about having carpenters, pharmacists, nurses, bankers, and architects come to the school. Selena remarked, "I have had several people to come into my classroom and do activities with them [her students] or talk about their professions and why it's important to learn certain things." Nona comments that for the 8th grade students, "...I've had speakers come in, like I had when I was doing a lesson on interest rates and commissions...I had Mr. Alexander from the bank come over."

Denise stated, "Every day I connect what they're doing to the real world. They (the students) used to ask me at the beginning 'when am I going to use this, why do I have to learn this' and they have gotten out of that. They hardly ask me because at the end of the day I'm going to tell them why we're going to do this, why we need this and why they're going to need it later."

Lesson Content

In the area of lesson content, teachers recognize that they do have certain restraints when it comes to what they teach in the classroom. Fortunately, the district-wide curriculum guides are changing to become more aligned with the national math standards based on reform. Teachers are able to teach concepts in line with the standards. The teachers have learned that students have to be taught mathematical concepts on a regular basis and must be able to understand the big picture with respect to mathematical concepts. Selena asserts, "In the past, we had a curriculum guide that listed specific objectives. The students would learn their addition facts 0-10, and now, the concept is more that students learn the idea of addition...it is more the idea that you teach them." Denise states, "I do more of the why instead of the
how to. By the time they get to me, for instance, adding, they know how to add. They don’t know why you carry from ones to tens, they just do it." The teachers recognize the importance of the students being able to solve problems by themselves and being able to think more critically. Nona asserts, "We’ve got to teach these children to attack problems on their own and not just sit there and wait for instructions and say, work these 10 problems, work them and be done with it.... We’ve got to teach them how to think about it. . . and come up with solutions on their own."

Some of the teachers expressed that through LaSIP they learned that topics need to be covered on a regular basis and not just once when it was introduced in the textbook. Denise remarks, "It’s not like you do this and you’re finished with it, it’s every day ongoing and [concepts] have to be built on and stressed everyday and not teach it once and get finished." Angela discusses how she uses a kit called Every day Counts that allows her to go over various mathematical concepts everyday. The students practice multiples and factors, as well as prime numbers and composite numbers.

**Discipline**

*Discipline* is another area that has changed for teachers. The teachers admit that they do not have extreme discipline problems in their classes. However, I believe that they would agree that student discipline is crucial to implementing these techniques in the classroom. Angela stated, "You’ve got to have control over your kids first of all. . . you’re going to have children that aren’t going to work well with everybody and you’re going to have activities or something that they can do.”
Overall, the teachers have found fewer discipline problems since they have implemented these techniques. Selena stated, "Since I have been doing these types of math lessons, I have less discipline problems than I had before, because my kids are actively involved in something and they don't have time to get disruptive and they enjoy what they're doing; so, they get along." Denise stated, "It cuts down on discipline; it makes my job a lot easier by doing it this way than just the book work."

**Teacher Attitudes**

Change in teacher attitudes toward their development as a teacher, the profession of teaching and the LaSIP training in general have been outcomes of the program. Selena stated, "My job's more exciting, learning's fun, teaching's fun, and it's not so much of that repetition of going in and doing the same old thing everyday." She goes on to state, "It makes my job easier, because the kids are enjoying it and it's fun to teach this way; it's not so much repetition because you can kind of lay things out there for the kids like problems to solve, but they may not always go about it the same way; so, every year is different." Angela also agrees that this style of teaching makes her job fun. "It's fun; it makes math fun for me." Denise states, "I feel like that I like this and I think the kids are excited about it, which I get excited about it. And, and I enjoy teaching it this way, and the days are certainly not boring."

Some of the teachers noted some personal changes that have occurred due to their involvement in the training project. Selena stated, "Gratification has come because I see that my students achieve and I see that they're reaching more than what they used to; they're going beyond the limits that we used to set and that
gives me great gratification.” Nona asserted, "I have more self-confidence," and she also stated, "I guess I feel I'm competent; I think this pushes me to try harder."

**Student Outcomes**

The teachers also commented on some of the changes that they have noted in students as well. With the 8th grade students Nona taught, she stated,

I think they [the students] are scared of them [the manipulatives]. They're not sure what they're supposed to do with them [the manipulatives]... when they see those new materials... they want to play with them at first, but....when you don't put a lot of pressure on them... they say, ‘Oh, wow, hey, yeah, I see it, you know I think it’s a wonderful tool.’ They really enjoy it and then they start figuring out other mathematical tasks that they can do with them.

The other teachers also see the effects of the teaching on their students. Angela stated, “The children enjoy it. I don’t have any discipline problems really, other than one person who can’t work in a group with everybody else...they’re busy, they’re happy.” Selena remarked on how her students respond, “Positively, absolutely, no doubt in my mind, they look forward to math....it has changed learning from being a headache to these kids to being something more like a game...They want to do those fun things. But that comes along with changes in our world and our kids are so smart with technology that we’re having to change what we do in the classroom just to keep their interest.”
Factors Relevant to Implementation of the Program

Support

Principal

Support from one’s principal also emerged as an area that was important to implementing the LaSIP strategies in the classroom. Nona stated, “If you were at a school where your principal was not very supportive of new math standards and math methods, it would be very bad.” Nona also asserted that part of her implementing the techniques in the classroom was self-motivation. However, principal support was also helpful. She stated, “I’m sure glad that he supported us in it, I was afraid that he might not like some of the things we were going to be doing, but he did. He’s very supportive of his teachers.”

All of the teachers in the study were fortunate that their principal had participated in the program. Denise commented that it is important that principals go through the process as well as teachers. “Every school that’s doing this needs to have their principal go through this. He’s not surprised about anything that comes around. He knows we may be a little noisy or more talkative than other groups or other classrooms because he knows we are learning...but he’s very supportive, anything we need or anything that can help us, he’s willing.

Site Coordinator

Angela agreed that her principal was very supportive and that helped. However, she also felt that having one of the site coordinators housed at their school was also quite helpful. She stated, “with the Site Coordinator based here at the school
last year, we had unlimited resources, you know.” Angela also remarked on how the Site Coordinator had a broad spectrum of resources to pull from since she had been able to travel to many different schools in both Coleman and Calais parishes. Nona also commented, “we have...[the Site Coordinator], she’s great, she’ll come in and help us any way we need her help.”

The teachers expressed concern that the site coordinator positions were being eliminated. Denise stated, "I think that this is a major, major area that we need. With the Site Coordinator being here at my school, I don’t know how many times I’ve knocked on her door and said, ‘Do you think this will work?’ or ‘Do I need...’; she’s been my support." Denise went on to say, "We’re going to be lost without her, I think, and, I just hope we don’t end up sliding backwards because there’s not going to be anybody to say that...to talk these ideas through with." Denise talks about who is going to be there to help those people who have been designated for leadership positions. She commented, "I’m a leadership person and another person; we are at this school, and so then, who’s going to help us.”

Selena expressed her dismay on this issue as well. "I think that job is extremely important. We felt like we had somebody to go to and whether it was to ask questions or it was something we needed. We had contact with this one person and...[the Site Coordinator’s] job was extremely important in seeing that this program was done right." Nona also expressed the importance of the position for her parish as well. "I think it is almost necessary, and let me clarify that,...but even here, you know, where we have all the... that have been through LaSIP and we have each other,
even here it's just wonderful to have Donna here. Help me, you know, how should I go about this, you know,...she'll come in and help you."

**Peer interaction**

Increased peer interaction has also been very useful to teachers. The teachers who I interviewed were all at schools where a sizable number of their peers had been through a LaSIP project as well. Nona comments, "We have very open communications here." She says, "We're fortunate, very fortunate here at our school because we have five of us that went through LaSIP; so we [are] kind of a support group of our own. If we try something and it doesn't work, I can always go down to the other [teacher]...and say, 'I tried this and this didn't work' and some of them might say well do it this way." Denise remarks, "We share, we share ideas and we send stuff all over. Things we want to do, and we get ideas from everybody. We stop each other at Wal Mart or wherever...We try to watch out for each other...This might be something that so and so might want to do, and that's really helped, you can't do it alone."

Angela noted that at the training, "I met a lot of new people from Coleman parish that teach on the same level, and you know, we shared ideas while we were sitting at the table, you know, 'you could do this too, and this' And then, they would say, 'Oh, I have trouble with teaching this and how do you do this' and we would share about how we taught it..." Teachers got a lot from being able to share what they did with other teachers as well as learning from what other teachers were doing in the classroom.
Selena stated the support that she gets from other teachers was very important to her work. She asserted, "It makes you feel more confident if somebody is sharing with you what they are doing and you are saying Yea, that's good, do that, you know I think that will work. It just kind of gives you more confidence and you are more likely to do these activities."

**Resources**

Factors relevant to implementation of the program also emerged from the data. Resources was one area that appeared important to the teachers being able to implement the reform-based teaching techniques in their classes. Nona stated, "Every teacher is going to have to be provided some resources." She believes that teachers need materials, books and computers for their classrooms.

**Portfolio and Curriculum Guide**

Another resource that the teachers claimed should be particularly helpful for new teachers was the portfolio that Katharine, one of the site coordinators, has put together and the new curriculum guide that is being developed at the district level. Angela stated, "the book that Katharine is putting together will be a good tool for new teachers to use. I haven’t seen the curriculum guide, but that should be helpful to make sure that they have covered everything."

**Computer**

All of the teachers believed that they could use additional computer resources with the appropriate software as well. Denise commented, "Well I’d like to see more, but I don’t know where I would put them. I need an extension on my room right
there." Denise did have three computers in her class that were connected to the internet. Nona had the opportunity to participate in a district wide professional development project on computers sponsored by Goals 2000. As a result, she received special training and a computer for her classroom. She states, "And at the time, we knew we would get a small stipend for it, but we, at the time, were so computer ignorant...we did not realize that we would get a computer." Selena stated that her principal is putting computers in every classroom. However, she will not receive her new computer for another year. She does, however, have one new one and two old ones that are very hard to find software for. Angela uses the computer lab across the hall, but stated that she would prefer to have some computers in her classroom.

Training

The training has also been beneficial to the implementation and continuation of the program. All of the teachers commented on how the training experience affected their views of teaching and made them implement the changes. Angela stated, (referring to training) "So that's changed the way I teach, we do a lot of getting up and moving around and [we] go to the bathroom and take breaks more often than are scheduled in the day...And if it [sitting all day] were that bad for me, I just think how bad it would be for children. So, by actually being in the thing, it puts you in a child's place."
Denise stated,

When we were in the classes, . . . the students and teachers that were in the class with me, they were excited about doing this, and when we would do something new, . . . the excitement was there, like for kids... and because of that experience, it made me want to share that excitement with my children, because, 'Oh, this is neat, you know, this is neat,' and I've heard that a million times this year. 'Oh, this is so cool; you know, this is really neat.' And that's what we said... it's really catching.

Many of the teachers stated that the reason they got involved in the training was because of the financial incentive. Nona expressed,

I think teachers today have too much to do and too little time to do it in, and I don't think they're going to do anything unless they're paid for it and probably myself included... Because besides money, money is not everything, and we have so little time with our families, they have to show me that it's going to be valuable for me to take my weekend time or my summer time or my off-hour time away from my family to do it.

Angela also agreed,

I did it for the money. I'm saying if they're going to pay me $1,500 I can sit through this or whatever... I got that money, I got the stuff for my class, that was motivation, I always like stuff for my class, and I got nine hours of graduate work I didn't need, but you know, I feel that it would look good. I think that's why we all went, I think, originally, because who would give up their whole summer and pay a babysitter to come to a workshop.

Teachers' Personalities and Attitudes Toward Change

Another important factor that emerged from the data was that teachers who were more likely to implement the change had the spirit of wanting to go the extra mile for their students and make a difference in their learning. They expressed that it took some of their own independent time to plan for classes and get comfortable with teaching these lessons. Denise remarked, "There is a lot of thinking ahead and a lot of planning time that goes into this before you just give them the lesson." Even
though the teachers put in extra time to do this, the teachers agreed that they want to
do what is right for the students. Selena expressed that she has a genuine interest in
teaching her students in the best way that she can.

Well, as a teacher, you’re always out there searching for something new, and
maybe that’s because we get bored maybe with repetition, teaching the same
subject areas every year, but you know, when you get something that works you
usually keep that in your curriculum...but if it’s not working, then that’s when we
want to find something else, whether it’s new manipulatives....and we want to
change what we think is a weakness.

Denise also agreed that she would consider any change that would be good for
her students and would be willing to do whatever it would take to implement the
change as well. Denise stated, “If I believe in it, I’ll do it and I’ll jump in there with
everything I have. If I don’t feel it’s best for the kids, I’m not going to touch it.”

Denise goes on to comment that “What is right, is what is best for the kids.” Nona
comments, “Why, I want to be a better teacher. I want to reach these students, I want
to push them, I want to know how to do that...I want to be better.”

The attitudes of teachers toward change and reform also influenced whether a
teacher would implement the changes in their class. The interviewees in this study
appeared to be more open to change. Nona remarked,

I felt uncomfortable at first [about the change]. . .It’s a scary thought at first after
you’ve taught ten or twelve years, and somebody comes in and says, well, we’re
not getting the job done, we’ve got to do it differently. You kind of get your back
up, . . .and it’s not the teachers, I don’t want to sound like it is, I don’t feel like
it was me. I think I was doing a good job, but it’s the world, it’s the world is
what’s changing and our kids are going to have to be able to compete in a world
that was completely different from . . . the world we had to compete in . . .
Change is just inevitable and we’re just going to have to push our kids, and
they’re going to have to learn. And another thing, I don’t think kids today learn
the way we learned. . . They have to be motivated in different ways.
Nona recognizes the changes she is making are necessary and she wants to be involved in them. Nona also commented, "I guess I’m just one of those people, I want to see it, I want to do it myself."

In addition, the teachers noted that this change was very important to them and important to the activities that they did in their classroom. Selena stated, "I think that it’s very important, because the kids are making connections and they’re enjoying it and I’ve seen for a few years that there definitely needed to be a change, so this is like one of my number one priorities in my classroom right now." The teachers see the need for the change, recognize that the students need a change and make the decision to make the change.

Summary of Findings

Analysis of the interview data revealed several important points. One area has to do with participation in the training and the teachers’ attitude toward change. All of the teachers strongly agreed that the stipend was the main incentive for their participation in the training. Without this additional incentive, the teachers probably would not have participated in the training. As a result of their participation in the training, however, three of the teachers had the opportunity to learn about the reform movement in mathematics. Selena, the fourth teacher, was familiar with the reform before the training because of her acquaintance with Katharine, one of the leaders of the project. The teachers agreed that they were able to make changes in the classroom, but a lot of the changes had to do with their own personality type and their attitude.
toward change. One of the teachers mentioned that she was normally one of the first people to change when things such as this come up.

Another important element that emerged was the issue of support. The teachers strongly agreed that peer interaction, support from their principal (actually having their principal go through the training), and having the site coordinator there as a resource was very beneficial to being able to implement the techniques in their classrooms. Planning time came up as a problem for the teachers. They stated that they already do not have enough time with their families and it definitely takes time to plan and prepare for classes when using reform-based techniques in the classroom. The teachers commented that each class is different and there are times when students will pick up different concepts through different activities and there are times when they do not. The teachers commented that you have to be prepared for this.

The teachers also indicated that additional computer resources would be helpful to them as well. Selena stated that this would allow them to stay in contact with each other better. She even mentioned the importance of getting access to the LaSIP homepage. Nona mentioned that there is a national network of teachers that she is in contact with on the internet that share ideas about math activities and this has been very helpful to her. Even though the teachers mentioned the importance of computers, this issue did not come across as a do or die situation.

Another important issue that emerged from the interviews had to do with teacher attitudes toward teaching. The teachers seemed quite upbeat about teaching mathematics. They all commented that they really enjoyed their jobs now. They
found that it gave them a chance to see their students enjoying their work and
learning. Two of the teachers that previously had aspirations for administrative work
stated that they are putting that on hold because being in the classroom is where they
need to be. The teachers stated that they are having too much fun in the classroom.

Another area that has to support teachers in implementation is the change in
the district curriculum guides and the gradual change of the state standardized testing
system. The teachers noted that it is important that the items that students are being
tested on are taught. Louisiana pilot tested a new criterion referenced test this past
spring semester and expects to implement it next year. The mathematics portion of
this test will be more in line with the standards and reform-based teaching techniques.
CHAPTER FIVE: CONCLUSIONS

Background

The purpose of this study was to determine how a federally funded reform initiative has affected classroom practices in two rural school districts in Louisiana. The charge for this study arose in light of LaSIP's recognition of special circumstances operating within rural communities. These special circumstances include limited financial and educational resources, as well as geographic isolation that inhibits communities from tapping into resources available within metropolitan centers (De Young, 1987). Programs designed to increase student achievement in mathematics and science, as well as other subject areas have the potential to increase the number of students graduating from high school and participating in post secondary education in Louisiana. In addition, higher education administrators can learn more about educational change projects.

In this chapter some of the results of the study are discussed further and conclusions are presented. Some implications of the research for current theory and practice are also addressed. Finally, recommendations for further research are discussed.

Overview of Findings

In all, findings from the quantitative data analysis supported findings from the qualitative data analysis. Teachers indicated that the LaSIP in-service training did have an effect on classroom practices in mathematics classes.
Reform in the Classroom

Teachers agreed that they had significantly changed the way they taught mathematics because of their training from LaSIP. They noted that they now use more manipulatives in their classes and cooperative learning groups. There was also a group of the teachers that indicated that they had utilized other techniques such as discovery-based learning, open-ended questions, and expanded teacher/student dialogue, as well as expanded student/student dialogue. The teachers communicated that many different techniques were important to student learning in reform based instruction. However, they strongly expressed that the use of manipulatives and cooperative learning groups were very important to this process.

Eighty-five percent of the teachers who completed the survey indicated that they now use manipulatives in the classroom often and 60% of the teachers indicated that they also use open-ended questions often. Seventy-one percent of the teachers disagreed with the statement that their teaching skills in math have remained the same since their involvement in LaSIP. While 70% of the teachers agreed that they had become more of a facilitator of student learning rather than a dispenser of knowledge.

Classroom observations and teacher interviews with teachers also revealed that teachers were using more reform-oriented techniques. Classroom observations revealed techniques such as hands-on activities with manipulatives, thinking exercises and games to teach students different mathematical concepts. The educators stated that they have been able to implement many different types of teaching strategies in
the classroom that are outside of teaching methods utilized in traditional mathematics
classes.

**Discipline**

Teachers also noted that some of the barriers to being able to implement the
reform-based techniques in the classroom were student discipline, emphasis on
performance on standardized tests and lack of planning time. Even though teachers
identified these barriers, responses to the other items on the survey and classroom
observations indicated that teachers were utilizing different techniques in the
classroom.

Discipline emerged as an important component in implementing the various
reform-based techniques in the classroom. On the survey, teachers selected student
discipline most frequently as an item that inhibited the implementation of reform-
based teaching techniques. Discipline in these schools involved getting the students to
pay attention and having the students not play or talk to one another. The classroom
observations also revealed the importance of discipline. In order for activities to be
useful and for student learning to occur, teachers must be in control of their classes.
This is particularly significant when students are working in group activities or
working with manipulative-based activities. Lack of control in the classroom can
cause students to play among themselves as was evident in an 8th grade class that I
observed. In addition, teachers must be very aware of what the students are actually
doing with the manipulatives. Teachers who laid out rules for working in groups and
working with hands-on activities appeared to be more successful with student
listening and participation.

Teaching Attributes

The teachers agreed that utilizing reform-oriented strategies resulted in more
movement in the classroom. Teachers in these classes were very active with the
students. They were leading activities, addressing student problems and thinking of
ways to best help students address their problems. The teachers I observed were on
the move constantly in the class. They were handing out manipulatives, asking
students questions, encouraging students and helping to facilitate learning rather than
dispensing knowledge. There was no time for teachers to sit at their desk and tend to
other activities.

Student Engagement

Another area that emerged from the analysis of the observations was student
engagement in the lessons. The teachers believed that students were more actively
involved in learning and that students seem to enjoy math more. Fifty-two percent of
the teachers strongly agreed that students were more actively involved in learning and
50% of the teachers strongly agreed that students seem to enjoy math more.

In the two fifth grade classes that I observed as well as the first grade class,
the majority of the students were actively involved in learning. The group learning
activities allowed more students to be actively involved. In two of the classes, the
African American students were quite involved in lessons as well. Unfortunately, in
one of these classes where the African American students were actively involved, the
African American boys were also the ones that were constantly sitting in the punishment seat when I would come in to observe the class. The eighth grade students did not seem as engaged with the activities as the younger students.

**Training and Attitudes Toward Change**

Analysis of the interview data also disclosed several other important points as well. One area has to do with participation in the training and the teachers' attitude toward change. All of the teachers strongly agreed that the stipend was the main incentive for their participation in the training. Without this additional incentive, the teachers probably would not have participated in the training. As a result of their participation in the training, however, three of the teachers had the opportunity to learn about the reform movement in mathematics. One of the instructors was familiar with the reform before the training because of her acquaintance with one of the project leaders. The teachers agreed that they were able to make changes in the classroom, but a lot of the changes had to do with their own personality type and their attitude toward change. One of the teachers mentioned that she was normally one of the first people to change when things such as this come up.

In the survey, teachers indicated that the most useful part of the training was learning hands-on activities and working with other teachers. Sixty-five percent of the teachers strongly agreed that they had improved their ability to help students gain experience with hands-on activities. While 50% of the teachers strongly agreed that they learned a lot from working with other teachers.
Support

Another important element that emerged was the issue of support. The teachers strongly agreed that peer interaction, support from their principal (actually having their principal go through the training), and having the site coordinator there as resource was very beneficial to being able to implement the techniques in their classroom.

Planning Time

Planning time came up as a problem for the teachers. They stated that they already do not have enough time with their families and it definitely takes time to plan and prepare for classes when using reform-based techniques in the classroom. The teachers commented that classes are different and there are times when students will pick up different concepts through different activities and there are times when they do not. The teachers commented that they have to be prepared for this.

Computer Resources

The teachers also expressed that additional computer resources would be helpful to them as well. Selena stated that this would allow them to stay in contact with each other better. She even mentioned the importance of getting access to the LaSIP homepage. Nona mentioned that there is a national network of teachers that she is in contact with on the Internet that shares ideas about math activities and this has been very helpful to her. Even though the teachers mentioned the importance of computers, this issue did not come across as a do or die situation.
Teacher Attitudes Toward Teaching

Another important issue that emerged from the interviews had to do with teacher attitudes toward teaching. The teachers seemed quite upbeat about teaching mathematics. They all commented that they really enjoyed their jobs now. They found that it really gave them a chance to see their students enjoying their work and really learning. Two of the teachers who previously had aspirations for administrative work stated that they are putting that on hold because the classroom is where they need to be. The teachers stated that they are having too much fun in the classroom. The survey revealed that 52% of the teachers strongly agreed and 46% of the teachers agreed that they teach more confidently since their involvement in LaSIP.

Curriculum and Assessment

Quantitative and qualitative data also reflected that teachers recognized the importance of changes in district curriculum guides and the gradual change of the state standardized testing system. Two of the teachers involved in this study were involved in committees to change curriculum guides. The teachers noted that it is important that the items that students are being tested on are taught. Louisiana pilot tested a new criterion referenced test this past Spring semester and expect to implement it next year. The mathematics portion of this test will be more in line with the standards and reform-based teaching techniques.

Quantitative Conclusions

This is what we can expect from these findings. Teachers who participate in LaSIP training will have the opportunity to learn more about new teaching strategies. Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
in mathematics. In particular, teachers will learn about strategies to implement hands-on techniques and lead cooperative learning groups. Apparently, teachers who do participate in the training are implementing new teaching techniques in their mathematics classes. Teachers note their use of hands-on activities, cooperative learning groups, discovery based learning situations, open-ended questions, and expanded teacher/student dialogue, as well as expanded student/student dialogue. In addition, we can also expect to see students who are taught by teachers who use these techniques to have students who are more actively engaged in the learning process. This differed from the ways teachers previously taught students.

With respect to barriers, we can expect that student discipline may inhibit teachers from being able to fully implement these techniques in the classroom. Teachers who are not in control of their classes and who have not found effective ways to discipline their students may be limited in the way that they can use cooperative learning groups and hands-on activities. Another barrier that emerged from the data is the emphasis placed on student performance on standardized tests. We can expect that if teachers are not confident with their skills in teaching students with reform-based techniques and if standardized exams are not designed to test students the way that they are being taught in class, then teachers will have a difficult time implementing reform-based techniques. Planning time was another barrier that emerged as making it difficult to implement these techniques in the classroom. We can expect that those teachers who are not willing to go the extra mile and spend extra time planning for their classes will not implement the techniques in their classrooms.
Thus, it is important that teachers are given adequate planning time preferably with other teachers to plan their mathematics classes.

We can expect that teachers who choose to participate in the training are interested in receiving more materials for their classes and are also interested in learning more about hands-on techniques. However, from the interviews I had with the four teachers, I do suspect that teachers who choose to participate in the training are also interested in the financial stipend that they received as well.

The literature supports that students who participate in classroom instruction that utilizes hands-on activities outperformed students who did not. Hartshorn and Nelson (1990) studied the effects of a program called the Elementary Science Education Institute on students with teachers that implemented hands-on techniques in the classroom versus those who did not. The study revealed that there was a positive relationship between hands-on science instruction and achievement. In addition, the study suggests that the science activities and the hands-on instruction tend to slow down or restrict the erosion of favorable attitudes toward science in particular. This work also revealed that when students were taught by teachers who used hands-on activities and other stimulating activities in the classroom, students were more actively engaged in their work and had favorable attitudes to their work. This LaSIP study did not show that the students outperformed other students who were not taught by teachers who used these techniques.

This LaSIP study also supports research done by Teddlie and K.T. Associates (1996) on the LaSIP program. Teddlie, et. al, found that a large proportion of the
teachers believed that the LaSIP training improved their ability to help students gain experience with hands-on activities. In addition, the researchers found that participation in LaSIP also appears to have an effect on increasing teachers’ knowledge of the applications of mathematics and science principles, it helps teachers develop additional skills for improving student problem solving or critical thinking abilities and it helps teachers update their teaching practices in order to take into account new methods and course contents. The research done by Teddlie, et al. was more focused on the training of teachers and the effects of the training. This work supports the findings that teachers who participated in the training improved their ability to teach with hands-on techniques. However, this LaSIP study went one step further than Teddlie, et al. It examined what techniques teachers implemented in the classroom, how often they implemented these strategies and how students responded to the strategies.

Both studies examined the barriers that teachers faced in implementing LaSIP. In Teddlie, et al., the most frequently chosen barrier by both teachers, project directors and site coordinators was classroom resources. The teachers frequently indicated that student discipline, overcrowded classrooms and textbooks not being amenable to reform teaching affected implementation of the strategies in the classroom. Student discipline also emerged in this work as well. I suspect that the problem of overcrowded classes emerged because of the sample including more teachers from urban areas than smaller rural communities. In addition, I suspect that these findings do not follow my findings for several reasons. One is that the focus of my particular
study was on two rural areas that generally had smaller classes. Secondly, teachers in
the two parishes that I studied did not have a problem with resources because recently
the two parishes received a $300,000 grant from the United States Department of
Education for materials and resources. Thus, schools had their own resource rooms
and teachers were able to individually order their own supplies. In addition, the
teachers at the schools where I observed were very open to sharing their materials and
were also very creative in making their own inexpensive manipulatives. In addition,
the issue of the textbook not being amenable to reform teaching was not an issue in
the two parishes I studied because teachers had learned how to teach without the
textbook. One of the teachers that I interviewed said that students almost threw away
their whole workbook this year because they were not used very much.

Qualitative Conclusions

Several things can be concluded from these findings. First of all, it appears
that the teachers are implementing the training. However, there are certain
characteristics of teachers that have been able to implement these techniques in the
classroom. Teachers' personalities appear to be very important to whether a teacher
can implement the program. In this study, some of the teachers identified themselves
as self-starters and noted different ways that they went the extra mile to plan their
classes. Some of their personalities emerged as being very caring and doing whatever
was needed to ensure their students learned.

Fullan (1991) advances a model of change that states that there are nine critical
factors organized under three main categories that can affect the implementation of an
educational reform. One of the factors that is discussed is the role of the teacher. Fullan asserts that the teacher can play a major role in the direct influence of a change effort or can emerge as a major blocker to a change. Fullan (1991) and Huberman (1988) maintain that the psychological state of the teacher can predispose a teacher to consider change or improvements. Fullan asserts that some teachers can be more or less predisposed to change because of their personality, previous experiences, and the stage of their career.

The teachers in this study did appear to be predisposed for change. They had a high sense of efficacy and appeared to be more satisfied. They were comfortable with what they were doing and believed that they were good at what they did. One teacher stated that she knew why she was chosen to teach the fifth grade class at her school. She knew that the principal wanted someone strong in that position since that was the year students took the LEAP test. In addition, the teachers attitudes' toward the change process were quite positive and open.

Assistance and peer interaction also emerged as important to the implementation of the project. The teachers identified that support was very important to the implementation of the project. Huberman and Miles (1984) developed eight different types of assistance that teachers need at different levels of the implementation process. In the later phases of implementation, the authors noted that teachers identified resource adding, facilitation, support and solution giving as important sources of assistance. In this study, the teachers agreed that at the beginning they needed resources so it was important that the resources were made
available to them. However, support evolved as a critical type of assistance that the teachers needed. Support, as indicated by the teachers, is necessary in the early phases of the project, as well as the later phases. One teacher stated that she does not need someone telling her what to do at this point, but she just needs a "sounding board". Solutions giving also emerged as an important element teachers need. In the past, this role was played by the site coordinator. However, next year this position will no longer exist in the two parishes and the need for this assistance will probably become more crucial.

Peer interaction also emerged as an important element in this study. Fullan (1990) advances that one of the key themes that has emerged with respect to successful implementation of a reform effort is staff development and resource assistance. He asserts that during implementation sustained interaction and staff development are essential regardless of what the change is. In addition, Fullan argues that it is important that teachers are involved in "ongoing, interactive, cumulative learning experiences." The teachers in this study refer to the importance of interaction with the other teachers. The teachers did not refer to having the need to be involved in ongoing in-service training. They did have the opportunity to participate in Saturday workshops from month to month and three of the teachers were leaders in these workshops. However, they saw this activity as more beneficial for teachers that had not been through a LaSIP project.

The need for support is important for several reasons. Various works refer to the isolation of rural teachers and the need to provide resources to these teachers.
Batey and Harts-Landsberg (1993) and Stoops (1993) discussed computer intervention as a means to connect rural teachers with other teachers. One project called SMART (Science and Mathematics Academies for Rural Teachers) was designed to deal with the issue of teacher networking and support in rural communities. The need for peer interaction that evolved from this particular study did not appear to be because of limitations due to geographic locale or limited resources. The need for peer interaction appeared to have more to do with the profession of teaching and not having the time to sit and discuss challenges and ideas with other teachers.

The role of the principal is also important to the implementation of a reform initiative. Teachers found it very important that the principal had been through the training. They said that the things that they were now doing in their class were much easier to implement with the support of the principal. The principal understood when there was a lot of noise in the class or why teachers preferred to have tables in their classrooms rather than desks. In addition, they found that it was helpful for the principal to understand the strategies that they had implemented. Louis and Miles (1990) found schools that are most effective in making changes have leaders who articulate a vision, establish shared ownership, and use evolutionary planning. The teachers in this study state that they believe that their principal has the same vision that they have for mathematics reform in the classroom. However, an articulated vision does not seem apparent. This study does not imply that principals have established shared ownership or used evolutionary planning in order to make change work in the classroom.
Fullan (1991) also refers to the role of the principal in his research. He states that the principal’s actions serve to legitimate whether a change is to be taken seriously. This study does support the role of the principal in a change effort. Fullan argues that not only is principal support important, but the involvement of the principal in the training itself is also very important to the implementation of a reform project. This study supports the importance of the involvement of the principal in the training process. In this study, principals became dedicated to the change and meeting the needs and concerns of the teachers. In addition, other teachers that had not gone through the training were also encouraged to learn more about LaSIP and incorporate the teaching strategies in their classes.

One change that teachers have noted who implemented the reform based teaching techniques was students who were more directly engaged in their work. According to the work of Quietszch (1994) and Haas (1994), the authors argue that this is to be expected from rural schools. Quietszch (1994) says that this a strength of small schools. These schools have been noted for creating a more enriching school experience for students and a more engaging learning atmosphere as well. He asserts that smaller community schools tend to create a place with more student responsibility and more school and teacher accountability. Haas (1994) advances that small schools are also best suited to implement the kind of hands-on, problem-solving, context-specific pedagogical approaches that profession organizations such as the National Council of Teachers in Mathematics (NCTM) and the American Association for the Advancement of Science (AAAS) encourage.
Both authors refer to rural schools as small schools and this is not always the case. There are times when the schools will have large numbers of students in the school. However, the smaller community atmosphere of rural towns do appear to contribute more to student and teacher responsibility in the classroom. Thus, I agree that the climate in a rural school is different from a larger urban area and this ultimately contributes to more active and involved learning in the classroom.

Implications for Theory

This research contributes toward building a theory of teacher change and developing the teacher’s role in educational reform. This research implies that models that refer to the teacher change process must include the variable teacher collaboration and teacher commitment. This research contributes to the importance of teacher collaboration in implementing reform, as well as learning about the reform. Teacher commitment is important because it depends on the personality and the attitude of the teacher whether the change will be implemented.

In the conceptual framework that I presented earlier in this study, change in teacher behavior and attitude were shown as changes that took place concurrently. However, findings from this study and others imply that changes in teachers’ behaviors and attitudes must be considered separately in a model. It is apparent that teachers do not always change their behavior and attitudes at the same time. As Fullan (1991) states, there are times when the teacher will change her behavior first and then change her attitude. There were times in this research when teachers started to use the manipulatives and cooperative learning groups, but they were still skeptical about the
As time passed and teachers became more confident with the teaching methods, there were times when their attitudes were more positive and there were times when they were still skeptical about the change.

In revising the framework (See figure 5.1), I would recommend that the variable of teacher collaboration be added to the model. This current work along with research by Lortie (1975), Goodlad (1984), and Rosenholtz (1989) indicate that teacher collaboration is critical to the profession of teaching and learning. Another revision made to the model is that the variable, school climate, determines the type of training experiences teachers participate in and the type of collaboration that occurs in the school setting. The former model shows teacher training experiences outside of the school climate. In addition, I would add the variable resources to the model. If teachers get a certain type of training and do not get the proper type of resources to implement the training, this may affect teacher behavior and attitudes which could ultimately affect student learning outcomes.

**Implications for Practice**

Results of this research indicate that the LaSIP intervention is affecting the classroom practices of teachers in two rural communities in Louisiana. There are several implications that this study may have on state government, local school districts, principals, teachers in particularly rural communities and LaSIP.

**State Government**

This study implies that the decisions that state governments make must be in line with the methods and content that teachers are teaching. In order for reform
Figure 5.1: Revised Conceptual Framework (Jones, T.M., 1997)
initiatives to be implemented at the classroom level, state policies must allow teachers to implement the strategies they learn how to teach. Results from this study imply that teachers list the emphasis of student performance on standardized testing as one limitation to implementing this program. Teachers have indicated limitations in implementing the reform-based techniques because the state's standardized testing system is not fully in line with what and how teachers are being taught to teach. This is important for state governments to be informed about these issues when they are determining the types of testing measures that they will use to measure student achievement. Thus, if teachers are instructing students in one way then the state must be testing them in the same way.

Districts

This reform initiative can teach local school districts a lot about implementing change projects. In my study, the local school districts got involved in the intervention and supported the intervention. On two occasions, the Assistant Superintendent of Coleman parish was one of the Co-Project Directors on the project. In addition, Calais parish hired a grant writer for their school district and wrote a successful grant to the U.S. Department of Education for materials and resources to support the teachers' efforts in these projects. The districts also supported the position of a site coordinator in order to continue supporting teachers who had been through the change process.

Many districts can learn from what happened in this study. Districts must take an active role in change efforts introduced. Direct support from leadership and
financial support from the district must occur to help the interventions flourish.

Districts must allocate resources for specific support personnel important in assisting teachers and principals which will ultimately add to the longevity of a project and its effectiveness. Finally, districts must consider adding a skilled grant writer to their local staff in order to acquire additional resources for schools and teachers in the district.

**Principals**

The results from this study imply that principals need to participate in change efforts if the change is going to be fully implemented in the school. Involvement in the training program will assist principals in understanding the reform so that they are able to fully support the teachers' change. With respect to the LaSIP initiative, principals who have some type of orientation to the change effort will more likely be able to support the increased noise levels in the classroom and the different instructional styles of the teacher.

Principals must also be aware that teachers need collaboration and time must be set aside for teachers to have meaningful collaborative experiences. This includes time for planning, sharing ideas, and discussing visions relevant to the change. In addition, principals must work with teachers to ensure that student discipline does not get in the way of teaching. Student discipline was one area noted by teachers that would inhibit them from being able to fully implement this reform initiative in the classroom.
Teachers

This study implies several things for teachers. Teachers who implement these techniques are more successful with support systems than those who do not have them. These support systems include other peers, one's principal, or a person who works with the program. The study also implies that implementing these techniques can be personally gratifying, but it takes some additional planning time to prepare for classes. The teachers in this study commented that every class is different from year to year and what one class may understand one year may differ in the next year. Thus, one must still prepare for classes from year to year.

In order for teachers to fully implement the techniques, they must be comfortable with discipline in the classroom. Discipline issues can hinder a teachers' success in implementation. However, as this study reflects, teachers who have been able to implement the techniques in the classroom have students that tend to be more engaged and actively involved in learning. Teachers noted less discipline problems because of more active and involved learning.

Teachers in the State of Louisiana must be able to negotiate how to use LaSIP techniques with a current state standardized testing system that is not fully in line with the content and methods taught by LaSIP teachers. The teachers in this study were able to implement reform-based strategies in their classes even with this limitation. They believed that the students were well prepared for the tests and they were also quite confident in their teaching abilities using reform-based techniques.
LaSIP

This study implies that there are some things that the LaSIP administrative staff could do to more effectively implement the program for all students. Apparently, many of the students in the lower classroom levels appear to be actively engaged in the lessons. However, there were several situations in which the African American students were more likely to be placed in punishment or these students were not as actively involved in the lesson. In one instance, out of all the students in the class, two African American students were the ones to fail mathematics. Thus, it is up to the organization to implement strategies that ensure that all students are really understanding the lesson. This may involve some strategies that involve learning about students from many different backgrounds. It may be necessary that teachers are involved in more diversity workshops or classes on multicultural education.

Suggestions for Future Research

Several areas emerged for further examination in this study. One area focuses on examining what is happening in the classes of mathematics teachers who have not participated in LaSIP to identify how they are teaching mathematics. It would be helpful to understand the behaviors and attitudes of teachers that have not implemented the techniques in the classroom. Another area of research would be to look at teachers who are at different phases in the initiative and identify elements that teachers need at each level of the change process. In addition, what would be needed in the future to ensure continuation of the project.
Another important area of research would be to do a longitudinal study. This would include follow-up on the teachers that were observed in this study and other teachers that went through the program. A follow up study that was done in two years and then another study in another two years would be helpful in determining whether changes have continued and whether the intervention continues to be fully implemented.

A study would also be useful to understand how rural settings compare to urban settings. This may be helpful in guiding practices in urban schools, as well as rural schools. There are many studies that focus on schooling in urban communities. However, studies focused on rural areas are more limited and may serve to help guide schools in larger, more complex environments. (This is not to say that the rural school environment is not complex as well.)

Another important area that needs to be addressed is incorporating critical educational theory into this study and other studies on educational reform initiatives. This is important since as Kathleen Weiler (1988) states, “Critical educational theory rests on a critical view of the existing society, arguing that the society is both exploitative and oppressive, but also capable of being changed.” This analysis would add another level of issues to this study. Thus, matters such as class, gender and race would become more central.
Summary

In this study, I provided a detailed description of the implementation of the LaSIP intervention in two rural communities. It explored and described how teachers were implementing the project in the classroom and teachers' perceptions on implementation and training. The observations, interviews, and surveys were done to understand how teachers in rural communities reacted to the program and to guide other initiatives in rural communities. In this study, a conceptual model for teacher change and educational reform was developed to help better understand the process.

An attempt was made to describe each case in detail, providing contextual, and situational particulars that would enable readers to make further comparisons. In this study, the complexities of the teacher change process emerged along with educational reform endeavors.
BIBLIOGRAPHY


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APPENDIX A
CONSENT FORM

April 1, 1997

Dear ___________________,

As an educator and independent evaluator, I am interested in learning more about your experiences with LaSIP and how it has affected you as an educator in a rural community. It is possible that the results from this study will be useful in guiding future projects in rural communities. Currently, funding for a Rural Systemic Initiative Project in the Delta Region is being considered by the National Science Foundation. This includes funding for some parishes in Louisiana (this includes Concordia and Catahoula), Mississippi and Arkansas.

You have been recommended to me as a teacher who could positively contribute to this study. This study will be conducted as a dissertation research project from the College of Education at Louisiana State University. Participation is completely voluntary. The purpose of this letter is to describe the project, explain what your involvement will require and request your participation.

The focus of this investigation will be on how LaSIP has affected your classroom practices. The study will include an interview and classroom observations. The interview should not last longer than an hour and the classroom observations will consist of observing one mathematics class for five days. The information provided by you will be seen only by the researcher and complete confidentiality will be maintained. All names, locations and other identifying characteristics will be changed in order to insure complete confidentiality.

Again participation in this study is completely voluntary and consent for participation can be discontinued at any time without penalty.

A copy of this letter will be given to you. If you would like more information on this project in order to make your decision, or simply if you want to discuss any questions or concerns you might have, please contact Tanya Jones (Home: 504-293-4009) or my advisor, Dr. Kofi Lomotey (Louisiana State University: 504-388-6900).

Respectfully,

Tanya Jones
Louisiana State University

I ____________________________ AGREE to participate in the above mentioned research.

(Your name)

Signature___________________________ Date__________________
APPENDIX B
INTERVIEW GUIDE

General Contextual Questions
1. How did you get into the teaching profession?
2. How long have you been teaching?
3. What are your parents' profession?
4. What do you like best about teaching?
5. What do you like least about teaching?
6. How did you get interested in teaching Mathematics?
7. Are you certified? What type of certification do you have?

General Questions about LaSIP
1. Describe the LaSIP training to me.
2. What was the most valuable part of the training?
3. Why did you go to the training?
4. How have your teaching techniques changed, if they have changed?
5. How has the content of your classes changed, if they have changed?
6. What actually led you to implement the strategies that you learned from the LaSIP training in your classroom?
7. What is your perspective on the current reform movement in mathematics?
8. If we lived in a perfect world, what would you need to be able to fully implement mathematics reform in your classes, if you are not already fully implementing reform in your classes?
9. What mathematics lessons are you best able to teach using reform-based techniques?
10. As a rural school educator, did the LaSIP in-service training cover all the necessary needs of the students? Are there other strategies or techniques that you would recommend that are needed to teach mathematics?
11. Have there been other reform movements or curriculum changes that have been implemented since you have been teaching?
   Follow up: How effective do you think they have been?
12. How do you think students respond to hands-on techniques, manipulatives?
   Follow-up: What about it makes it effective?

Other
13. What were you taught about motivating female, minority and disabled students in math?
14. How has LaSIP prepared you in the area of technology and teaching mathematics?
15. As a result of LaSIP, what types of community partnerships have you developed?
16. What methods of information dissemination been established between LaSIP teachers since your involvement with the LaSIP project?
Follow-up Questions - June 5, 1997

Planning
1. If you were an administrator, how would you restructure the day so that teachers could get more planning time?
2. Has time been set aside for you to plan or share ideas for your math classes this year with your principal? Has any planning taken place for next year with your principal?
3. Has time been set aside for you to plan or share ideas for your math classes this year with other teachers? Has any planning taken place for next year with other teachers?

Reform
1. What do you think about having to change the way math is taught in the classroom?
   a. What do you think about the change process in general?
2. What are your ideas about curriculum reform?
3. How has this change affected your overall teaching?
4. What is your school’s vision for math reform?
5. What is the school district’s vision for math reform?
6. What is your vision for math reform?
   Follow up: Has a vision ever been stated?
7. What do you understand this math reform project to mean?

Implementation
1. What is your motive for implementing this change in the classroom?
2. Why do you go the extra mile to implement this in your classroom?
3. What degree of administrative pressure did you get for implementing this in the classroom?
4. How did your understanding of the curriculum change influence implementing it in the classroom?
5. Compared to things that are really important for you in class, how important is this reform effort?
6. How much do you ‘own’ this change in teaching math?

Extra Initiative
1. How much does the implementation of this project come from your own independent efforts?
2. How has implementation of reform-based teaching in the classroom affected you in terms of energy? time? new skill? sense of excitement and competence? and interference with existing priorities?

Staff Development and Resource Assistance
1. How explicit is the support you get from your principal for using reform-based techniques in the classroom?
2. What type of assistance do you need most? (Huberman & Miles 1984, p.102)
3. What type of assistance do you need in the 1st year, 2nd year, 3rd year?
4. What type of ongoing assistance do you expect to have?
5. How important is other teachers support, ideas, and positive feelings to implementing change in the classroom?
6. Do you know what type of staff development is planned for the next year?
7. How important do you think the presence of a site coordinator or administrator is to implementation and continuation of the reform effort?

Monitoring and Problem Coping
1. How do you handle situations that you are unsure of? Give details.
VITA

Tanya Jones was born in New Orleans, Louisiana on August 22, 1967. She is the daughter of Edward William Jones III and Janet Catherine Jones (formerly Janet Sigur). She is the brother of Edward William Jones IV and Randy Stephen Jones. She graduated from St. Mary's Dominican High School in New Orleans in 1985 and received a bachelor of business administration degree in marketing from Loyola University, New Orleans in 1989. She then worked as a Bond Representative for Aetna Casualty and Surety, Inc., for two years. Tanya then moved to Fort Lauderdale, Florida and worked in the Admissions department at Fort Lauderdale College in Florida.

Tanya received an academic fellowship to the University of Illinois at Urbana-Champaign in the fall of 1992. She was awarded a master's degree in educational policy analysis in the spring of 1994. While at the University of Illinois, she was a research assistant for Dr. William Trent in the educational policy studies department. She also worked as an Educational Specialist at Carle Foundation Hospital in Urbana, Illinois. She entered the doctoral program at Louisiana State University in the fall of 1994, specializing in educational leadership and research. While at Louisiana State University, Tanya was a research analyst for the Louisiana Collaboration for Excellence in Teacher Preparation. She was then awarded a Huel Perkins Fellowship for 3 years and became a consultant to the Louisiana Systemic Initiative Project. Currently, Tanya is doing some consultant work for the Louisiana Collaboration for Excellence in Teacher Preparation and other research grants. She has plans to continue her research and policy interests in New York City or Washington D.C.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Tanya M. Jones

Major Field: Educational Leadership and Research

Title of Dissertation: The Effects of the Louisiana Systemic Initiative Project on Two Rural School Districts in Louisiana

Approved:

[Signatures of Major Professor and Chairman and Dean of the Graduate School]

EXAMINING COMMITTEE:

[Signatures of committee members]

Date of Examination: August 11, 1997