RURAL HIGH SCHOOL MATHEMATICS TEACHERS’ RESPONSE TO MATHEMATICS REFORM CURRICULUM INTEGRATION AND PROFESSIONAL DEVELOPMENT

BY

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DISERTATION
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Abstract

The purpose of this qualitative study was to examine rural high school mathematics teachers’ responses to the initial implementation of Louisiana’s Comprehensive Curriculum during their second year of involvement in a professional development program. The curriculum changes were the culmination of an alignment between standards, curriculum, assessments and instruction which exemplified the shift to standards-based accountability and high-stakes testing characteristic of post-NCLB systemic reform efforts. I further investigated some of the discrepancies between the teachers’ professed beliefs about mathematics and their classroom practices. The research questions probed the responses of forty-seven teachers to the implementation of the Comprehensive Curriculum, their impressions of the impact of the professional development program, and the nature of mathematics as portrayed in the new curriculum.

The study was framed in symbolic interactionism and grounded theory. The concerns and interests of the rural mathematics teachers guided the interview discussions and some of the observations. Data sources included surveys, participant-observations, interviews and other documents. Predetermined and constant comparative coding themes contributed to the constant comparative data analysis. Analysis of the data revealed three major themes that pervaded the teachers’ perceptions of the educational changes they were undergoing: expectations, need for alignment, and big picture. Both teachers and teacher educators agreed that there was a misalignment between the different districts’ goals and foci and they identified strengths and weaknesses in the professional development program.

The implementation of the new curriculum coupled with the professional development program and the pressures for increasing test scores offered me an opportunity to study teachers
during a challenging and uncertain time. The findings of the study may contribute to a better understanding of how teachers perceive mandated changes to their practices as prompted by reforms in mathematics education.
To all who Believed in me and Helped me Along the way
Table of Contents

List of Tables .................................................................................................................. vi
List of Figures .................................................................................................................. vii

Chapter 1 Introduction ................................................................................................. 1
Chapter 2 Literature Review ......................................................................................... 15
Chapter 3 Methodology ............................................................................................... 46

Chapter 4 Louisiana’s Comprehensive Curriculum: Historical and Political Context ........................................................................................................... 67

Chapter 5 Teachers’ and Teacher Educators’ Views of the Comprehensive Curriculum and the Associated Professional Development Program ........................................................................................................... 85

Chapter 6 Teachers’ and Teacher Educators’ Views of Professional Development and Reforms ................................................................................................................... 185

Chapter 7 Conclusions .................................................................................................. 239

References ....................................................................................................................... 248

Appendix A Teacher Survey 2005 .................................................................................. 254
Appendix B Andrea Interview Questions ........................................................................ 267
Appendix C Joanne Interview Questions ........................................................................ 269
Appendix D General Interview Questions ....................................................................... 271
Appendix E Additional Interview Questions ................................................................... 273
### List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Timeline of Study ...............................................................51</td>
</tr>
<tr>
<td>2</td>
<td>Classroom Visits and Observations, 2005-2006 .....................................52</td>
</tr>
<tr>
<td>3</td>
<td>Interviews With Target Participants ..................................................54</td>
</tr>
<tr>
<td>4</td>
<td>List of Data Collected .......................................................................55</td>
</tr>
<tr>
<td>5</td>
<td>Survey Question # 16 ........................................................................188</td>
</tr>
<tr>
<td>6</td>
<td>Survey Question # 17 ........................................................................190</td>
</tr>
<tr>
<td>7</td>
<td>Survey Question # 18 ........................................................................191</td>
</tr>
<tr>
<td>8</td>
<td>Survey Question # 19 ........................................................................193</td>
</tr>
<tr>
<td>9</td>
<td>Survey Question # 20 ........................................................................195</td>
</tr>
<tr>
<td>10</td>
<td>Survey Question # 21 ........................................................................197</td>
</tr>
<tr>
<td>11</td>
<td>Classroom Instructional Strategies ......................................................203</td>
</tr>
<tr>
<td>12</td>
<td>Student Cognitive Activity ....................................................................204</td>
</tr>
</tbody>
</table>
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of activities by version of the <em>Comprehensive Curriculum</em> and course/grade</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>Star-shaped geometric figure</td>
<td>164</td>
</tr>
<tr>
<td>3</td>
<td>Square with diagonals</td>
<td>164</td>
</tr>
<tr>
<td>4</td>
<td>Two examples of possible correct constructions using six toothpicks of equal length</td>
<td>165</td>
</tr>
<tr>
<td>5</td>
<td>Two different orientations of isosceles right triangles</td>
<td>166</td>
</tr>
<tr>
<td>6</td>
<td>Two-dimensional rendering of a tetrahedron</td>
<td>167</td>
</tr>
<tr>
<td>7</td>
<td>A right equilateral triangle in spherical geometry</td>
<td>167</td>
</tr>
<tr>
<td>8</td>
<td>Expectation pairings among stakeholders in the systemic reform</td>
<td>172</td>
</tr>
</tbody>
</table>
Chapter 1
Introduction

Mathematics education seems to have been undergoing changes for more than a hundred years, yet nothing much has actually changed. Starting with the recommendations of the Committee of Ten (late 1800’s), going on to New Math (1960’s), and then the back-to-basics movement (1970’s), mathematicians, teachers, and mathematics educators have experienced many ephemeral changes to the curriculum in American schools. Not only has the content been significantly unchanged but the presentation of that content has remained relatively unchanged. One might infer that the content and quality of instruction have survived the test of time yet test results bring into the question the effectiveness of these long-lived practices. American students are consistently outperformed on international comparisons that place an emphasis on factual knowledge. In response, the Trends in International Mathematics and Science Studies (TIMSS) (1995, 1999, 2003) were designed to gain insights into the implementation of a reform curriculum by examining the professional development learning of mathematics teachers and their responses to the state-wide mandated curriculum.

The mathematics teaching community and those who study the effectiveness of students’ skills in and understanding of mathematics worked together to determine standards for mathematics curriculum and evaluation and several publications have ensued (NCTM, 1989, 1991, 1995, 2000). Although these standards have served as valuable discussion documents, many teachers, especially those in rural areas, remain relatively unfamiliar with them. Due to the lack of research on rural mathematics teachers and their students, the mathematics education community knows little about the practices and unique needs of rural teachers who are faced
with these and other reforms. In many instances these documents are far more than “valuable discussion documents” as they have been used to establish policy and curricula in mathematics.

The research questions guiding this inquiry were: (a) What are the mathematics teachers’ and teacher educators’ understanding of and reactions to *The Comprehensive Curriculum* and the professional development program associated with its implementation? (b) What are the mathematics teachers’ and teacher educators’ views of professional development and reforms? Utilizing primarily qualitative research methodologies augmented with quantitative analysis in the initial stages of the study, I studied and documented the implications of mathematics education reforms for secondary mathematics teachers in a rural high school in Louisiana. I examined the mathematics teachers’ understanding of recent mathematics reforms, in particular the *No Child Left Behind Act* and the state-wide implementation of the *Comprehensive Curriculum* in Louisiana schools. More specifically, I sought to understand the teachers’ reactions and responses to these reforms and to the professional development activities associated with them.

**Rationale**

I was prompted to pursue this research for numerous reasons. Among these reasons were the reported underperformance of American students, the current education reform efforts, the increased emphasis on test preparation and accountability at all levels, and the lack of research on rural schools. I wanted my contributions to the field of mathematics education to be significant in informing the broad education community—teachers, students, parents, educators, administrators, politicians—of the present status of mathematics education in at least one small
community. Rather than engage in a global study, I questioned exactly how the teachers in the trenches were making sense of and responding to reform efforts and the political climate.

National and international assessments such as the National Assessment of Educational Progress (NAEP), the Trends in International Mathematics and Science Studies (TIMSS), and the Program for International Student Assessment (PISA) consistently report that American students score at about the international average in mathematical literacy, content knowledge and problem-solving skills. Typically, among American students, the middle school students have performed better on such mathematics assessments than the high school students. Various reports in the past, such as A Nation at Risk, The Neal Report and America 2000, have attempted to draw the attention of policy makers, educators, and the general population to this unsatisfactory state of performance.

The report A Nation at Risk, published in 1983 by the National Commission on Excellence in Education, called for “responsibility,” “care,” and “courage” in addressing the dismal state of the American education system. Among the indicators of the risk are testimonies to the effect that “many 17-year-olds do not possess the ‘higher order’ intellectual skills we should expect from them” and “only one-third [of those] can solve a mathematics problem requiring several steps” (p. 9). There were concerns about this generation of Americans who were growing up “scientifically and technologically illiterate” (p. 10). The recommendations included a call for educators to update the textbooks and “other learning tools” to “assure more rigor” (p. 28). The general recommendations included higher standards, tougher graduation requirements, better prepared teachers, longer school days and school year, as well as more homework for students. Critics of this report complain that the reforms that followed A Nation at Risk have neglected income and racial inequalities and have failed to bridge the “achievement
gap” especially between white and minority students (Oakes, 1990). A Nation at Risk is credited with paving the way for the No Child Left Behind Act. Many of its recommendations can be found in the NCLB, such as the emphasis on higher standards and greater accountability at all levels. Still, some of the recommendations of A Nation at Risk never materialized. Among them are increased teacher salaries, financial rewards and incentives for the best teachers.

While A Nation at Risk focused mainly on high school education and NCLB initially centered around elementary schools, some reports made recommendations to strengthen collegiate education. One such document is the Neal Report of 1986. It captured the attention of educators, politicians, and policy makers by raising serious questions about issues critical to any reform in education. The Neal Report called for improved collegiate education in the name of strengthening the American leadership in science and technology. (Note that this was also a popular refrain from the time of the Industrial Revolution and the launch of Sputnik.) A strong undergraduate education was perceived as vital to having “the best technically trained, most inventive and adaptable workforce in any nation; and to have citizenry able to make intelligent judgments about technically-based issues” (p. 2). In response to this and other reports, the National Science Foundation invested close to $50 million over the next eight years on Calculus reform. Overall, the findings of these reports brought to the attention of policy makers and educators the importance of financial support for the success of their recommendations. This financial support took many forms. Among them were increased spending for teacher professional development and teacher training, textbook improvement, and technology implementation.

The 1990 report Reshaping School Mathematics (Mathematical Sciences Education Board) emphasized the need for a new school curriculum that would address the changes in the
role of technology (primarily computers and hand-held calculators) as well as changes in the understanding of how students learn: “mathematics is a creative, active process very different from passive mastery of concepts and procedures” (p. 12). In line with this thinking, William McCallum reminded educators in 2000 that traditional calculus only introduced students to techniques and procedures, and not to “flexible skills” (Ganter, p. 13). Furthermore, this traditional emphasis on rigor led to an undesirable uniformity of the curriculum.

The national program America 2000 was set up to implement the National Education Goals adopted by President George H. W. Bush and the state governors in 1990. Goal four in this program states that “U.S. students will be first in the world in science and mathematics.” The Third International Mathematics and Science Study (TIMSS), funded jointly by the U.S. Department of Education and the National Science Foundation in 1995, was set up to measure the progress toward that goal.

Despite all the reports and programs mentioned above, American students failed to succeed on international tests such as TIMSS and PISA. Not only were American students outperformed by their peers in numerous other countries, but American students of low-socioeconomic status and minorities underperform at even greater rates than their more affluent and white counterparts (Secada, 1992). These findings created concern in those who believe that in a democratic society all students should have access to mathematics. This idea prevailed in many democratic countries, as can be seen in this excerpt from an Israeli report that was discussed at the 1998 University of Chicago School Mathematics Project (UCSMP) Conference on Mathematics Education:

Mathematics, the natural sciences and technology are growing in importance, especially for future scientists in the coming millennium. Hence, it is our duty and privilege, as educators, to provide all students with mathematical knowledge and thinking
processes, so that they may be fruitful, constructive citizens in a democratic society. (NCTM, 2000)

This focus on all students and a commitment to their learning are expressed in various reports over the years. From *Everybody Counts* (1989) to the *No Child Left Behind Act* (2001), legislators, politicians, and educators profess an interest in the education of all students, and especially of those of low socioeconomic status and minority students.

In the state of Louisiana, policy-makers and administrators instituted a state-wide educational reform that has been implemented at the K-12 level since 2005. This reform was characterized by the mandated use of the *Comprehensive Curriculum* which was supposed to align content, instruction and assessment. The *Comprehensive Curriculum* strove to provide uniformity in major content areas, such as mathematics, and prescribed activities that allow the use of different instruction strategies. The state mandated that all content of the curriculum be taught in all schools in addition to the previously chosen curricula adopted for use by individual schools and schools districts. During my study the *Comprehensive Curriculum* was at the beginning of its implementation phase as Louisiana schools embarked upon their first academic year of using it in their classrooms. My data collection ended before the continuation and outcomes phases of the *Comprehensive Curriculum* reform phases that according to Fullan (2001, p. 47-48) are necessary to make systemic reform complete.

Although studies of mathematics reform in rural schools are almost nonexistent, more general research highlights the needs of rural schools. According to a study conducted by the Rural School and Community Trust (2005), the state of Louisiana was one the top ten states in the country that needed to address the dire needs of their rural schools. In this study the states were ranked based on the importance of rural education to the state and the urgency of rural school needs. In addition, according to a growing body of research on rural education, rural
communities nationwide have problems attracting and keeping qualified teachers due to low pay and poor working conditions. Now, in addition to the high expectations placed on rural teachers, such as teaching multiple subjects and helping with extracurricular activities, rural teachers also have to comply with the mandates of the NCLB Act and the Comprehensive Curriculum.

In the existing research on schools, rural schools are greatly underrepresented. While they serve a large percentage of American students they remain invisible in the research studies. Many years have passed since Alan Peshkin’s (1978) exemplary qualitative research account of life in rural communities and the importance of the rural schools for their well-being. With the rise of systemic reform and federal legislation such as NCLB, rural schools are facing new challenges in meeting the demands and mandates of these reforms.

**Personal Theoretical Framework**

As a graduate student in mathematics and mathematics education I realized that when a researcher believes that there is an objective truth that needs to be identified and can be identified, then she is likely to employ in her research a theoretical perspective, methodology and methods that are influenced in large part by this theory of knowledge. This objectivist research is frequently incorrectly associated with quantitative methods while the constructionist or subjectivist research is associated primarily with qualitative methods. In fact, many of the current qualitative methods have been carried out in the past in research that is positivist in nature. Conversely, constructionist and subjectivist research do not rule out the use of quantitative methods. Unfortunately, a large volume of knowledge, mostly in the form of qualitative inquiry, is being ignored or suppressed by labeling it as “non-scientific” due to prevailing positivist methodologies (AERA, 2003; Horn, 2004). After studying the tenets of
qualitative inquiry, I came to realize the care and diligence that go into this kind of work, as well as the openness and passion that characterize the individuals committed to qualitative research. I now appreciate the contributions of this type of research as one that avoids simplifying social phenomena (by quantifying them) and instead allows the researcher to explore multiple perspectives and explore a wide range of behaviors.

As a result of my initial exposure to qualitative research, I realized that I have a choice in the research specializations I desire to pursue. I remember Alan Peshkin’s account of becoming a qualitative researcher (Glesne, 1992). Unlike him, I felt at home in the world of numbers. I would likely be as equally comfortable doing quantitative research, but I feel that the questions that I pose and the relationships that I study are best addressed through qualitative methods. The variables that concern me are complex and difficult to measure or quantify. Just as in quantitative research, I rely on a theoretical framework in my work. As in quantitative reporting, research reports still contain the established components: a stated purpose and research questions, a literature review, research design and methods, an established time frame, methodology that elaborates on collection and analysis of data, and a presentation of findings/outcomes, as well as limitations of the study.

Not only is my view of the nature of the mathematics deemed unorthodox to many students, but my view of research is viewed as unorthodox or perhaps merely inappropriate by many as well. With the signing into law of the No Child Left Behind Act almost eight years ago and the emphasis on validity of research, I am in the minority again since I am interested in pursuing predominantly qualitative research. While I do not deny the value and established position of quantitative research, qualitative inquiry allows me to delve deeper into questions of interest to mathematics educators and still claim an adherence to the “systematic observation,
competent analysis, and rigorous classification” (Brownell, 1948, p. 495) attributed to scientifically-based research.

In my earlier research projects on high school students’ problem solving and mathematics anxiety in pre-service elementary teachers, I unknowingly assumed the role of a participant observer in part due to my personality. I liked interacting with the participants and feeling that I was in the middle of what was going on. This probably explains why I could never see myself as a distant, unapproachable researcher who pretends to be “a fly on the wall” while the research process somehow unfolds around me. I developed a relationship with my participants prior to the studies and several of these relationships continued after the completion of these projects as well. I learned that developing relationships with participants opens doors to understanding that otherwise remain closed to researchers. Following these previous research experiences, I was able to approach the dissertation study in a more mature way where I set some boundaries in the relationships. Most of the teachers who participated in this study accepted me as a partner in their classroom and spoke to their students with respect about me. Furthermore, they sincerely valued my contributions to their teaching and sought my ideas to improve their everyday practice.

Over the course of the last ten years that I have spent teaching high school and college students and working closely with pre-service and in-service teachers, I recognized many of the challenges that students and teachers face. I dealt with student apathy and math anxiety as I tried to provide opportunities for my students to enjoy the beauty and richness of mathematics. I used a variety of teaching methods and technology tools to reach out to the different needs of learners and to make mathematics more accessible to all of my students. Now through this study I bring
valuable insights to the areas of mathematics reform, professional development, teaching and rurality in high schools.

**Theoretical Framing of the Study**

As a researcher I seek to understand meanings and perceptions on the part of the people participating in the study and to view their understandings against the backdrop of their overall worldview. Therefore, I strive to view things from the perspective of the participants. In the kind of research that I do, I value people’s unique experiences. Each person’s way of making sense of the world is equally valid and valuable. Such assumptions on my part influence my choice of methodologies. I use symbolic interactionism as my theoretical perspective because it best sums up my assumptions at the present time. Integral to symbolic interactionism are issues of communication, representation, language, relationships and community. It is through these interactions that the perceptions, attitudes, and beliefs that I studied were formed.

Robert Prus (1996) defines this interaction as “the study of the ways in which people make sense of their life-situations and the ways in which they go about their activities, in conjunction with others, on a day-to-day basis” (p. 10). Although multiple versions of this perspective exist, the classic or canonical Blumer-Mead version is committed to the following three simple premises: (a) People act towards things and other people based on the meanings that the objects and people have for them; (b) The meanings of things arise out of the process of social interaction; and (c) The meanings are modified through an interpretive process which involves self-reflection and symbolic communication among people (Blumer, 1969).

The presence of all three premises makes symbolic interactionism appropriate for my study. The first premise alone is not unique to symbolic interactionism as it is shared by other
theoretical approaches such as constructionism. It suggests that people make meanings themselves rather than simply receive meanings as stated to them for others. The second and third premises are more unique and because of them symbolic interactionism stands out among theoretical approaches. As such, these two premises are also vital elements of my framework. The second premise refers to the source of meaning. Meaning is viewed neither as inherent in the thing that has it, nor is it a figment of someone’s mind. Instead, meaning is reached in the process of interaction among people. The third premise suggests that meaning is developed and negotiated as a social product. In sum, the interpretation process through which meanings are reached begins with an individual person who engages in a process of communication with himself: “[t]he actor selects, checks, suspends, regroups, and transforms the meanings in the light of the situation in which he is placed and the direction of the action” (Prus, 1996, p. 5).

Symbolic interactionism supports my personal theoretical framework. I believe that in our everyday lives we act as social beings—we interact with others and we are influenced by our interpretations of these interactions with others. Regardless of the many definitions of the same object that may exist, we ultimately strive to develop shared definitions of our worlds and our experiences. In symbolic interactionism objects are things that can be indicated or referred to. They become common objects when several people have the same meaning for the objects. Objects can be classified in three categories: (a) physical objects, such as textbooks and school buildings; (b) social objects, such as students, teachers, school administrators, and (c) abstract objects or ideas such as equity and equality.

All social interactionism is not symbolic. Blumer (1969), crediting Mead, identified two levels of social interaction in society: non-symbolic interaction and symbolic interaction. Non-
symbolic interaction is associated with immediate and unreflective responses while the latter involves interpretation of the actions.

In this and in former studies, in order to understand the processes through which the participants made sense of and created meanings of teaching and lesson planning, teaching anxiety and math anxiety, I was attentive to what they said and also their written reflections on these and related topics. I made an attempt to understand their perspectives by interacting with them to learn more about their own definitions of the above-mentioned topics. Thus I studied what the prospective elementary teachers took into account and how they interpreted information. By listening to and interacting with my participants, I was able to share in their lived experiences and come closer to an understanding of them. The symbolic interaction perspective allowed me to gain a respect for the research participants by entering their worlds. This was accomplished by bridging the “us” vs. “them” divide and abandoning the claim that it is possible for a researcher to be an unbiased observer. Kathy Charmaz beautifully described the curiosity that drives researchers to pursue this highly humanistic research process as “a curiosity born through authentic interest, aimed toward understanding, and tempered by compassion” (Prus, 1996, p. xii-xiii).

Like me, other researchers are interested in developing a familiarity with the language of the community they study. According to Prus (pp. 19-21, 1996), such researchers generally employ three major methods for data collection: observation, participant-observation, and interviews. By means of these three data sources they become familiar with the world of their participants. For these researchers observation adopts a meaning beyond simply watching and listening. Observation also includes the use of artifacts or documents. Using artifacts alone offers only a limited picture of the people and/or situations under study, because the researcher
would have to make extensive inferences regarding the participants’ meanings and intentions (Prus, p. 20). But together with watching and listening, the use of artifacts enriches the researcher’s understanding of the participants’ perspective. I used teachers’ lesson plans, survey responses, field notes, Louisiana State Department of Education state reports and other written materials as detailed in my methodology section.

I also used participant-observation as a way of coming close to and sharing in the participants’ experiences. As Schwandt (2001) describes it, “participant observation is a means whereby the researcher becomes at least partially socialized into the group under study to understand the nature, purpose, and meaning of some social action that takes place there” (p. 186). Ideally, by means of participant-observation researchers can build a more personal relationship with their participants; a relationship built on mutual trust and openness. I began this building of relationships with area mathematics teachers and teacher educators at the beginning of the study when I expressed an interest in working with local mathematics teachers. I followed this initial engagement with educators by working closely with mathematics teachers at a workshop and in a professional development program. Some of the difficulties that I had to overcome to build these personal relationships are detailed in Chapter 3.

In addition to artifacts and participant observation, I conducted semi-structured interviews with my target participants. With the help of this data source researchers can further inquire into the participants’ experiences and learn more about how the participants make sense of the experiences. In past studies, I used all three methods of data collection to gain an understanding of how the future elementary teachers’ views of the nature of mathematics connect with mathematics anxiety. In the present study I again used all three data sources and in addition I expanded the domain of participants and the length of time for building relationships
and for data collection. I used grounded theory methods to conduct rigorous qualitative research. A full description of my methodology can be found in Chapter 3.

**Overview**

The report of this study is presented in six chapters. The following chapter, Chapter 2, provides a review of literature on the nature of mathematics, rural schools, mathematics reform efforts and professional development. Chapter 3 outlines the methodological framework of the study, data collection, and analysis implemented in this study. The chapter concludes with a description of the setting and participants. The historical and political context in which the *Comprehensive Curriculum* was developed and implemented can be found in Chapter 4. In Chapter 5 I address the first of the two research questions that guided this study. I delve into the mathematics teachers’ understanding of and reactions to the new curriculum and I conclude the chapter with a discussion of the major findings organized in themes. Chapter 6 contains the teachers’ responses to systemic reforms in Louisiana. The final chapter, Chapter 7, provides a brief summary of the study, my findings, implications for further research in mathematics education, limitations and recommendations.
Chapter 2

Literature Review

In this review of research literature I begin with literature on the nature of mathematics and place a special emphasis on two opposing views of the nature of mathematics, namely the absolutist and fallibilist views, and their implications for teaching mathematics. I also examine the limited available literature on rural schools and the challenges they face. Of important consideration is also reform in mathematics education--both in content and pedagogy. The literature review is complete with a brief exposition of professional development programs including recent efforts for improving professional development. While I conscientiously reviewed literature prior to the beginning of the studies I conducted, I have learned from experience that the literature review is an ongoing process that cannot be considered complete until after the data collection and analysis are completed. I chose to conclude this chapter with an outline of the theoretical framework used in this study. This framework was distilled from analysis of research literature and in-depth study of various embedded theoretical frameworks and methodologies.

The Nature of Mathematics

I was fascinated to learn how mathematics teachers’ views of the nature of mathematics affect their practices and how in turn their everyday teaching may possibly challenge some of their deeply held beliefs about mathematics. The educational consequences of the absolutist and fallibilist paradigms of the nature of mathematics, as defined by Ernest (1991), draw mixed reports. Although the paradigm’s effects on student achievement are debatable, one of the views leads to empowerment of the learners and the other one brings about disempowerment and
alienation. I examine some alternative non-traditional approaches that educators have introduced to enhance understanding. Through these approaches mathematics is seen as a journey and not a destination, or as Ludwig Wittgenstein (1956) aptly described it, mathematics is a collection of norms, rather than a body of truth(s). I was interested in particular in studying how the mathematics teachers’ perceptions of the nature of mathematics influence their response to recent reforms.

Before looking at the two epistemological perspectives of mathematics that I have introduced, I offer a close examination of the nature of mathematical knowledge. In mathematics, knowledge consists of a set of propositions and their proofs. These propositions are known as postulates and/or axioms, and many students become familiar with some of them when they study Euclidean geometry (in relation to Euclid’s five postulates as stated in Euclid’s *Elements*, 1956). There is a certain sense of certainty to mathematical knowledge since, unlike other scientific knowledge, empirical knowledge is unnecessary to verify the propositions. Instead, the proofs are based on reasoning and logic alone, and thus the mathematical knowledge can be described as apriori knowledge. What I mean by apriori knowledge or apriori truth here is that it can be known independently of any experience. Postulates or axioms are treated as basic truths upon whose certainty new knowledge is built. Since we may believe that we start with truths, any new theorems founded on these truths would also be considered true. Therefore mathematical objects are products of human invention, unlike in the physical sciences where we have natural objects such as rocks, animals, plants, etc. Mathematical objects come about as a result of a need to know or problem solve in our daily lives and they arise from already existing mathematical objects.
In his book *The Philosophy of Mathematics Education* (1991), Paul Ernest discussed two epistemological perspectives of mathematics—the absolutist and the fallibilist. I do not claim that this dichotomy is necessarily the best way to classify views of nature of mathematics but it is commonly accepted and used in many research studies. Some people may question the possible existence of a middle ground. However, after my discussion of the two views you too may become convinced that no middle ground exists; either mathematics is certain or uncertain (which could be in varying degrees), value-free or value-laden, objective or subjective, theoretical or applied.

I would agree with Paul Ernest that mathematics has been dominated by what he calls an absolutist paradigm for a long time (he claims that this has been the case for over two thousand years). From this perspective mathematics consists of truths that are treated as absolutes. According to this paradigm mathematics is a value-free body of infallible and objective truths that is removed from reality and the people who study it. The certainty of this kind of mathematics is left unquestioned by most learners. Mathematics bears no social responsibility if it is accepted as a body of infallible objective knowledge. Therefore, the unequal representation and participation in mathematics by certain groups such as women and minorities, the alienation from mathematics experienced by many students, and the role mathematics plays in the distribution of wealth and power (often seen as a filter or gatekeeper) are not issues relevant to the study of mathematics.

On the other hand, mathematics could be regarded as an unfinished product, a continually growing field of human contributions. Without prior assumptions, mathematics would be uncertain. Trying to establish the certainty of these assumptions by proving them would lead to an infinite regression. No matter how much we reduce the number of assumptions to a
“manageable” set of axioms/postulates, the latter would still have to be proved to ensure their certainty. These axioms may be replaced by another set of similar statements, but they cannot be completely eliminated. These assumptions then are merely beliefs, not knowledge, and as such they are subject to change and open to challenge. Not only are the assumptions uncertain, but so are the rules that govern the underlying logic that is at the base of mathematical proof, because logic itself rests on a set of assumptions. As Hersh (1986) pointed out, mathematical truth is “fallible and corrigible.” This fallibilist view of mathematics welcomes human contributions and values input from all participants.

A turning point in the case for shifting the public’s attention to the fallibilist view of mathematics was the proof of the Four-Color Theorem (4CT) (Tymoczko, 1986). Known for centuries as the Four-Color Conjecture, it states that four colors suffice to color any map. The 4CT is the first mathematical proposition that is not an apriori deduction of a statement from premises and thus is to be known aposteriori. While part of the proof of this theorem has the usual formal and rigorous format, it also introduces empirical experiments to mathematics. The proof uses computers and computer logic to fill in a gap, thus relying on a machine and a program, which makes it impossible to check in the usual ways associated with formal mathematical proof. Thus this conjecture would not be regarded as a theorem if we expect it to be known independently of any experience (a priori truth) since the 4CT is not known by reason alone.

Belief in the certainty of mathematics must be based either on empirical experiences (no known contradictions or inconsistencies exist in the present mathematical systems) or on faith. Proponents of the absolutist perspective fail to agree that either one of these beliefs can lead to a justification of the absolutism of mathematics.
Even if mathematics were neutral and objective, the same cannot be said of the teaching of mathematics which is intrinsically value-laden. So then we need to consider what the consequences of the absolutist and fallibilist views of mathematics are in the context of education and schooling. One consequence of the dominant epistemological perspective of mathematics—absolutism—leads to the alienation and disempowerment of the learners, and these can often be expressed in what is defined as math anxiety or math phobia. The fallibilist view, on the other hand, could lead to the empowerment of learners to create their own mathematical knowledge. Students may come to believe that their contribution to mathematics is important and valued by others. This perspective of mathematics would allow school mathematics to be made flexible so that more students see the beauty of the subject and benefit from the wealth and power that mathematical knowledge can bring. This kind of mathematics would be seen as relevant to the learner’s lives and it would take into consideration the different learning styles, cultures, languages and backgrounds of the people who engage with it.

Mathematics Anxiety

Several theoretical perspectives have informed the empirical studies that I read as I prepared for my dissertation research, and many helped me gain a valuable understanding in seemingly minute but actually major differences in approaches to the same idea. For instance, many studies established a connection between the students’ often negative attitudes towards mathematics and their beliefs about the nature of mathematics, as often attributed to communications between them and their teachers. Two theoretical perspectives have largely influenced many of the empirical studies that I reviewed, namely studies involving the
motivations and commitment of elementary, secondary and tertiary students in their pursuit of education.

The dominant perspective is known as the intervention perspective. It locates the problem of mathematics anxiety in the learners and assumes that this condition will persist until they come to terms with their problems. Proponents of this perspective naively believe that the students will overcome their mathematics anxiety once they acknowledge “their ignorance of consequences, their faulty beliefs, their mathophobia” (Kaiser & Rogers, 1995, p. 6). Furthermore, the intervention perspective seeks to find the deficit in the learners, and does not question the power structure of schooling as a whole, the nature of mathematics in particular, or the role of the teachers in transmitting not only mathematical knowledge but also their values and beliefs to the students. This perspective treats mathematics as a set discipline that more or less demands submission to its rules if one wants to be successful in mastering it. There is no concerted effort to portray mathematics as a more open discipline. Instead, the view is that everyone needs mathematics and not that mathematics needs diverse people who can make meaningful contributions to the discipline. Sheila Tobias (1978), who coined the term “math anxiety”, focused her work on the mathematics anxiety of individual students. Her approach used mainly clinical psychological means and relied on the assumption that mathematics anxiety is a learned behavior and can therefore be changed.

In contrast, the discipline perspective questions the mathematics itself, and not the learners. From this theoretical viewpoint there is no assumption that girls, minorities and the economically disadvantaged students are in need of re-socialization so that they fit the mold. Instead, the nature of mathematics itself is problematized. Researchers and educators who consider mathematics anxiety through this lens recognize that students who experience this
condition are not the objects in need of a correction or compensation (Mura, 1995). The view of mathematics as set, neutral, and unbiased is recognized as invalid, because a defense of value neutrality is nothing more than a defense of the status quo. The nature of mathematics is acknowledged as being socially constructed, dynamic, and flexible. (By ‘socially constructed’ I mean mathematics that is recognized as being the product of the group that is using it.) This kind of mathematics is established by means of dialogue and negotiation, a process through which the members of the learning community construct the meanings of different terms and constructs together.

Benn & Burton (1996) make an excellent point about the critical philosophical differences that mathematics practitioners (teachers, mathematicians) may associate with mathematics. They argue that at the core of the problem of “maths phobia” is how different people think about the nature of mathematics (p.405). While some people may view mathematics as rigid and disconnected from real life and human experience, others consider mathematics to be constructed in a dialogic process that is grounded in historical, cultural and political influences that are an inseparable part of mathematics. This kind of mathematics is “a negotiated journey, a quest and a voyage of discovery” (p. 405), and it can be facilitated in ways that are enjoyable and useful to students’ lives.

The discussion so far in this section was limited to philosophical paradigms about the nature of mathematics, and the possible advantages of the non-absolutist set of beliefs for empowering student. On the practical side, the Access program in Great Britain (Benn & Burton, 1996) and Cognitively Guided Instruction (Carpenter et al, 1999) are examples of well-recognized and established programs that raise students’ awareness about the nature of mathematics and allow them to make connections between their informal and formal knowledge.
The authors of the first study openly support a non-absolutist view of mathematics and the Access program is a reflection of their views.

Other more traditional programs may not focus their resources on the eradication of math anxiety by means of questioning the nature of mathematics. Some of the causes for mathematics anxiety as identified in the research articles I examined earlier include parent, teacher and peer anxiety, as well as societal, educational and environmental factors. A strong argument is made for connection between math anxiety and negative classroom experiences, associated with certain instructional methods and the quality of the instruction. A study conducted by Presmeg (1986) showed that students’ views of mathematics can enable or constrain the making of connections between everyday activities and the mathematics they study in school or in college. Kloosterman (1986) found contradictions in the student responses between believing that memorizing is very important in mathematics but also that some people can be successful in mathematics without memorizing.

Very few of the articles actually suggest that the problem may be compounded by the nature of mathematics as portrayed to the students by their teachers. Krussel (1998) brought up challenges associated with the language of mathematics, language that could be perceived by learners as a “confusing array of disconnected facts, rules, and definitions” (p. 437). When referring to mathematics Tobias (1993) made the comment that mathematicians would insist that mathematics is not “fuzzy”, “[b]ut it is often taught fuzzily” (p. 56). As a feminist educator she brought to the surface the issue of the systematic socialization of women to avoid mathematics. Also writing from a feminist standpoint that allows the parallel existence of a multiplicity of truths, Damarin (1995) urged her readers to “abandon beliefs about the nature of mathematics
and how it must be taught and learned in order to be open to the ‘nature’ of mathematics as it is experienced” (p. 248).

The calls for reform in mathematics education over the past 40 years are reflected in the NCTM Standards where special emphasis is placed on process standards that portray mathematics as a dynamic and growing discipline. In line with the recommendations of the National Council of Teachers of Mathematics (NCTM) (1989, 2000), Fiore (1999) argues that teachers should focus on mathematics content and understanding, “because the more the student understands, the less math anxiety the student will have” (p. 405). Fiore’s argument connects well with the fallibilist perspective of mathematics in that it urges teachers to dispel the mystery behind the mathematics students learn.

Teachers’ perceptions of the nature of mathematics play an important role in the development of school curriculum and the enactment of curricula in the classroom. The teachers’ views of what mathematics teaching should look like in the classroom are shaped in large part by their views of the nature of mathematics.

**Rural Schools**

In addition to the influence of the nature of mathematics, the impact of the environment within which teachers and students experience mathematics plays a part in teaching and learning mathematics. Historically, American rural schools have been meeting more than the pedagogical objectives of the communities they serve. They are social, cultural, and recreational centers as well. However, their impact can oftentimes be felt only locally due to their geographical isolation. Overall, rural schools appear to be the least studied category of schools. The emphasis on urban and sub-urban schools in the research community still greatly surpasses the focus
placed on rural schools. Access alone provides researchers with greater opportunities in suburban and urban schools. In 1992 Anne Lewis, a writer for the Phi Delta Kappan, made the statement that rural public schools are as invisible as urban public schools are visible. More than a dozen years later this is still the case in research publications.

Yet, a substantial number of students attend rural schools all over the United States. According to a frequently used definition, rural schools serve communities with up to 2,500 residents. Depending on the source, minor discrepancies appear in the number or percentage of children attending rural schools and the number of the schools. According to the National Education Association, forty percent of American students attend rural schools, but only twenty-two percent of federal education funding is allocated for these schools. The U.S. Department of Education claims that slightly less than one-third of students go to rural schools, and that forty-three percent of schools are in rural communities. A lack of clarity in the very definition of rurality may be a detraction to researchers.

Many of the rural schools lack the public support from parents and the community in comparison to more affluent school districts with a larger college-bound student population. In addition, an emphasis on testing and test preparation may disenchant some rural parents about the benefits of their students’ education. Because of the special attention paid to reading, mathematics and science, parents may become disinterested with their students’ education since other subjects like art, music, and foreign languages would take a secondary place, and possibly disappear from the school curriculum altogether. Thus the quality and richness often attributed to public schooling is likely to fade in rural communities. According to NCLB, with the start of the 2006-2007 academic year, all schools have to employ only “highly qualified teachers,” which
may be a particularly challenging requirement for rural areas since teachers do not seem to flock to rural areas.

In more practical terms, rural schools are subject to the same level of accountability as are urban and suburban schools. Although the amount of research that pertains to rural schools is quite limited, some conclusions about rural schools and communities can be drawn from findings about low-income or poor students. For example, the 2003 assessment administered by the Program for International Student Assessment (PISA) revealed that low-income 15-year-olds were outscored by students with higher socioeconomic status. A study of the mathematics scores from the 1992 National Assessment of Educational Progress (NAEP) concluded that 89 percent of the difference in state scores can be explained by the following variables: number of parents living at home, parents’ educational background, type of community [e.g. “disadvantaged urban”, “extreme rural”], and state poverty rate. Unfortunately, these variables were not considered in relation to the quality of instruction, or whether or not the teachers were “highly qualified”, etc. Numerous other examples of studies support the common finding for the studies described above, namely that poverty level is the main predictor of the differences in test scores. Thus high poverty rates in rural schools might predict low test scores.

At the same time that rural schools remain unrepresented in research, they continue to serve about 40 percent of American students, and about 95 percent of rural districts receive some form of Title I funds based on the low socioeconomic status of the communities served. The strong correlation between students’ socio-economic status and achievement is well documented (e.g. Oakes, 1990; Secada, 1992). Therefore, attaining academic excellence in rural areas is likely to be particularly challenging due to the threat of labeling schools as “failing” for not meeting their Adequate Yearly Progress (AYP), as dictated by NCLB.
Some of the greatest challenges that rural teachers encounter currently are the mandates of NCLB. These mandates may be almost impossible to meet especially since many rural teachers may be unfamiliar with them and unclear on the details. For example, many of the teachers with whom I worked in the professional development program had never heard that they could take advantage of a $400 deduction per year for out-of-pocket expenses as part of NCLB. They could have used that money toward improving their classrooms or professional self-improvement.

Due to the geographical and professional isolation of rural communities, rural teachers may be unaware of the new expectations placed on them and their students. Usually such information is disseminated by education administrators and researchers, as well as policy makers and politicians. Not only is teaching a very isolated profession (Lortie, 1975), but this is especially true for rural teachers. Rural teachers must strive to stay up-to-date on education reform and remain informed of present research. At the same time, they encounter firsthand the harsh realities of life and schooling in rural areas. Staying grounded in the community and its needs is one of the primary reasons why teachers who come from rural communities are best prepared to meet their needs. Therefore many urban and sub-urban teachers will not be able to connect with rural students and their communities. They may feel like transplants or misfits there. Regardless of how knowledgeable they are of the content and pedagogy, they may struggle with these unfamiliar surroundings.

Despite the challenges of teaching in rural schools and the added pressures for increasing student performance in certain subjects, NCLB has hidden promises for teachers. The greatest promise of NCLB remains flexibility in improving student performance. School districts are able to use their own assessments and set their own “passing” cut line. Rural schools in general
offer smaller and fewer classes, therefore teachers there are expected to teach a variety of subjects even at the high school level. Although teachers had until the end of June 2006 to meet the national requirement for “highly qualified” teachers, those teaching in rural districts who were highly qualified in one subject had an extra year to prove they were qualified in the other subjects they teach.

The distribution of financial resources based on school performance requires a re-evaluation. If some schools are already falling behind, they need more help, not less. However, NCLB threatens to take away funds from poorly performing or failing schools. Instead of allocating more money and resources for the schools in dire need, this legislation takes away from them the little they have. The students at these schools need improved access to effective teachers and technology and should not have to suffer as a result of mandates.

In order to address the relatively low pay of rural teachers, at least two states so far have equalized teacher salaries (Collins, 1999). Furthermore, there is a nation-wide renewed discussion of merit pay. If these recommendations are adopted by states and districts, rural teachers can receive competitive salaries for outstanding work. Other ways of improving rural schools and encouraging more qualified teachers to teach in rural areas are through the creation of supportive parent-school and community-school partnerships, in addition to mentoring programs for new teachers. Individuals who contemplate entering the teaching field in rural areas would be more likely to become effective rural teachers if they have the opportunity to be a part of teacher education programs that target rural education.

Last, but not least, educators need to set high expectations for the Rural Education Task Force formed in 2003 and the brand-new Center for Rural Education. Appointed by former Secretary of Education Rod Paige, the members of the Rural Education Task Force were
supposed to help address and possibly resolve some of the unique challenges faced by rural schools. However, so far there has been little mention of its work in the research literature and the reports of the Department of Education.

**Mathematics Reform and Educational Change**

The changes that teachers’ beliefs about the nature of mathematics undergo and the need for further research on rural schools are addressed at least in part in recent reforms in mathematics education. Reform in mathematics education and American education in general is not a new idea. Historically, the launch of Sputnik in 1957 gave rise to large-scale curriculum reforms and a shift from teacher-centered to student-centered instruction. This phase of adopting educational changes was followed by an “implementation failure” (1970-77), “implementation success” (1978-82), and “intensification vs. restructuring” (1983-1990) (Fullan, 2001). The waves of reforms started in the 1980’s were more comprehensive than the earlier ones. The more recent reforms called for a systematic change. Systematic reform, also referred to as system-level improvement, is an attempt to encourage improvement through systematic reorganization (e.g. state or central office) or through increased funds initiated by organizations outside the schools—concerned citizens, political groups, private support, and so on (Bodilly et al, 2004). Systemic reforms focus on improving the performance and achievement of all students.

The National Science Foundation (NSF) has funded statewide, urban, and rural systemic reform initiatives since 1990. The Rural Systemic Initiative (RSI) has focused on examining “the significant disparities between the academic performance of students living in economically
disadvantaged, geographically dispersed rural areas and that of their counterparts living in more affluent areas” (Anderson et al, 2003).

The newest effort at reform of the public education system is the move to standards-based accountability and high-stakes testing. Recent educational reforms have focused on raising test scores without seriously considering the improvement of student learning. These reforms claim to establish connections or alignments among standards, curriculum, assessments, and instruction (Anderson et al, 2003; Wilson & Peterson, 1996).

In his book The New Meaning of Educational Change, Fullan (2001) connects the “value and technical quality of the change” (p. 18) to its actual implementation. According to him, the ideal situation in implementing a quality systemic reform is to witness its successful implementation. He deems three cases in systemic reform undesirable: a quality program that does not become implemented, a “flawed” program that is being implemented, or a “flawed” program that is rejected. All of these possibilities lead to a waste of time, energy, and resources. [Versions of the three undesirable implementations occurred in Louisiana schools and were captured in this study.] Fullan criticizes individuals for lacking a clear vision and meaning of what educational change entails. He points out the two inseparable entities of change: what and how. Namely, what is it that we want to accomplish by means of change, and how do we go about accomplishing this goal? Another serious question concerns support for teachers: What can be done to support teachers’ efforts to change their practice? These questions were identified by Ross and his colleagues (2000) as critical in supporting teachers in times of systemic reform.

In order for reforms to be successful, teachers need to feel that they are empowered stakeholders in this process of change (Horn, 2004, p. 202). Horn juxtaposes two models for
promoting educational change: teacher empowered initiatives and top-down/expert driven systems. The former involve a negotiation process that aims at reducing conflict between the individuals and groups involved. It also engages the participants in conversations and discussions that promote “the full participation of teachers in the design of educational systems and the resolution of educational problems” (p. 202). The latter model is centered around conflict which disempowers teachers.

The notion of introducing a national curriculum has gained increased attention recently with the new NCLB-prompted accountability movement. Anne Lewis (2002) identified current changes in reading instruction to approach a national curriculum. She viewed the reform efforts as ones that attempt to align “instructional components, resources, and teachers preparation programs” (p. 4). She further criticized the new test-based accountability movement as one that lacked opportunity-to-learn standards. Although the current NCLB-driven reforms abound in pressures to live up to higher standards and improve assessment, teacher quality and improved working conditions for teachers are harder, and more expensive to achieve. As a direct consequence of this lack of commitment to opportunity-to-learn standards, we see the difficulty of convincing highly qualified teachers to teach in high-needs rural schools.

With the current pressure for testing, states are not being selective about the tests being used. The tests they use may not even meet the states’ self-imposed learning standards. Under the pressure to have “passing schools” and “higher standards” many states are actually lowering their standards. For example, during the first year of NCLB Arkansas did not label any of its schools as “failing” because the state standards were already low enough to meet the required adequate yearly progress (AYP). Louisiana, in contrast, lowered its existing state standards. According to the 13th Bracey Report (2003), Louisiana had been one of four states that had
tougher requirements than NAEP. Concurrently, Louisiana engaged in developing the

*Comprehensive Curriculum.*

From the eight chief characteristics of mathematics education reform (Ross *et al*, 2002), four can be identified in Louisiana’s *Comprehensive Curriculum*:

1. Broader Scope,

2. Access for all students to “all forms of mathematics, including teaching complex mathematical ideas,”

3. Exposure to complex, open-ended problems,

4. Use of manipulatives and computers.

Ross and his colleagues (2002) concluded that the most effective strategy for increasing classroom applications of reform ideals is in-service or professional development. Research has shown that professional development driven by systemic reform often reaches only highly motivated teachers (Zucker *et al*, 1998). Thus the teachers who need the most help may remain unaffected by the professional development opportunities. Other possibly helpful methods for promoting reform ideals are technology implementation and curriculum alignment, although the latter has been reported as less promising. Research has shown that systemic reform efforts need at least 5 years for establishing long-term success (Fullan, 2001). This success is often linked with equitable outcomes that reduce achievement differences across groups of students of different gender, ethnicity, class, disability, and socio-economic status.

The purpose of the *No Child Left Behind* (NCLB) Act, signed into law by President George W. Bush on January 8, 2002, is literally to ensure that no child is left behind. The Act addresses a concern that the numerous government programs in effect at the time the legislation was conceived were not effective. This ineffectiveness was not limited to lack of student preparation in the key areas of literacy and numeracy but to inadequacies in schooling overall.
Moreover, the students who underperformed were oftentimes those of poor socio-economic status as well as minorities—ESL students, African-American students, children of military personnel, to name some of the groups. NCLB expresses an interest on the part of the government to consolidate existing programs and grants in order to make better use of government money going into public education.

The four “pillars” of NCLB (2001) as quoted in the document are “stronger accountability for results, more freedom for states and communities, proven education methods, and more choices for parents.” To encourage improvement in the schools, those schools and districts that performed well and showed improvement, mostly measured by standardized tests, were to be rewarded financially. However, the schools and districts that failed at improving their test scores would be penalized by having a part of their money allocated towards more successful schools. Also, the students in these schools would be given a choice to transfer to a more successful school.

At the time the document was signed into law at least twenty states had established partnerships between schools and universities in an effort to improve mathematics and science education—prepare better teachers and raise students’ scores in these two areas. Under NCLB, states have 12 years to bring children up to academic proficiency or lose federal funding.

Throughout this review and the rest of this dissertation, I repeatedly refer to curriculum. In the majority of the studies, reports, and other documents that I reviewed, curriculum is understood and implied to mean mostly instructional materials, such as textbooks and manuals. I fully recognize that curriculum may mean anything that goes on in the classroom, but in the context of Louisiana’s Comprehensive Curriculum (CC) I chose to use the more limited definition. In this study, I address the initial implementation of this curriculum in a rural high
school, an ongoing professional development program that coincided with the implementation of the CC and the implications for the implementation of the CC for the classroom practices of teachers.

**Professional development**

Researchers overwhelmingly agree that teachers need to possess two different, yet interrelated kinds of knowledge: content knowledge and knowledge for teaching this content. Ideally, teachers acquire both kinds of knowledge during their university education in a pre-service teacher education program. However, such programs have proven to be insufficient for developing deep content knowledge and mathematics knowledge for teaching. Furthermore, new research on teaching continues to change our thinking about content and pedagogy. Thus professional development has emerged as the standard mode for in-service teachers to re-connect with mathematics and pedagogy.

The contributions of professional development during the current mathematics reforms remain to be established. Many studies of professional development programs identify possible characteristics that contribute to the success of such programs or features that contribute to their failure (Cohen, 2004; Crockett, 2007; Gellert, 2008; Hill & Ball, 2004; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003; Mundry, Spector, Stiles, & Loucks-Horsley, 1999; Tobias, 1997; Kennedy, 1999; Peterson & Barnes, 1996; Sleeter, 1997; Tobias, 1997). Some researchers discuss professional development as an extension to teacher education (e.g., Tobias, 1997), while others aim at identifying the challenges and problems that impede it (e.g., Crockett, 2007; Mundry et al, 1999). In the remaining section of this literature review, I explore some of the successful features of professional development programs. I also take a close look at the problems that professional development programs face as well as some recommendations for
improving professional development. The focus in the reviewed literature is on the professional development of mathematics and science teachers.

Many of the problems in teacher education in mathematics and science are also issues that need to be addressed regarding teacher professional development. Tobias (1997) identified two issues that require attention in order to “maintain the momentum of reform in science and mathematics education” (p. 1). These issues are (a) paying close attention to teacher preparation and (b) changing the pedagogy of mathematics and science content courses and the content of the teacher preparation courses. Tobias recognized mainstreaming as the main theme that has permeated teacher education reforms since the 1960’s. In mainstreaming she refers to the move of teacher preparation “to a more central location in standard baccalaureate programs” (p. 1). Mainstreaming enabled pre-service teachers to leave their isolation and interact more with other students and faculty. However, Gellert (2008) noted that more than thirty years since Dan Lortie’s seminal work Schoolteacher (1975) on teaching in the United States, teaching is still a very isolated profession.

Tobias identified two main issues as stumbling blocks for the improvement of teacher preparation in mathematics and science: local autonomy and divided responsibility. Teacher education is viewed predominantly as “a local affair” (p. 2) since the majority of pre-service teachers attend local universities and then seek employment close to where they were raised. Despite the pressures from the National Council for the Accreditation of Teacher Education (NCATE) for some uniformity among the expectations from universities and school districts there is “substantial variation around the country” (p. 2) in the level of teacher preparation. The divided responsibility for teacher training between content area and education faculty is another area that needs improvement. Oftentimes content area—mathematics and science—faculty do
not have experiences in real-life classrooms and thus lack an understanding of the challenges teachers face. Education faculty members, on the other hand, may be out of touch with advances in mathematics and science.

Mathematics teacher education is increasingly affected by a social dimension (Gellert, 2008). Evidence of this phenomenon is the undeniable presence of cooperation, collaboration, sharing and negotiation among teachers. In his study of primary mathematics teachers Gellert closely examines the two key factors that he identified for their professional development: collaboration and cooperation. He calls attention to possible tensions that might occur when mathematics professional development is considered a collective enterprise. Gellert believes that the connection between teaching practices and professional development is “complex and complicated” (p. 98). The three forms of the social dimension that he mentions are teams, communities and networks. The notion of communities of teachers is the one form that he finds most interesting for his work on professional development. The development of the knowledge base and the development of instructional practice are the two notions in which he is particularly interested. Gellert notes that for some teachers the two notions develop simultaneously while for others the development knowledge base may precede the development of their instructional practice.

As I reviewed this literature in light of the literature on rural schools and my experiences in rural schools, I realized that evidence of communities of practice was rare in the secondary rural schools I was studying. The most obvious detriments were that secondary rural teachers lacked colleagues teaching the same secondary mathematics subjects and they entered professional development activities for reasons so diverse that the bit of community present
during the meetings with colleagues was short-lived. I included only literature reviews more relevant to my study.

Connecting teachers’ pre-service education to professional development and thus establishing a continuum of professional development experiences across programs is the focus of a study done by Mundry and her colleagues (1999). They draw the attention of teacher educators to the need for a continuum of teacher development that would unify teachers’ experiences from the time they enter a teacher education program through their career and professional development involvement. The authors conducted a one-year qualitative study of reform activity initiatives involving pre-service and in-service science and mathematics teachers. They observed a multitude of discontinuities throughout the teachers’ preparation and certification process, actual teaching experiences and professional development. The authors reported a lack of focus, coherence, and alignment within and across programs. A glaring example of these discontinuities is the fact that many teachers find themselves unprepared for the challenges of teaching following the completion of their pre-service studies and experiences.

Mundry et al. identified seven issues related to the building of a continuum of professional learning experiences. These issues are summed up below. I listed the authors’ numbered points below and included a few selective quotes in my summary and interpretation of the seven issues.

1. Weak “anchor points” on each end of the continuum (p. 14)

Neither pre-service nor in-service teacher education can be characterized by its ability to fulfill “the vision of standards based learning for all” (15). In-service professional development, usually fragmented, lacks sustainability of new teacher practices and long-term support. There is a lack of shared philosophy and vision for teacher education. There are problems with the coordination of teacher preparation among education faculty and mathematics and science
faculty. Furthermore, teaching and testing practices vary widely across schools, districts, and states.

2. Lack of a shared vision among stakeholders for a career-long continuum of teacher learning (p. 14)

A vast discrepancy exists between pre-service and in-service programs. Many of the pre-service programs are based on the assumption that future teachers need to learn everything they need to know as part of the program. On the other hand, many in-service programs project the belief that teachers do not know anything. The prevalent teacher education programs offer “pre-service that is a “mile wide and an inch deep” and in-service that does not build on prior experiences or knowledge” (1999, p. 16). These problems create a need for discussion among the stakeholders in pre-service and in-service programs.

3. Entrenched and isolated roles in and responsibilities for teacher development (p. 14)

The roles of university faculty, pre-service and in-service teachers, and the corresponding institutions, universities and K-12 schools are clearly defined. The clear demarcation between university content and education faculty: the former serve as content experts while the latter are seen as “educators” leads to a disconnect between content knowledge and its application in classroom settings. Similarly, there is little interaction between institutions of higher learning and K-12 schools. Pre-service teachers are treated as students and not as growing professionals. In the system of pre-service and in-service programs, ongoing relationships and partnerships are rare.

4. Cultural differences among stakeholders (p. 15)

Vast differences exist in personal and institutional philosophies and missions. At the college level, faculty members are typically expected to conduct research and provide services,
in addition to teaching. Incentives for excellent teaching are rare both at the university and school levels. Teachers are given little unregimented school time for their own professional development. In addition, the status of elementary teachers is at the bottom of a widely accepted education hierarchy while university mathematics and science faculty are at the top. There are also vast differences in the professional literature/resources, organizations, meetings, and terminology as related to K-12 teachers and university professors.

5. Incoherence in the goals, content, and design of teacher development programs (p. 15)

The goals for teacher preparation and expectations of teachers as communicated by national organizations such as NCTM need to be communicated clearly to pre-service and in-service teachers within their courses and professional development opportunities. Teachers are getting mixed messages about what they need to know and how they should learn it from various stakeholders—individual faculty members, accrediting and certification organizations, other teachers, school administrators and districts. Also, the subject and pedagogical contents in the teacher preparation courses need to be redesigned to be made more consistent with national standards. The same need for redesign applies to their field experiences and student teaching as well.

The lack of coherence in teacher professional development creates a need for coordinated and coherent pre-service, induction, and in-service programs. Pre-service programs typically fail to establish a connection between disciplinary and pedagogical courses. The few induction programs need to consider how to better match the new teachers’ needs with appropriate professional development and mentoring opportunities. The in-service programs often offer only short-term learning experiences that rarely address the teachers’ specific individual needs.

6. Uncoordinated quality control mechanisms (p. 15)
The criteria established a) for accreditation of teacher preparation programs, b) by university mathematics and science departments, and c) for teacher certification, and instead fail to provide a continuous path for longitudinal teacher education.

7. The different educational needs of elementary, middle, and secondary teachers and of science and mathematics teachers (p. 16)

Confusion exists about what teachers need to know to teach different grade levels, especially the distinction between what elementary teachers believe they need to know, on the one hand, and what secondary science and mathematics teachers believe they should know, on the other hand. The majority of elementary teachers are women who have had negative experiences with mathematics and science, and they may not have been held to the same standards as their male classmates during their education programs. Elementary teachers tend to focus on the students’ overall development and accept responsibility for the entire content instruction at that level. In contrast, high school teachers are charged with developing the students’ content knowledge in a single subject. There are also unacknowledged differences in science and mathematics education such as, for example, the weak focus on science education at the elementary school level.

The purposes and goals of professional development take many forms. Some are described in terms of what the teachers gain as a result of their participation in professional development programs, while others focus on the impact on students. Teachers may increase their content knowledge, their knowledge for teaching, or develop new instructional practices. Students may gain a deeper understanding of the content and/or report gains on assessments. In the following pages I examine in-depth several studies which focus on various outcomes of professional development programs.
Hill and Ball (2004) set out to study whether elementary teachers develop mathematics knowledge for teaching as a result of professional development. Furthermore, they were interested to find out, if that happened, what features of the professional development contributed to this learning. Their goal was to determine what comprises effective professional development that improves teachers’ mathematics knowledge for teaching. The teachers were involved in the largest content-focused statewide professional development program in the United States: California’s Mathematics Professional Development Institutes (MPDIs). Both mathematicians and mathematics educators were involved in the design and implementation of the program.

The researchers found that the elementary teachers involved in the MPDIs improved their performance on a novel instrument used for measuring their content knowledge for teaching mathematics (Hill & Ball, 2004). They also concluded that the two factors that could be used to predict teachers’ learning are program length and focus on “mathematical analysis, reasoning, and communication” (p. 330). The results showed that it is possible for elementary teachers to gain content knowledge for teaching in the course of a single professional development program. The authors provided three explanations for the success of this initiative. First, the program focused on content knowledge and not on instructional activities. Second, the teachers were able to work together on “elementary level problems that addresses problems that arise when teaching mathematics content” (p. 345). Lastly, the people who taught the institutes were knowledgeable about mathematics and the participants were well-paid volunteers. Despite their intention to answer a multitude of questions about the success of the MPDIs, at the conclusion of this study the researchers were unable to model exactly how teachers learned during the institutes.
Another study of elementary teachers focused on professional development through curriculum case studies (Cohen, 2004). The author identified several specific characteristics of professional development programs that support stronger teaching practices prior to her study. These included professional development programs that (a) aim to deepen teachers’ content knowledge; (b) offer increased attention to reflection on student work and classroom practices, and (c) build learning communities. Prime examples of professional development programs that exhibit at least some of these characteristics are Cognitively Guided Instruction (CGI) (1999), the *Investigations* curriculum and Japanese lesson study. The focus of CGI is on the development of children’s mathematical thinking and the sharing of research findings with practicing teachers. The *Investigations* curriculum (2007) offers teachers professional development built into the curricular materials through the use of samples of student work and classroom conversations. Gaining popularity in the United States, lesson study relies on the teachers’ collaborative creation of lesson plans, reflection on their execution and the student understandings that transpire in the course of the lesson, and the teachers’ future lesson revisions.

Cohen set out to study these new kinds of professional development that support stronger teaching practices. For one year she closely followed the work of two seminar groups, a rural and an urban one, that were part of the Developing Mathematical Ideas (DMI) seminars. The participants used curriculum materials for grades K-6 that were put together for these seminars. The curriculum included cases written by elementary teachers and at the same time were focused on students’ sense making of mathematical ideas. In her book, Cohen reports on two modules/volumes of this curriculum that were different from each other in content and approach to content. The teachers analyzed the students’ mathematical thinking, worked on the mathematics content, and discussed pedagogical issues relevant to classroom practice. Cohen
identified the following characteristics at the core of the DMI which she describes as part of a new kind of professional development:

1. the solidity and complexity of the mathematics under study,
2. the concurrent examination of teachers’ and students’ mathematics, and
3. the parallel between the seminar’s pedagogy and elementary classroom pedagogy as envisioned by both national standards and DMI designers (p. 189)

Furthermore, in Cohen’s discussion of what she referred to as rigorous professional development seminars, she identified three strands that helped her organize the observations and document analysis of the teachers’ work and classroom practices during the seminars. The strands are: (a) the changing visions of the teachers themselves and of the children they teach, (b) the teachers’ growing knowledge and understanding of mathematics, and (c) the teachers’ changing practices as they tried to balance what they learned in strands (a) and (b).

Another study in which teachers used student work as a vehicle to reconsider their practices was aimed “to generate dilemmas regarding teachers’ beliefs and practices about mathematics teaching and learning in and through activities that constitute their daily work—planning lessons, teaching lessons, and assessing students’ work—as they interact in weekly inquiry groups” (Crockett, 2002, p. 611). Crockett employed a professional development model that is an adaptation of lesson study which is characterized by four general stages: (a) identification of teaching and learning problems, (b) lesson planning, (c) reflection on the lesson taught, and (d) assessment of the lesson’s student work products (p. 610).

Crockett observed that the teachers’ firmly held beliefs about the nature of mathematics and mathematical thinking were challenged. The teachers first engaged in “uncritical inquiry” (p. 622) because they did not question their taken-for-granted beliefs and practices as they worked on geometry and fraction lessons. When they discussed student work in weekly inquiry
groups, the teachers began to question what was considered mathematical understanding. Such observations suggested that as teachers go about their everyday activities, they may encounter conflicts and dilemmas. Trying to resolve the issues that arise within communities of practice could enrich the teachers’ knowledge of mathematics and pedagogy, and may even “unmask taken-for-granted assumptions” (p. 623). This study yet again draws attention to communities of practice by describing professional development in a climate of the current mathematics reforms via the creation of teacher inquiry groups.

The relationships among the factors that influence professional development, such as the knowledge and beliefs that support effective professional development are undoubtedly complex. Loucks-Horsley and her colleagues (2003) identified seven issues that are critical for a successful professional development program: finding time for professional development, ensuring equity, building professional culture, developing leadership, building capacity for sustainability, scaling up, and garnering public support. Furthermore, they listed six clusters with a total of eighteen specific strategies for professional learning. The clusters relevant for the study in this dissertation are (a) aligning and implementing curriculum, (b) collaborative structures, and (c) practicing teaching. Special attention is allotted to these strategies for professional learning in the discussion of the results.

Professional development projects that are committed to reforming mathematics education face a “daunting challenge” (Peterson & Barnes, 1996, p. 485). These authors describe an ambitious professional development project dedicated to reforming mathematics education, promoting equity and developing teacher leadership especially among elementary teachers. Peterson and Barnes acknowledge that a particular challenge that elementary teachers face is the need to learn mathematics with understanding and not just learn more mathematics.
In this study the lead teacher aimed to create a safe learning community where the teachers would feel comfortable to openly ask questions and pursue deeper understanding. The authors commented that “this sort of risk-taking is quite unusual in traditional teacher development because it demands that a teacher learner expose her mathematical thinking and learning in a semi-public environment” (p. 488). The teachers were encouraged to figure out mathematics for themselves, to “wrestle’ a mathematical idea to the floor in pursuit of understanding” (p. 488).

Peterson and Barnes (1996) propose the creation of “extraordinary resources for learning that go beyond the usual considerations of time, money and materials” (p. 490). They identified three resources: (a) participants themselves with their knowledge and experiences, (b) the community created in the course of the project, and (c) learning about interrelated areas such as mathematics, equity and leadership.

Because of the large minority population of students in rural Louisiana I also searched for literature that would extend my understanding of professional development from a multicultural perspective. Multicultural education was at the core of a two-year professional development program on mathematics teachers’ instruction (Sleeter, 1997). The thirty teachers involved were predominantly white while at least a third of their students were from racial minorities and/or low socio-economic status. Sleeter observed how mathematics instruction was organized in the teachers’ classrooms. Teachers perceived and taught the mathematics as a sequence of disconnected skills and failed to integrate the mathematics with the other subjects. In all but one kindergarten classroom mathematics instruction was taught as a discipline disconnected from other disciplines and the real world. Mathematics was perceived by teachers and students alike as a sequence of disconnected skills. Mathematics ideas were treated as disconnected from each
other as well as from other disciplines. The teachers did not use the children’s experiences to develop mathematics concepts. The teachers’ understanding of mathematics was quite limited and their conception of multicultural education was limited as well. Many of the ideas the teachers discussed in the course of the professional development program such as small-group work, gender equity, and utilization of multicultural curriculum, were used infrequently in the classrooms and gradually most of the changes that the teachers attempted to implement as a result of the professionally development faded away.
Chapter 3

Methodology

As researchers we bring a number of assumptions to our chosen methodologies. The theoretical perspective serves as a statement of these assumptions. Through interactions between the researcher and the participants, we negotiate a common understanding and form perceptions, attitudes, and beliefs about the meaning of complex notions such as “professional development,” “curriculum integration,” and “reform.” I chose to frame my study in symbolic interactionism because symbolic interactionism directly deals with these issues of communication, language, relationships, and community, and provides a needed theoretical perspective through which to examine the data.

Framework

With symbolic interactionism as a theoretical as well as a methodological framework (Blumer, 1969), I designed and carried out this study of rural high school mathematics teachers’ responses to state-mandated reform efforts. This research into teachers’ views of professional development and systemic reform in a rural school relied primarily on qualitative research methodologies. Although qualitative research is finding its place in mathematics education research, quantitative research often continues to be considered more “valid” or appropriate especially due to the recent pressures for scientifically-based research. Although qualitative, action, and interpretive research are not yet granted this status in the various interpretations of “scientifically-based” research I chose qualitative research because it is the most appropriate for addressing my research questions and highlighting complexity of situations should they emerge.
In the design phase I was fascinated by the possibilities of long-term face-to-face involvement with the participants in the study. Through direct involvement in their professional lives I became aware of the idiosyncrasies and complexity of their professional lives and I became better able to represent the voices of the participants with accuracy. I embraced the openness of qualitative research and the exploration of the participants’ multiple perspectives, something totally remiss in quantitative research with its predetermined classifications and methods. I felt privileged to listen to other people’s stories and share in their experiences, especially since I felt that the participants’ perspectives were often misrepresented or missing in much of the quantitative research in educational settings.

As I identified symbolic interactionism as theoretical framework to guide my study, I sought methodologies that would enable me to apply systematic approaches throughout the data collection, analysis and writing phases of the study. Grounded theory and symbolic interactionism methodologies proved to be a perfect fit for this study in terms of gathering sufficient data, synthesizing the data and making analytic sense of them. In particular, grounded theory enhanced the symbolic interactionism framework as I employed a “logically consistent set of data collection and analytic procedures aimed to develop theory” (Charmaz, 1995, p. 27).

These two methodologies provided me with rigorous methods to check, refine and develop ideas from the data, and further make conceptual sense of the large amount of data I collected. Grounded theory methods allowed me to move away from common stereotypes of qualitative research which would label it as “intuitive” and “impressionistic.” By using systematic procedures for working with rich qualitative data, I was able to bring rigor to the data collection and data analysis. Working with rich, detailed data I was able to produce “thick” descriptions (Geertz, 1973). This rich data, in turn, allowed me to more clearly discern what the
participants meant and how they defined their experiences as they communicated their thoughts, feelings and actions to me. Thus the interpretations of the data started from the participants’ sharing of their viewpoints.

The identifying characteristics of grounded theory methods as identified by Glaser and Strauss (1967) include: (a) simultaneous engagement in data collection and analysis phases of research; (b) creation of analytic codes and categories developed from data, not from preconceived hypothesis; (c) the development of middle-range theories to explain behavior and processes; (d) memo-making, writing analytic field notes, as a critical intermediate step between coding and writing the initial drafts; (e) theoretical sampling to check and refine the researchers’ emerging theories and abstract conceptual categories, and (f) delay of the literature review. These characteristics guided my work throughout the entire research process as I explain in greater detail later.

I also followed Blumer’s (1969) modes of inquiry: exploration and inspection. Exploration allowed me to become more familiar with a previously unknown sphere of social life—rural schools and communities—as well as to develop my inquiry so that the direction of the study arose out of it and was grounded in social life. Such an exploration is flexible by nature and yields intimate descriptive accounts. It starts out broad and gradually becomes more focused. Inspection, on the other hand, is an analytical procedure through which one examines the descriptive accounts in a theoretical form from different directions and at different angles. For example, I studied professional development from the viewpoints of both mathematics teachers and professional development facilitators. I closely examined their attitudes toward and perceptions of professional development with respect to the workshop. In addition, I analyzed interview data to gain additional insights into their worlds through their descriptions and
depictions of professional development. Inspection as such is characterized by close scrutiny. It is “flexible, imaginative, creative, and free to take new directions” (Blumer, p. 44). Since symbolic interactionism as a theoretical stance is embedded in the natural world, its methodological stance enables researchers to directly examine the empirical social world. Thus I identified my participants’ attitudes and perceptions of professional development, reform and the nature of mathematics and how these attitudes and perceptions may have influenced their actions in the classroom, rather than view their actions as only a final fixed product.

Data Collection

The symbolic interactionism and grounded theory methodologies enabled me to directly examine the empirical social world by developing a familiarity with the language of the community that I studied. I set out to study the multiple meanings of my participants’ actions with the assumption that my interactions with the participants produce or generate the data and thus the meanings that I observed and defined. I followed the advice of Prus. According to Prus (1996, 19-21), researchers who are committed to understanding the world from the viewpoint of their participants generally employ three major methods for data collection: observation, participant-observation, and interviews. By means of these three data sources they become familiar with the world of their participants. For these researchers observation adopts a meaning beyond simply watching and listening. I did sit in mathematics classrooms and observed the teaching of mathematics lessons and the teachers’ use of the reform curriculum. According to Prus, observation also includes the use of artifacts or documents. Using artifacts alone offers only a limited picture of the people and/or situations under study, because the researcher would have to make extensive inferences regarding the participants’ meanings and intentions (Prus, p.
20). But together with watching and listening, the use of artifacts enriches the researcher’s understanding of the participants’ perspective. Artifacts that I used included teachers’ lesson plans, survey responses from the embedded groundwork study, field notes, state Department of Education reports and other written materials as described in detail later in this chapter.

I also used participant-observation as a way of coming close to and sharing in the participants’ experiences. As Schwandt (2001) describes it, “participant observation is a means whereby the researcher becomes at least partially socialized into the group under study to understand the nature, purpose, and meaning of some social action that takes place there” (p. 186). Ideally, by means of participant-observation researchers can build a more personal relationship with their participants; a relationship built on mutual trust and openness. I started building these relationships with area mathematics teachers and teacher educators at the very beginning of the study when I expressed an interest in working with them. I followed this initial engagement by working closely with mathematics teachers and teacher educators, by actively participating in a summer workshop and by participating in a year-long professional development program. I also collected survey data during the initial stage of the study and include this quantitative aspect of the study and the initial focus on forming relationships as the initial underpinnings within the larger study. The overall timeline for this study is presented in the following table:
Table 1

**Timeline of Study**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Professional Development Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2004</td>
<td>Initial acquainting with participants, instructors and professional development coordinators at Southern Della University (SDU)</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>Two Friday/Saturday sessions at SDU</td>
</tr>
<tr>
<td>Spring 2005</td>
<td>Two Friday/Saturday sessions at SDU; Classroom visit at City High School</td>
</tr>
<tr>
<td>May-July 2005</td>
<td>Planning meetings for summer professional development institute at SDU</td>
</tr>
<tr>
<td>July-August 2005</td>
<td>Two-week summer institute at SDU</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>On-site classroom observations in high school mathematics classrooms; One Friday professional development meeting at SDU; One Friday/Saturday professional development meeting at SDU; On-line communication via Blackboard</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>On-site classroom observations in high school mathematics classrooms; Two Friday/Saturday professional development meetings at SDU; On-line communication via Blackboard</td>
</tr>
<tr>
<td>Summer 2006</td>
<td>Interviews with two professional development coordinators from SDU; one mathematics content area coach, and two rural teachers from Bayou High School (pseudonym)</td>
</tr>
</tbody>
</table>
The schedule of classroom visits and observations is presented in the following table:

### Table 2

**Classroom Visits and Observations, 2005-2006**

<table>
<thead>
<tr>
<th>Teacher Name</th>
<th>Course</th>
<th>Number of days</th>
<th>Time Entry (rounded up to the nearest hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joanne</td>
<td>Office Visit</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>William</td>
<td>Pre-Algebra</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Paul</td>
<td>Advanced Math; Calculus</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Linda</td>
<td>Algebra I;</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Meredith</td>
<td>Algebra I &amp; II; Algebra I Honors</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Robin</td>
<td>Geometry &amp; Honors Geometry</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Jen</td>
<td>Advanced Math II</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Eugene</td>
<td>Geometry</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Virginia</td>
<td>Advanced Math I; Geometry</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Michael</td>
<td>Algebra I &amp; II</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Martha</td>
<td>Algebra I</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Nancy</td>
<td>Algebra I</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Barbara</td>
<td>Algebra, Geometry, LEAP 21</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Kimberly</td>
<td>Algebra</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Donald</td>
<td>Algebra I</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alyce</td>
<td>Pre-Algebra</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Catherine</td>
<td>Algebra II</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

(continued)
Table 2 (continued)

<table>
<thead>
<tr>
<th>Teacher Name</th>
<th>Course</th>
<th>Number of days</th>
<th>Time Entry (rounded up to the nearest hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laura</td>
<td>Geometry</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Debra</td>
<td>Earth Science</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Judith</td>
<td>3rd grade</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to observation coupled with collection of artifacts and participant observation, I conducted semi-structured interviews with my target participants. With the help of this type of data source researchers can further inquire into the participants’ experiences and learn more about how the participants make sense of the experiences. Furthermore I relived the experience when I listened to the interviews, transcribed them myself and wrote my own field notes and memos. By listening repeatedly to the teachers’ voices I was able to discern the various connotations of the meanings they associated with different objects such as reform, support, and professional development. I believe that I actually got to know them better by being exposed to the thoughts and feelings they shared with me in their own voices. I could also sense the similarities and discrepancies and the fine nuances in meanings that might have been overlooked if I read someone else’s interview transcriptions. As a researcher, I did not and could not assume that my views of reform, the nature of mathematics and professional development were the same as those of my participants. So I asked them questions about their taken-for-granted meanings to shed more light on the implicit meanings. The interview schedule is outlined in the table below:
Table 3

*Interviews With Target Participants*

<table>
<thead>
<tr>
<th>Target Participant</th>
<th>Occupation</th>
<th>Interview Date(s)</th>
<th>Duration (rounded up to the nearest half hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrea</td>
<td>On-site coordinator</td>
<td>7/10/2006, 7/17/2006</td>
<td>2.5</td>
</tr>
<tr>
<td>Paul</td>
<td>High School Mathematics Teacher</td>
<td>7/12/2006</td>
<td>1.5</td>
</tr>
<tr>
<td>Susan</td>
<td>Professional Development Organizer</td>
<td>7/7/2006, 7/13/2006</td>
<td>2</td>
</tr>
<tr>
<td>William</td>
<td>Middle and High School Mathematics Teacher</td>
<td>7/19/2006</td>
<td>1.5</td>
</tr>
</tbody>
</table>

The in-depth semi-structured interviews were conducted both on the campus of Southern Delta University (pseudonym), where I worked at the time of this research, and Bayou High School. The interviews with the target teachers and professional development coordinators lasted between one hour and an hour and a half. They were conducted either at Bayou High School or in private offices at Southern Delta University. The complete list of data that I collected for this study is presented below:
Table 4

*List of Data Collected*

<table>
<thead>
<tr>
<th>Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews with target participants</td>
</tr>
<tr>
<td>Activities/Handouts from on-campus professional development meetings</td>
</tr>
<tr>
<td>Teachers’ daily journals from 2005 summer institute</td>
</tr>
<tr>
<td>Observation protocols from classroom visits</td>
</tr>
<tr>
<td>Field notes and memos</td>
</tr>
<tr>
<td>Lesson plans and tests from 2005-2006 academic year</td>
</tr>
<tr>
<td>Professional development project grant proposal</td>
</tr>
<tr>
<td><em>Comprehensive Curriculum: Mathematics</em> (grades 4-12)</td>
</tr>
<tr>
<td>Materials from the Louisiana State Department of Education website</td>
</tr>
<tr>
<td>Mathematics content exams from summer institute</td>
</tr>
<tr>
<td>Pre- and post-survey</td>
</tr>
</tbody>
</table>

**Analysis**

As I studied and scrutinized the data, some ideas began to emerge and then I assigned appropriate codes to them. Instead of scanning for predetermined ideas I read each complete thought and pondered what was meant by the participants and coded it. Then I went back and read every line and meticulously analyzed each line and adjusted the already created codes. After that I analyzed the codes themselves. I merged some of the codes, refined others and created some new ones.
I began with three of the interview transcriptions. After I read them in their entirety I came up with initial codes which seemed to make sense with respect to the data and my research questions. After I decided on the initial codes, I went back over the text and coded it. I intended to apply the same codes as lenses to the next interview, but as I read I reconsidered the initial codes and made some changes. Because another category emerged from the fourth interview I added a code and then went back to the first three interviews and added appropriate new coding. I repeated this kind of cyclical process of coding and re-evaluation for all eight interviews.

As I was working closely with the data and coding it, I also noted data from the same participants that reinforced or contradicted data from different points in time. If disconfirming evidence appeared then I analyzed it with respect to the participants’ accounts, backgrounds, beliefs and so on, until I could make sense of how the data fit together to tell the participants’ story. I noted confirming evidence as well and challenged it in subsequent interviews.

In addition to writing extensive field notes I also wrote notes to myself, memos (Charmaz, 2000, p. 517), which included e-mails and other hand written or typed communication with myself and at times these also served as a means of communication with my advisor and dissertation director. This memo-writing enabled me to sift through the data and write down for myself certain specific directions that I needed to pursue and ideas and categories that emerged. As the study progressed the memo-writing became more focused and precise. It allowed me to refine and solidify my ideas. In other words, the memo-writing led me to theoretical sampling (Charmaz, 2000), that is, collecting and analyzing data which was relevant to my research questions. As I found some gaps and holes in my theories I went back to the data with a renewed focus. I aimed to find further evidence that would make my emerging categories “more definitive and useful” (Charmaz, 2000, p. 519).
Furthermore, memo-writing helped to clarify my ideas and illuminated how they fit together. When conducting theoretical sampling I was much more selective than during the initial stages of my research. I had a better idea about what data I needed to obtain and from whom. I was able to focus on pertinent data that would help to establish connections between the participants’ lived experiences and my research questions. As I accumulated more focused data from different sources I began to form theories. In some of my later memo-writing I even used quotes of raw data to demonstrate the connection between the data and the on-going analysis. The quotes I cited in this report were chosen as representative of the general data collected and used in the analysis.

I began my research study with certain interests and a set of general concepts. For example, I began with mathematics teachers and professional development specialists with an interest in how they respond to reforms. My data analysis sparked greater interest in including concepts such as the nature of mathematics and professional development into the study, although initially those were only marginally important. These concepts served as “points of departure” (Charmaz, 1995, p. 32) that provided me an opportunity to study the data and think analytically about it. By using grounded theory methods, the research process and the development of conceptual categories and theories were inseparable. The boundaries between data collection and data analysis were blurred, because both were done at the same time. I was constantly looking for “thick” descriptions that served to fill in the story, extend and refine theoretical concepts and enable me to make theoretical connections. By listening closely to and carefully observing my participants, I attempted to discern the unstated or assumed meanings of their statements. Furthermore, I reshaped my emerging research questions to obtain data that illustrates my theoretical categories.
Setting

Given the assumptions on which this research project was created and the nature of my research questions, this study required an approach to research that dealt with multiple sources of data and constantly evolving complex narratives. This dynamic allowed me to explore multiple dimensions and tackle the ambiguity of curriculum reform and its implementation in rural schools. The nature of this kind of fieldwork may be regarded by some as “political.” Numerous relationships were involved in this research. The primary one was the relationship among the participants and me, the researcher. Additionally, there were the relationships among the culture and power structures of the schools, and the state and national policies and mandates. All of these relationships influenced the design, implementation, and ultimately the outcomes of my work. This fieldwork was a dynamic and complex phenomenon which involved a process of constant negotiation. I was continually immersed in ethical and political situations facing both the teachers and myself as a researcher.

My role in this project was multi-faceted. I began building relationships with my participants from a position of power in that I served both as an instructor and on-site coordinator for the professional development project in which my informants were participants. I worked closely with the teachers during the workshops and also gained access into their classrooms during the school year. My job as an instructor and facilitator was to plan and implement the face-to-face activities for the middle-school teachers.

As a newcomer to the state of Louisiana, my first task was to learn about the state and education within the state and local parishes. I learned more than I had expected. To begin with, Louisiana is the only state whose legal system is based on the Napoleonic Code instead of the English common law. While the latter relies on general principles and leaves the interpretation of
the laws to the judges, the legal system in Louisiana relies on everything being explicitly spelled out in detail. This leads to an incredible number of laws and bureaucracy and slows down the judicial process. In order to pass a new law the people of Louisiana need to make an amendment to the state constitution. This slowness and bureaucracy is also apparent in any attempts at change in the schools. Also unfamiliar to me was the different racial make-up of the population in northeast Louisiana. The population in the part of Louisiana where I lived and worked is predominantly African American, while I was Caucasian. I have lived in predominantly white neighborhoods, and I had distinctly a different accent from the people around me. I frequently felt like a foreigner in Louisiana and its schools and I experienced some difficulties when establishing a rapport with the participants in my study.

The existing professional development program was focused on schools that participated in the state-sponsored Learning-Intensive Networking Communities for Success (LINCS) program and the US Department of Education-sponsored Gaining Early Awareness and Readiness for Undergraduate Programs (LA GEAR UP). The aims of the professional development program were to improve the quality of instruction and to raise the test scores in poorly performing schools in the state of Louisiana.

Participants

I focused my research focused on the experiences of high school mathematics teachers with professional development and reform curriculum integration in rural Louisiana. Forty-seven middle and high school teachers from nine parishes participated in the two-week long summer institute. There were nine male and thirty-eight female teachers. All but five of the
teachers were from Region VIII LINCS and/or LaGEARUP schools. They represented twenty-three schools and one of them also served on the parish school board.

The participants’ teaching experience varied widely both in terms of time spent in the classroom and educational background. Some of the teachers had just completed their first year in the classroom while other had taught more than 30 years. Eighteen of the teachers had taught less than five years, twenty had taught between 5 and 20 years, and the remaining nine had taught for more than 20 years. Twenty-six of the teachers held bachelor’s degrees in elementary education, special education and/or mathematics. The remaining twenty-one teachers held degrees in general studies, business, social work, biology, management, chemistry, accounting, psychology and African studies, communication, physical education, and criminal justice. Sixteen teachers held Master’s degrees.

Working with the mathematics teachers for several months enabled me to establish a rapport with them, visit their schools and classrooms, and work closely with them in implementing a state-wide reform curriculum. I had already learned that the majority of the teachers participating in the professional development project felt a pressure from their administration to be a part of the project in order to achieve the very desirable status of “highly qualified” or simply to attain their alternative certification as part of the Teach Northeast program. The high degree of interactions with the large group of teachers provided me the opportunity to select a target population of teachers for more in-depth data collection.

Two high school mathematics teachers and a mathematics coordinator at rural Bayou High School (pseudonym) were my target participants. They participated at least in part of a two-year long standards-based professional development project, funded by the Louisiana Systemic Initiatives Program (LaSIP).
Other target participants consisted of the two organizers and on-site coordinators of the professional development project who worked closely with the teachers in the project. These individuals had access to the professional development activities in which the teachers participated. Furthermore, they had the opportunity to observe the teachers in their classrooms and witness firsthand the implementation or lack of implementation of the Comprehensive Curriculum. They provided assistance to these and other mathematics teachers in teaching unfamiliar content and at times even modeling the teaching in front of their students. These participants were closely associated with the target rural teachers and their professional development. The coordinators confirmed some of my interpretations of the data that I collected from the high school teachers as well as helped me describe a richer picture of rural teachers’ responses to systemic reform.

The participants were chosen by criterion sampling as they were closely involved with professional development and rural schools. The targeted participating high school teachers from a rural high school were of special interest to me because of their commitment to professional development and their professed interest in improving student learning. Prior to the data collection for this study the participants were notified that they could discontinue their participation at any part of the research process. The consent forms also sought their permission for the use of specific previously collected items from their earlier work with me and the professional development project.

**Startup study and initial underpinnings**

Embedded within my dissertation is what I call my startup study. This study prefaced my selection of target participants and provided me with the knowledge base upon which to continue
the research. Although the startup study is part of my larger study, I set it aside for organizational reasons as well as for several other reasons. One reason is that working with teacher educators and a large group of teachers during this initial stage of the project helped me establish myself in the community and I believe this grounding is absolutely necessary in a study of this kind. Secondly, the relationships we established coupled with the results of surveys and pre- and post-tests provided me with a basis from which I felt confident in my selection of a few target participants for the more focused aspects of the study.

I began my startup study of mathematics teachers in rural schools by completing a literature review on the topic of rural schools. I presented my findings and ideas in a poster session at the Children and Rural Education (CARE) conference in April 2005 in Monroe, LA. In *No Child Left Behind and Rural Schools: Challenges and Promises*, I explored new aspects of the challenges faced by rural schools as a result of the NCLB Act as well as the greatest promise—flexibility in improving student performance. Perhaps because most reports about the consequences of NCLB were negative, I decided to include a focus on positive implications, if they existed, especially for rural schools.

I was able to create the groundwork for my dissertation study by completing some preliminary fieldwork. I conducted an initial study with the forty-five middle- and high-school teachers who participated in the two-year long professional development program. The teachers attended a two-week professional development workshop on the campus of Delta University during the summers of 2004 and 2005. I served as one of the presenters at the workshop in the summer of 2005 and I also participated in some of the sessions on the university campus during the 2004-2005 academic year. After the completion of the two-week summer 2005 professional development activities I also became the high-school site coordinator for the project. In that
capacity I visited the classrooms of seventeen of the participants in the fall of 2005 and spring of 2006. These teachers taught mostly high school mathematics courses and I was in each classroom an average of three times during the academic year.

For the purpose of this initial study I collected various artifacts from the teachers such as pre- and post-tests related to mathematics content knowledge as well as survey data related to their attitudes about teaching in general, and algebra and measurement in particular. I was also curious to find out more about the teachers’ perceptions of mathematics reform and what the NCLB Act meant for their jobs. In this early stage, I had the teachers help me narrow down the topic of school reform to what aspects were relevant to them in their day-to-day professional lives.

As one of the instructors in this professional development program, I quickly learned that the majority of the teachers who participated were reluctant to do so because they felt that they were forced into this program by school administrators and supervisors. Yet the teachers wanted to have the cherished title of “well-qualified” as defined by NCLB and they knew that involvement in this program would bring them one step closer. Approximately half of the participants had aspirations of obtaining a new certification of some kind. Several of the teachers were certified to teach content areas other than mathematics such as English/Language Arts and physical education, and others were not certified at all but still held Bachelor’s degrees in other subject areas such as chemistry.

This lack of certification in the content area that teachers were presently responsible for teaching was becoming more and more problematic for schools since the signing of the NCLB Act into law. The three broad tenets of a “highly qualified teacher” that NCLB requires are: a bachelor’s degree, state certification, and evidence of subject matter competence. These
requirements added to the legislation’s unwritten assumption that the sole responsibility for educating students lies within the schools, without any in the document of student or parental responsibility, could be quite stressful for any teacher. As Carpenter (2004) pointed out, one of the greatest problems for educators with this series of reforms is the lack of a national definition of “highly qualified teacher.” He furthermore distinguished between “highly certified” and “highly qualified” teachers. Carpenter defined the former as people who “pass the states’ stupid tests” (p. 107). Either way, many of the teachers who took part in the professional development program were in need of further certification. Without that certification they could possibly lose their positions and be replaced by teachers who had adequate certification for teaching mathematics.

Based on the survey data, I concluded that the teachers were open to adopting some aspects of reform mathematics education. The majority of teachers responded that they were familiar with state and national mathematics standards, as well as the NCLB Act. More specifically, they overwhelmingly expressed their agreement with the National Council of Teachers of Mathematics’ (NCTM) standards. In particular, they claimed to use a variety of instructional techniques and assessment methods in their classroom, as well as some form of technology, mostly graphing calculators. While the teachers’ responses were highly encouraging in terms of expressing their potential for improving student learning of mathematics and increasing the students’ interest in the subject, there were also some significant discrepancies. For example, the question that most participants failed to answer was about the implementation of the NCTM standards in their own teaching. Thus I was left to wonder why they would write that they were familiar with these standards and in agreement with them but failed to describe how these standards were incorporated in their mathematics teaching. It was possible that the
format and length of the survey did not provide the teachers with sufficient time to reflect on their responses and see the connections. It could also be the case that the teachers had little time to design standards-based instruction. They may have been too preoccupied with what was happening at their schools and the increased demands for changes that were placed on them.

Some of my suspicions were confirmed when I completed the follow-up observations in high-school mathematics classrooms. In the high-school classrooms I rarely observed implementation of the activities and ideas that we shared with the teachers throughout the course of the intense summer workshops and the follow-up on-campus meetings. Meaningful use of technology was also evident in only a few of the classrooms. The teachers failed to employ investigative learning strategies and cooperative learning groups. Instead many of them emphasized the use of algorithms and rules in ways that presented mathematics in an unfavorable light to the students. Yet, some teachers displayed their commitment to student learning by trying out some of the workshop activities with their students. These teachers’ enthusiasm and positive outlook about and engagement in mathematics education reform were instrumental in bringing mathematics to life for their students. The students’ mathematics engagement in the classrooms was obvious and the teachers’ interest in learning was clearly contagious. These teachers’ thought-provoking questions brought out lively discussions and explorations of exciting new topics and ideas.

The teachers with whom I worked professed their uncertainties about the implementation of the new curriculum in their classrooms and questioned the balance between the old and new curricula. Furthermore, they felt that activity-based curriculum would be a great inconvenience for them, since they were unsure about how to use the activities with their established
curriculum. The teachers were already experiencing pressures from their administrations for increasing test scores and passing rates on the state standardized exams.

The groundwork study provided me with a breadth of understanding about the field situation. For example, I obtained evidence that supported some of my initial hypotheses about the study. I learned that teachers may claim to be familiar with national (NCTM) and state standards about teaching mathematics and furthermore claim to support these standards, and still present little evidence of implementation of the standards they support in their own classrooms. I learned that many of the participants in my pilot study viewed mathematics as rigid and as disconnected from real life and human experience. Their tending-toward-absolutist views were also evident in their teaching of mathematics. I selected the five target participants whom I interviewed in the summer of 2006, following the first year of the implementation of the Comprehensive Curriculum based on my work with them during the start-up study and the relationships that we established early on in this study.

My groundwork study benefitted my dissertation study in at least two significant ways. First of all, I was able to establish a rapport with the teachers and their students. The teachers knew that they could seek my advice or ask me for help. Some of them would call me or e-mail me when they needed fresh ideas on teaching a topic, or if they needed help using certain manipulatives to enhance their teaching. Others openly asked for my opinion during my observations of their teaching and asked me on occasion to model the teaching of a given new concept. Secondly, based on my initial interactions with the teachers and the preliminary analysis of the various artifacts that I collected, such as the pre- and post-content tests and the surveys, I was able to narrow the focus of my research and polish the research questions my research questions.
Chapter 4

Louisiana’s Comprehensive Curriculum: Historical and Political Context

History Leading up to the Comprehensive Curriculum

This chapter contains a history of the major changes noted in the Louisiana educational system in the beginning of the 21st century. These changes encompass the introductions of the Grade Level Expectations (GLEs), the Model Curriculum Framework (MCF) and the Comprehensive Curriculum. Within the description and examples of each one of these phenomena is included information about their development and the decision making process behind their implementation. Furthermore, special attention is given to the political pressures that prompted these changes both at the national and state level. Lastly, insights are provided about the teacher training and professional development that accompanied the introduction of the GLEs, the MCF and the Comprehensive Curriculum in Louisiana’s classrooms. This chapter contains the following sections: Grade Level Expectations, Model Curriculum Framework, Initial Version of the Comprehensive Curriculum (2005) and Revised Comprehensive Curriculum (2008).

An understanding of the Comprehensive Curriculum and related changes at the state level is critical in order to address the research questions in this study. The release of the initial version of the Comprehensive Curriculum in 2005 and its implementation during the 2005-2006 academic year took place during the data collection process. Thus the 2005 version of the Comprehensive Curriculum would suffice in answering the research questions. However, in order to understand better longitudinally the changes in curriculum development and how they
are communicated to the teachers through the proper channels via professional development, the revised 2008 version of the Comprehensive Curriculum is also discussed briefly.

The Comprehensive Curriculum discussed in this study was preceded by other important changes in Louisiana’s educational system. In chronological order, the changes began with modifications to the existing standards, development of high-stakes state tests, and the creation of a new state curriculum for mathematics, science, English Language Arts, and social studies for all grade levels. In the early 1990’s Louisiana began a process of making the standards more rigorous and challenging. The content standards remained unchanged but some changes were made to the standardized tests and the school curriculum. The state tests—the Louisiana Educational Assessment Program (LEAP) test (grades 4 and 8) and the Graduation Exit Examination (GEE) (grades 10 and 11)—remained unchanged since their initial administrations in 1999 (Louisiana Department of Education, 2009c). The Iowa Tests, used from 1998 to 2005, were replaced by the integrated LEAP (iLEAP) (grades 3, 5, 6, 7, and 9) which includes both norm-references test items and criterion-referenced test items (Louisiana Department of Education, 2009d). The Iowa Tests provided information which compared the performance of Louisiana students with students across the country. However, with the introduction of the No Child Left Behind (NCLB) legislation, states were required to align their state assessments with the state content standards and the state performance standards. The iLEAP was developed as a test that would meet the requirements of NCLB because the Iowa Tests did not meet these requirements for alignment.

Grade level expectations (GLEs). The Grade Level Expectations designate the core content that the students must master to successfully complete a given grade. The state used the NCLB as the reason for the fast implementation of the GLEs and the subsequent curriculum
revisions. According to NCLB, states need to develop their own grade-by-grade standards. At the time the GLEs for the four main content areas—mathematics, science, social studies and English language arts—were introduced, NCLB did not require standards for social studies. The state of Louisiana went even further in laying out the standards: the state standards covered grades K-12, while NCLB only mandated standards for grades 3-8. Both state educators and out-of-state experts were involved in the process of developing the GLEs. This involvement took the form of teams of consultants, focus groups, committees and the Louisiana Board of Elementary and Secondary Education (BESE). The development committee for each one of the four content areas consisted of thirty members, for a total of 120 Louisiana educators involved altogether. Ten people worked on each grade cluster (Pre-K-4, 5-8, 9-12) for each content area. The committee members were chosen based on their knowledge of the content and standards for their respective grades. The GLEs were reviewed for both horizontal and vertical alignment.

Initially the two primary concerns about the GLEs were the large number of GLEs per grade and the grade appropriateness of some of them. The draft GLEs were officially approved by BESE in October 2003.

The teachers were supposed to participate in ongoing professional development for implementing the GLEs during the spring of 2004. The first set of new assessments incorporating the GLEs was administered in the spring of 2006, following two years of use of new or revised curricula. The LA DOE prepared a scripted PowerPoint presentation and video presentation on the GLEs, entitled GLE Awareness Training (Louisiana Department of Education, 2005b), which offered teachers an introduction and overview of the GLEs. In 2005-6 similar presentations were developed for the introduction and implementation of the new Comprehensive Curriculum.
Below is included an example of a mathematics GLE along with its associated benchmark and standard:

Sample GLE: Determine the radius, diameter, circumference, and area of a circle and apply these measures in real-life problems.

Benchmark: Making and testing conjectures about geometric shapes and their properties.

Standard: In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry and justify their findings. (Louisiana Department of Education, 2005b)

The GLEs for high school mathematics are organized by grade level rather than by course name. Such an organization eliminates the repetition of GLEs in courses that may be offered at the same grade level. The GLEs are very closely related to the standardized assessments that the students take at different grades. The relationship between the GLEs and the state tests is especially important at the high school level because a student cannot graduate without passing the state tests. All students are expected to master the grades 9 and 10 GLEs prior to graduation. The GLEs for grades 11 and 12 include the content and skills the students need to master in order to be successful in college.

**Model Curriculum Framework (MCF).** The GLEs and the Model Curriculum Framework were made available to teachers at the same time in early 2004. Neither one was a complete curriculum, but the MCF is a compilation of units that show how the GLEs can be organized and offers a description of activities that address certain GLEs. The decision of whether to modify and use the model developed by the state or develop new guides that address the GLEs was left up to the districts.

The GLEs were released in February 2004 and distributed to all schools in various formats. In a PowerPoint presentation dated December 2004 the Louisiana Department of Education described the Model Curriculum Framework as GLE-based and comprised of
organizational units. The MCF is one way to achieve the desired alignment of instruction with standards, benchmarks, and GLEs. The MCF was not intended to be a comprehensive curriculum. The districts were given three options about how to proceed with the MCF. The first one was for each district to develop their own GLE-based curriculum using the MCF as a guide. In that role, the MCF would provide sample activities to model the kind of classroom instruction desired as well as serve as a basis for evaluation of locally-developed curricula. The second option which districts could consider was to expand the existing MCF into a comprehensive curriculum and make it their own. They could do so by modifying and/or adding activities, identifying the content to cover at every grade level, and ensuring a sequential order for the activities. If the districts did not favor either one of these options then they had to prepare to implement the Louisiana Comprehensive Curriculum. Prior to the implementation the districts would need to identify resource gaps and suggest sample activities for possible inclusion in the new curriculum. The GLE-based Comprehensive Curriculum was to have the same structure as the MCF and replace the MCF upon its release. It would include not what is to be taught at every grade level, but more student-centered activities and more examples of assessments that would accompany the activities. The activities were supposed to be arranged sequentially in the order in which they were to be taught; however, the activities were not lesson plans. The sixty-five writers of the CC were to ensure that all content of the unit is addressed in the activities and that the activities are written as they would be taught. Furthermore, the writers had to ensure that the students would have adequate time to master the GLEs in the course of the CC. The projected release date for the new curriculum was April 1, 2005.
Comprehensive Curriculum (CC)

The new Comprehensive Curriculum was supposed to differ from the Model Curriculum Framework (MCF) in several aspects. Any given GLE was supposed to have been addressed just once in a course in the MCF. In the Comprehensive Curriculum, the GLEs were supposed to be addressed enough times to allow for mastery of the content. To ensure the GLEs are addressed throughout the course, those addressed during the last six weeks of the course were to be addressed also in the earlier units. The units in the initial MCF were slightly re-ordered in order to prepare students better for the state tests by exposing them to as many GLEs as possible.

In preparation for the implementation of the Comprehensive Curriculum, the teachers were provided with examples of ways to use their textbooks as a resource as they developed lesson plans. They could find introductory information in the textbooks, identify reading material and assign homework for the students. The districts were entrusted with any reordering of the units of the new curriculum. However, they were warned that such a re-organization may affect the coverage of the GLEs prior to the state tests.

In the following two subsections are included brief descriptions of the Initial 2005 version of the Comprehensive Curriculum and the Revised 2008 version of the Comprehensive Curriculum. The main impetus behind the creation of the new curriculum, its implementation and subsequent revision was NCLB with the expectations it placed on states for alignment and accountability. As can be seen in the enclosed examples from both versions of the curriculum, the writers of the curriculum had good intentions, however the lack of time and outside pressures were almost insurmountable challenges to overcome in the creation of an easily implementable curriculum statewide.
**Initial version of the *Comprehensive Curriculum* (2005).** The NCLB-mandated testing, based on the GLEs, had to be in place for Spring of 2006. The Louisiana state tests, the Louisiana Educational Assessment Program (LEAP) test (grades 4 and 8) and the Graduation Exit Examination (GEE) (grades 10 and 11), test students on specific benchmarks. The Grade-Level Expectations themselves are based on the benchmarks and therefore the state tests are aligned with the GLEs. The GLEs are listed in the state DOE’s documents following the corresponding overarching benchmark. Teachers can easily view the GLEs for a particular grade or course, but they did not have at their disposal a vertical alignment that would enable them to view what is expected at each grade due to the length of these lists (GLE’s Frequently Asked Questions). An easily accessible chart that enabled teachers to see how the GLEs compared across grades and view the similarities would have been very helpful. Instead the teachers were able to easily visualize the GLEs covered within their respective grade(s). The GLEs serve as guidelines for creating or revising local curriculum; they themselves are not a curriculum. Also, the GLEs do not include everything that students should know at a certain grade level. Teachers are expected to include additional material that the students can master by the time they reach a higher grade.

The Louisiana State Board of Elementary and Secondary Education (BESE), established in 1973, is the main administrative leadership body that sets educational initiatives (Louisiana Department of Education, 2009d). BESE initiated the development of the *Comprehensive Curriculum* to assist districts in three areas: addressing the standards through the GLEs, providing consistency in content across the state of Louisiana, and using best practices for instruction. The broad purpose of the *Comprehensive Curriculum* was to ensure alignment among content, instruction, and assessment. The BESE’s Student/School Performance and
Support standing committee is charged with curriculum, and thus the *Comprehensive Curriculum*, in addition to assessment, accountability, special education and other such issues (Louisiana Department of Education, 2009a).

The guidelines for using the *Comprehensive Curriculum* in 2005 upon its initial implementation stated that the districts “must teach the content of the curriculum” (Louisiana Department of Education, 2005b). The districts were not mandated to teach the curriculum exactly as presented nor were the teachers expected to teach the same lessons on the same days as other teachers. BESE left the decisions about the ordering of the units, use of equivalent activities, and the process of making changes up to the local districts. The districts were advised to preview the entire course in order to familiarize themselves with the content and then make decisions about replacing and/or adding activities.

The arena for the first research question is the 2005 curriculum, but in order to provide a larger picture of the state’s efforts we must also discuss the subsequent 2008 version of the *Comprehensive Curriculum*.

*Revised Comprehensive Curriculum (2008).* The *Comprehensive Curriculum* is aligned with the Louisiana state content standards as represented by the GLEs. It offered a curriculum comprised mostly of activities for nineteen mathematics courses ranging from Kindergarten through Math Essentials. Included in the table below is information on the number of pages and number of activities for each mathematics course according to the 2008 revised version of the curriculum. These materials are all available as zip files though the LA DOE website and the earlier version of the *Comprehensive Curriculum* no longer exists in electronic form since the 2008 revised version was made public in 2008 (Louisiana DOE). A hard copy was not officially made available because teachers and districts were expected to download and print their own
copies of the different courses from the state Department of Education website. The improved version of *Comprehensive Curriculum* in circulation since 2008 is easily accessible online. The mathematics portion of the curriculum is divided by grade and/or subject matter. In the figure below is information about each mathematics grade/subject with the name of the course, the length (in pages) and the number of activities.

<table>
<thead>
<tr>
<th>Mathematics Course Name</th>
<th>Length of document (in pages)</th>
<th>Number of Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td>102</td>
<td>151</td>
</tr>
<tr>
<td>Grade 1</td>
<td>116</td>
<td>133</td>
</tr>
<tr>
<td>Grade 2</td>
<td>107</td>
<td>156</td>
</tr>
<tr>
<td>Grade 3</td>
<td>83</td>
<td>94</td>
</tr>
<tr>
<td>Grade 4</td>
<td>90</td>
<td>127</td>
</tr>
<tr>
<td>Grade 5</td>
<td>99</td>
<td>140</td>
</tr>
<tr>
<td>Grade 6</td>
<td>74</td>
<td>58</td>
</tr>
<tr>
<td>Grade 7</td>
<td>103</td>
<td>80</td>
</tr>
<tr>
<td>Grade 7 Advanced Course</td>
<td>135</td>
<td>120</td>
</tr>
<tr>
<td>Grade 8</td>
<td>104</td>
<td>82</td>
</tr>
<tr>
<td>Algebra I</td>
<td>93</td>
<td>79</td>
</tr>
<tr>
<td>1</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Algebra I, Part 2</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Geometry</td>
<td>98</td>
<td>86</td>
</tr>
<tr>
<td>Algebra II</td>
<td>283</td>
<td>151</td>
</tr>
<tr>
<td>Advanced Math-Pre-Calculus</td>
<td>356</td>
<td></td>
</tr>
<tr>
<td>Advanced Math-Functions and Statistics</td>
<td>114</td>
<td></td>
</tr>
<tr>
<td>Financial Math</td>
<td>130</td>
<td>105</td>
</tr>
<tr>
<td>Math Essentials</td>
<td>133</td>
<td>81</td>
</tr>
</tbody>
</table>

*Figure 1.* Number of activities by version of the *Comprehensive Curriculum* and course/grade.

Each course consisted of eight units, except for Financial Math which had ten units. The number of activities ranged from 56 (Advanced Math—Functions and Statistics) to 156 (Grade...
2). The length and complexity of the activities varied widely. Some referred to a single GLE, while others addressed multiple GLEs. The second half of this section includes examples of the middle school and high school mathematics Comprehensive Curriculum activities.

The authors of the curriculum whose creation was overseen by the State Board of Elementary and Secondary Education (BESE) discussed the characteristics of the Comprehensive Curriculum that would make its use beneficial to students and teachers in the preface to the 2008 Revised Edition. Many of these sentiments were also expressed in the Frequently Asked Questions section about the curriculum which was available on the state DOE website since the initial introduction of the curriculum. The authors of the curriculum identified several characteristics of the curriculum which could improve student achievement. Among these characteristics are: a focus on important topics, alignment of the content with instruction and state standards, felt that the textbooks commonly in place of a written curriculum contained too much information. The authors of the Comprehensive Curriculum felt that commonly used textbooks contained too much information to replace written curriculum.

During the initial implementation of the Comprehensive Curriculum in 2005-2006 the teachers raised questions about the specifics of writing lesson plans that incorporated the proposed activities into the teachers’ established curriculum. These questions were officially addressed in the 2008 workshop materials, From Activity to Lesson Plan (LA DOE 2008). The teachers were provided specific questions to consider as they merged their textbook content with the Comprehensive Curriculum activities. Since 2008 the teachers are also provided with a guide for determining equivalent activities which address the same GLEs and content as Comprehensive Curriculum activities and require the same amount of rigor.
On the surface, the debut version of the Comprehensive Curriculum and the 2008 version for the mathematics sets of activities are very similar. The number of units and the page length for each grade/course are very similar. For example, there were initially eighty activities included in the Algebra II curriculum compared to eighty-four in the 2008 version. Similarly, the Geometry curriculum initially contained 86 activities, two less than the current version. The materials in the 2008 version tend to be a little bit longer in terms of page length than the initial version. For example, the Geometry set of activities extends over ninety-eight pages, which is twelve more pages than the initial version. Algebra II is an exception to the length observation, because its more recent version takes almost twice as many pages—283 vs 151—than the 2005 edition of the curriculum.

Each unit in the Comprehensive Curriculum is characterized by the following elements: unit title, unit number, unit description, time frame, student understandings, guiding questions, GLEs, sample activities, sample assessments, and blackline masters. The new features in the 2008 version are content area literacy strategies which are integrated in about one-third of the activities, blackline masters, focus GLEs, and a materials list for each activity. Furthermore, each unit includes a link to the Access Guide for the Comprehensive Curriculum, an online resource database with information in strategies, accommodations, and assessments. The teachers also have access to online documents which inform them of any major changes to the curriculum. As a result of the changes and additions described above, the Comprehensive Curriculum is now more detailed and helpful for teachers who are trying to implement it. Many of these changes meet the needs and answer the concerns voiced by the teachers in this study who were faced with the initial implementation of the curriculum in 2005.
The nature of the activities in the mathematics curriculum even in the same unit of a certain grade or course may vary widely. Some of the activities contain almost exclusively content presentation and definitions, others offer a description of how to run an activity, yet a third kind refers to online games and activities. In order to provide the reader with a better understanding of the *Comprehensive Curriculum* the following several activities taken from different grades illustrate some of these observations. All of the example activities are from the 2008 version of the curriculum since the 2005 version is no longer available online.

**Activity 3: Target (GLEs: 1, 5)**

**Materials List:** playing cards minus the face cards, paper, pencil

Provide each group of four students a set of playing cards minus the face cards. Ask students to shuffle the cards and tell them that the red cards represent negative numbers and the black cards represent positive numbers. Have Player 1 place the first four cards in the deck face up and identify one of the four numbers as the target number. Allow Players 2, 3 and 4 about 45 seconds to build a number sentence using the three cards that are not the target number as well as two different operation symbols. Have the players compete to be the first to build a sentence that results in the target number as the answer. If the sentence results in the target, award the player two points. If no one gets the target number, give the player closest to the target number one point. Ask all players to write the winning number sentence and their individual number sentences using the correct order of operations. When the winner of the round has been determined, have group members compare their answers, writing them as a repeated inequality. After each round of play, have the player to the right of the last player turn the cards over and determine the target number.

Example: Suppose the four cards turned up are red 4, red 8, black 3, and red 7. Player 1 selects the black 3 as the target because there are 3 reds or negatives. One student writes \(4 \times 7 \div 8\) and gets \(-3.5\), the second student writes \(-8 \div -4 + -7\) and gets \(-5\), and the third student writes \(-4 \div -8 = -7\) and gets \(7\). The students should write the inequality \(7 > 3 > -3.5 > -5\). The player with the answer of \(7\) is closest to 3 and receives 1 point. (CC, Grade 8, Mathematics, pgs. 3-4)

This is an example of an activity that has remained mostly unchanged from the 2005 version. The two biggest changes are the addition of a materials list, the inclusion of a focus GLE (GLE # 5 following the name of the activity is underlined), and the correction of the mathematical error which was part of the debut version. The last sentence of the original activity
stated: “The player with the answer of -3.5 is closest to 3 and receives 1 point.” In the assessment section of this unit the authors included an activity-specific assessment for Activity 3 which reads:

**Activity 3:** The student will discuss strategies that could be used by Player 1 when choosing the target number from the four cards turned up. The teacher will ask group members to choose one strategy that they think is best and share it with the class. The GLE indicates that the student will use the order of operations to solve problems. Make sure that the students express how the order of operations can help them get closer to their ‘target’ answers. (pgs. 9-10)

The last two sentences are an addition since the 2005 version of the document. Overall, this activity on operations with integers and inequalities does not offer any definitions in terms of teaching the content. The assumption is that the teachers have already taught the material which underlies this activity and that the students do not require additional instruction in order to address GLE 1 (Compare rational numbers using symbols (i.e., <, ≤, =, >, ≥) and position on a number line (N-1-M)) and GLE 5 (Simplify expressions involving operations on integers, grouping symbols, and whole number exponents using order of operations (N-4-M)).

The following activity from the Geometry curriculum is extremely different from the previous one. Not only is it extremely long, but it mostly resembles a textbook presentation of the material in a considerably abstract form despite the examples:

**Activity 8: Permutations and Combinations** (GLEs: 24, 25)

**Materials List:** pencil, paper, scientific calculator (minimum)

*Teacher note: Information on permutations and combinations can be found in most Algebra 1 and/or Algebra 2 textbooks. This activity reviews combinations and permutations and extends the student's prior knowledge to include circular permutations which have not been included in prior grades.*

The purpose of this activity is for students to apply the concepts of permutation and combination to geometric situations. For example:

A. How many ways can 3 books be arranged on a shelf if they are chosen from a selection of 8 different books? **Solution:** 336
B. How many committees of 5 students can be selected from a class of 25?

Solution: 53, 130

First, review simpler problems whose answers can be determined by making lists or tree diagrams. For example, how many different ways can you write the name of a triangle whose vertices are A, B, and C. The possibilities are:

ABC  ACB
BAC  BCA
CAB  CBA

One way to think about this is that for any vertex, there are two different possible names. So three vertices times two names each is six possibilities.

Another way to think about this is that there are 3 positions to fill when naming the triangle. There are 3 vertices from which to choose for the first position, but only 2 remain as choices for the second position. Once the second position is filled, there is only one vertex remaining with which to fill the last position. Review with students that 3! is 3 x 2 x 1 = 6 which is the same as the number of possible names. This is a concept taught in Algebra I. Give a few more examples in which the total number of possibilities can be determined.

Relate the idea of determining how many choices one has to name a triangle to Problem A: How many ways can 3 books be arranged on a shelf if they are chosen from a selection of 8 different books?

There would be 8 ways to fill the first position, 7 ways to fill the second position, and 6 ways to fill the third position. $8 \times 7 \times 6 = 336$. In situations in which order is important (e.g., ABC is different than ACB), the number of possibilities is called a permutation.

For situations in which order is NOT important (i.e., ABC and ACB would be considered duplicates since they are the same three letters), the number of possibilities is called a combination. To know the number of combinations of 3 books that can be put on the shelf, take into account how many arrangements would be considered to be the same for each set of 3 books. This is 3! or 6, so dividing 336 by 6 is 56. There would be 56 different combinations to put on the shelf. In other words, one could display a different combination of 3 books for 56 ways before he/she would have to repeat a set.

Have students discuss problem B. First, have them determine if the problem requires a permutation or combination and then solve the problem accordingly. Ask students if a committee of John, Sue, and Mary is the same committee as Sue, Mary and John. (yes)

It may be appropriate to use the permutation formula, $P(n,r) = \frac{n!}{(n-r)!}$, and combination formula, $C(n,r) = \frac{n!}{(n-r)!r!}$, with some classes; however, the teacher
should guide the students through the development of these formulas using counting, listing, etc. The use of the formulas can be an extension of the lesson.

Provide students a variety of problems to work. It is better for some students to think through the position process. For those who have had more experience, the use of the formula is acceptable when solving such problems. As stated above, whether the formula is introduced and/or used should depend upon prior experience and knowledge of students in the class.

Introduce the class to circular permutations to answer such questions as, “How many ways can n people sit at a round table?”

If one of the chairs is designated as the "head" of the table, then the answer is n!. Any of n people sits at the head of the table, and the permutation proceeds in a clockwise direction. In this situation, it doesn't matter who sits at the head. In this case everyone could be sitting in the same relative order (ABCD, BCDA, CDAB, DABC for four people at the table) seated in different chairs. A sits in position 1, then position 4, then position 3, then position 2 but A is always next to B, who is next to C, who is next to D. Therefore, for n people there would be n duplicate arrangements. So n! divided by n duplicate arrangements results in (n-1)! permutations if there is no designated head position in the circle.

Have students draw all arrangements for some simple problems to help them understand the process. For example, how many permutations are there for 3 people sitting at a round table? for 4 sitting at a round table? for 5? Then repeat the same process with the idea that one place is designated as the head position.

The following example shows a real-life application of a circle permutation. 
A disk jockey is setting up some CDs to play during his shift. He can put 6 different CDs on the tray. How many different ways can the discs be arranged?

In this instance, once the discs are arranged in a circle, that same arrangement can be rotated. The discs are in different positions, but the arrangement is the same. If you label them ABCDEF and rotate so that it is now FABCDE, the discs are still in the same relative order. Lead the students in a discussion to find that, in this case, 6 of the arrangements are the same, so the permutation is \( \frac{6!}{6} \) or 6! possible arrangements of the discs.

Students should then generalize the concept so that any circular permutation without a fixed point is \( n-1 ! \); with a fixed point, the permutation is n!.

Examples:
A. How many ways can 8 campers be seated around a campfire? Solution: 5040
B. How many ways can 3 books be placed on a shelf if chosen from a selection of 7 different books? Solution: 210

C. Find the total number of diagonals that can be drawn in an octagon. Solution: 20 (this is a combination taking 8 points, 2 at a time—however, since 8 segments are the sides of the figure, those 8 must be subtracted from 28 which is the number obtained from the formula).

D. Given 7 distinct points in a plane, how many line segments will be drawn if every pair of points is connected? Solution: 21

E. Suppose there are 8 points in a plane such that no three points are collinear. How many distinct triangles can be formed with 3 of these points as vertices? Solution: 56

F. How many pentagons can be formed by joining any 5 of 11 points located on a circle? Solution: 462

At the conclusion of this activity, students should respond to the following prompt in their math learning logs (view literacy strategy descriptions):

Describe the difference between a permutation and a combination. In your description, you should discuss the formulas, as well as, how you decide when to use a permutation or a combination. Include an example of each type and show how you would solve the problem. Explain why you chose to work each problem as either a permutation or combination.

The two GLEs addressed in this “activity” are GLE 24: Use counting procedures and techniques to solve real-life problems (D-9-H) and GLE 25: Use discrete math to model real-life situations (e.g., fair games, elections) (D-9-H). No activity-specific assessment is provided at the end of the unit because the students are expected to discuss permutations and combinations in their learning logs. A learning log is defined as “a notebook, binder, or some other repository that students maintain in order to record ideas, questions, reactions, and reflections, and to summarize newly learned content” in the Literacy Strategy Descriptions that go along with the 2008 version of the Comprehensive Curriculum.

The following activity from Unit 3: Linear Functions and Their Graphs has undergone minor changes since the debut edition of the Comprehensive Curriculum. The examples are
somewhat more explicit, yet the teachers still need to develop their own examples to go along with the activity:

Activity 11: Recognizing Translations (GLEs: 15, 26)
Materials List: paper, pencil, graph paper
Give students a set of ordered pairs that are the vertices of a triangle, square, or other geometric shape. Also, provide students with a translation rule depicted as an input-output rule. For example, the rule of \((x, y)\) goes in and \((x+2, y+3)\) comes out. Have students create a table of ordered pairs and then graph each ordered pair that represents a vertex and the corresponding new ordered pair \((x+2, y+3)\). Have them then describe the rule as a translation of each point 2 to the right and up 3. Repeat this activity using several different translation rules. (p. 33)

There are no activity assessments offered in either edition of the Comprehensive Curriculum. Sometimes the assessments take the form of a rubric as is the case with the following activity from Unit 6 in the Algebra II curriculum:

Activity 4: Exponential Data Research (GLEs: Grade 9: 10, 15; Grade 10: 20, 27; Grade 11/12: 4, 6, 7, 8, 10, 19, 22, 24, 27, 29)
Materials List: paper, pencil, graphing calculator (or computer), Exponential Data Research Project BLM
Activity:
This is an out-of-class activity in which the students will find data that is best modeled by an exponential curve.

Exponential Data Research Project:
- Distribute the Exponential Data Research Project BLM and discuss the directions with the students.
- State that this is an individual project and each person must have different data, so they should be the first to print out the data and claim the topic. Possible topics include: US Bureau of Statistics, Census, Stocks, Disease, Bacteria Growth, Investments, Land Value, Animal Population, number of stamps produced each year.
- Give the students approximately one week to complete the project.
- When the students hand in their projects have each student present his/her findings to the class.

This activity has remained essentially unchanged since the 2005 edition. However, the number of GLEs associated with the activity increased from nine (2005) to fourteen (2008). This activity is atypical because it includes as unusually large number of GLEs when most of the other activity typically address between two and five GLEs from the same grade/course. The
revised version of the Comprehensive Curriculum includes the following rubric for grading the student research projects in the Blackline Masters section:

Grading Rubric for Exponential Data Research Project

10 pts. – table of data with proper documentation (source and date of data)
10 pts. – scatterplot with model equation from the calculator or spreadsheet (not by hand)
10 pts. – equations, domain, range
10 pts. – real world problem using extrapolation with correct answer
10 pts. – discussion of subject and limitations of the prediction
10 pts. – poster - neatness, completeness, readability
10 pts. – class presentation (p. 142)

In conclusion, the activities presented in the Comprehensive Curriculum share presentation components yet they can vary widely in the number of GLEs addressed and the level of detail in the instructions, examples, and assessments.

The introduction of the Comprehensive Curriculum and the influences that brought about its creation and implementation are inseparable from the research questions in this study regarding the teachers’ responses to the implementation of the Comprehensive Curriculum and related professional development programs. In the next chapter I delve deeper in the teachers’ and teacher educators’ understanding of and reactions to these reforms.
Chapter 5

Teachers’ and Teacher Educators’ Views of the Comprehensive Curriculum and the Associated Professional Development Program

Originally this research study began with research questions that targeted a deeper understanding about mathematics teachers’ perceptions and reactions to standardized reforms, and related professional development especially in the context of implementation Louisiana’s statewide Comprehensive Curriculum. However, after an initial analysis of the earlier data collected during the study, two distinct sets of issues emerged. The teachers’ responses to reforms and professional development in general were quite different from their responses to the new Comprehensive Curriculum and related professional development. Therefore, I needed to separate the teachers’ responses into general and specific ones and analyze and discuss these separately. This observation was confirmed following the analysis of the surveys administered to the forty-five middle and high school mathematics teachers in the summer of 2005 prior to the implementation of the Comprehensive Curriculum. The majority of the teachers were not familiar yet with the Comprehensive Curriculum and lacked awareness of the state mandates for its implementation. Thus the teachers’ responses about their teaching and reforms were very general.

The initial research questions were:

1. How do secondary mathematics teachers in a rural school respond to standardized reform and enforced compliance to standards?

2. What do teachers and teacher educators determine as the impact of a professional development program on the teachers’ practices in a time of implementing systemic reform?

3. How might the nature of mathematics as portrayed in the reform curriculum versus the standard curriculum help explain the teachers’ responses to curriculum reform and the impact of that reform on their practices?
I posed these questions as the teachers prepared for and began the implementation of the Comprehensive Curriculum, a new statewide curriculum. The teachers participated in a professional development program whose focus was intentionally redirected from strengthening their content knowledge to easing their transition to the new curriculum. The findings of the survey, administered immediately prior to the implementation of the Comprehensive Curriculum, and my increasing awareness of the confusions that the teachers experienced with the new demands for change prompted me to formulate the two new research questions which replaced the original three research questions. The research questions that guided the analysis of the data are:

1. What are the mathematics teachers’ and teacher educators’ understanding of and reactions to The Comprehensive Curriculum and the professional development program associated with its implementation?

2. What are the mathematics teachers’ and teacher educators’ general views of professional development and reforms?

These questions target the same issues—responses to standardized reforms and associated professional development programs. A main difference, however, is that the first question seeks to explore the teachers’ and teacher educators’ responses in light of the new curriculum, while the second question seeks to identify the responses to these phenomena in general.

The results of this research study are organized by research question in Chapters 5 (new research question (1)) and 6 (new research question (2)). The teachers’ and teacher educators’ responses to the new curriculum and related professional development program are highlighted in Chapter 5, while the perceptions of these phenomena in general are discussed in Chapter 6. The discussion of the responses to the Comprehensive Curriculum in Chapter 5 is often embedded in larger views and issues that are further discussed in Chapter 6. Chapter 5 is divided in two large sections. The first part of Chapter 5 includes the introduction of each one of the five
target participants and their individual views on the new curriculum and the professional development program. The second part of Chapter 5 includes three themes—Expectations, Alignment, and Big Picture—which are common among the mathematics teachers, professional development coordinators and teacher educators. The following Chapter 6 has a structure parallel to the structure of Chapter 5.

**Target Participants’ Introductions and Their Views of the Comprehensive Curriculum and Associated Professional Development**

The target participants were five teachers and professional development coordinators who were interviewed for this study. Three of the target participants (Paul, William, and Joanne) participated in the professional development program associated with the implementation of the Comprehensive Curriculum. The other two participants (Andrea and Susan) were the two primary professional development coordinators for the two-year professional development program. Andrea also served as an instructor during the professional development program and an on-site coordinator during the academic year. The common factors among all five target participants were that they were all teachers at one time and were affected by the same reforms associated with the implementation of the Comprehensive Curriculum.

**Paul.**

**The ideal mathematics teacher.** Throughout this study, Paul’s dedication to mathematics and teaching were unsurpassed. Originally from the Philippines, he was the valedictorian of his high school class. As a high school student he was a student teacher—when the teacher was out Paul was in charge of teaching his classmates. Paul credits this experience with his excellent preparation in mathematics and science. He always stayed prepared and ahead of his classmates. His classmates praised him for the great job he did and Paul felt that at times he even taught the lessons better than his teacher.
Paul began his career as a teacher in a laboratory school in the Philippines where he taught physics and physical science for two years. The school was a rural school, yet it was high achieving and highly selective. This teaching experience was followed by one year at the junior high level in a junior high school in the same parish where he teaches now. He had been in his current position as a high school mathematics teacher at Bayou High school for two years. During this time he had taught every high school mathematics course offered at the school from the Algebra sequence to Calculus to Finance Mathematics and even Physics. Paul served as mathematics department head for the 2005-2006 academic year, chaired the textbook adoption committee and was on the school improvement team. At the conclusion of this study he was looking for another teaching position, possibly out of state, because Bayou High School was closing and was consolidating with two elementary schools to become a kindergarten through eighth-grade school.

Paul initially started out as an electrical engineering major in college and he pursued that area of study for three years. His parents encouraged him to pursue studies in engineering because he could make a lot of money in this line of work. While an undergraduate, Paul felt that the college professors needed training in education. So he switched to education, majored in high school mathematics education and minored in physics and still graduated on time. In the near future Paul plans to finish his Master’s degree in physics education and continue on to pursue a Ph.D. in curriculum and instruction. He was certified to teach grades 7-12 mathematics in 2005 and physics in 2006. He wished that he had completed his certifications earlier but did not have the time to do that because he was changing jobs.

After Paul passed the Praxis test he became certified to teach chemistry and physical science, which included physics. Paul wanted to pursue his education further and this was his
main reason to come to the United States. He thought that he would be able to continue with his studies but they were interrupted due to his lack of certification and additional immigration paperwork that had to be approved. So far he only had a work permit but no permit for study. Paul stayed involved professionally as an NCTM member who regularly attends the annual NCTM conferences.

Paul’s Use of the Comprehensive Curriculum and his Personal Experience with the Comprehensive Curriculum. Paul found that the implementation of the Comprehensive Curriculum took a great deal of planning. He re-evaluated his old lesson plans and saw how they compared with the Comprehensive Curriculum. He felt that this additional work was not above and beyond what he expected to do as a teacher:

It’s just part of it, you know, as a teacher you have to, you’re getting paid to do this, this is part of your preparation. We are trained in college how to make lesson plans, how to tailor, how to merge lessons together, how to structure a lesson in such a way it fits a certain topic, target certain skills, whatever, so we are trained to do this, and it’s part of our job. (personal communication, July 12, 2006)

He is concerned with the organization of the activities in the Comprehensive Curriculum, especially since initially he had been told to go through the units and the activities in the order in which they appeared in the Comprehensive Curriculum. In that sense Paul feels that the new curriculum is limiting the teacher’s creativity, “her freedom to conduct his or her own class” (personal communication, July 12, 2006). So therefore Paul is treating the Comprehensive Curriculum as a guide so that he is “still the master in front of your classroom.” Although there will be people observing him to see whether or not he is following the Comprehensive Curriculum, they will not be able to tell whether or not he is using it sequentially. They would pay more attention to whether he is addressing certain GLEs and his success in implementing the new curriculum will ultimately be judged on the students’ performance on the state tests. Thus
Paul finds the *Comprehensive Curriculum* helpful for accountability, “it’s just a check-and.balance for my own actions” (personal communication, July 12, 2006).

Paul credited his background, and in particular his military training, with the energy and perseverance to deal with the initial frustration and stress associated with the initial implementation of the *Comprehensive Curriculum*. He was in the habit of doing things first before complaining about them. After following the *Comprehensive Curriculum* for a year, he had no complaints about the new curriculum except for the minor mistakes he has noticed in it. The mistakes he identified were in grammar, website addresses, resources listed. He acknowledges that even textbooks and test keys have mistakes in them, so he is not bothered by the presence of mistakes in the *Comprehensive Curriculum*:

So, it’s a work in progress and that’s what I always tell my co-teachers, you know, that the *Comprehensive Curriculum* is a work in progress and we have to help, do our part into making this a very good curriculum because it’s not for us, it’s for the kids. (personal communication, July 12, 2006)

Paul described his initial preparation for teaching using the *Comprehensive Curriculum* as “pre-planning.” He is extremely organized and uses seven calendars to stay on top of his job. On one of the calendars he keeps track of the lessons he teaches in each class, mainly the content that he covers. A different calendar is dedicated to the activities for each course. This detailed planning ahead enables him to cope with the demands of the new curriculum as well as his other work and personal responsibilities.

*Paul’s personal experience with professional development associated with the Comprehensive Curriculum.* Paul’s last year at Bayou High school was also his first year of LaSIP training. He wished he could have been a part of that program during his first year at the high school but due to his transfer to the high school from an area junior high school he was too late to complete the application process. He felt that he wanted to be part of LaSIP “because
they always ask it in the state test, “Is your teacher LaSIP-certified?” (personal communication, July 12, 2006) and he felt that there is some kind of a difference between the “normal” teachers and those who are LaSIP certified through professional development. In order for a teacher to become LaSIP-certified, the teacher has to go through the LaSIP training which involved two years of content area training through LaSIP. Paul was concerned about his training because he only participated in one year of LaSIP training through the PDM professional development project and after that the project was not renewed. Thus he thought that he could not obtain the second year of professional development requirement for the LaSIP certification. However, Paul received his LaSIP certification none the less and was happy about that, although he said “I am not after the certificate, I’m after the training” (personal communication, July 12, 2006).

Paul found the PDM professional development project very helpful because the lessons were targeted toward the implementation of the Comprehensive Curriculum. He realized that he had not taught some of the topics before, such as matrices:

but if the state wanted us to teach that, we have to teach that, and so the teachers need practice on these things, you know, because, I mean, when was the last time I was involved in like doing a row-echelon form or proving logarithmic functions, OK? (personal communication, July 12, 2006).

Thus he welcomed a refresher on some of these topics through PDM and additional LaSIP training. Through LaSIP he obtained more sample exercises, bell-ringers, hands-on activities and other materials that he found very helpful. He further benefited from going through the Comprehensive Curriculum sample examples during the professional development and knowing where some of the mistakes were as well as being more familiar with them. He was unaware of any LaSIP follow-up certification or training that would be an extension to what he already completed. So it seems that once a teacher is LaSIP-certified he remains LaSIP-certified:
They should, and that’s what professional development nowadays are gearing towards to, it’s not what you are going to prepare them for, are you going to prepare them for and sustain them? So, there should be some type of a follow-up program. (personal communication, July 12, 2006)

The LaSIP-certified teachers were told vaguely of some observations that would happen during the following years but there was not much certainty or clarity in that information. They were also made aware that if the funding for the grant ended, then the program will close, which is exactly what happened with the PDM professional development project whose time was cut short from three years to two years due to funding issues. Paul believes in research and wishes that the state Department of Education would follow what happens with the teachers even after the money is gone:

They won’t have any money to continue to program for, but I still think that it’s gonna be very useful for research, for college research and stuff to continue and follow-up even without the pay, without the grant supporting you. Because, Hey, this is a project that you have started, you wanted to see how effective it is, you know, you wanted to see how far it could go through and how could it sustain itself, and up to the point where the teacher could already implement the Comprehensive Curriculum without the aid of a professional, without the aid of a facilitator (personal communication, July 12, 2006).

Several aspects of the professional development programs appealed to Paul. For example, since the LaSIP training was on several Fridays and Saturdays during the school year and then a week or two during the summer, he liked that the professional development was not job-embedded because he liked the extra money and that the students did not miss their teachers for many days. Paul also liked the manipulatives he received as part of the professional development. With the one hundred fifty dollars he was allotted for materials for his participation in the program, he obtained graphing boards, measuring instruments, and Algebra Tiles for his classroom. He wished he could get more graphing calculators but they were too expensive and usually purchasing batteries for the calculators he already has is a financial strain on the school and on him personally. Paul liked being able to look up the definitions of certain
terms easily instead of having to look through the textbook: “We tried to get other stuff, books, reference materials, you know, out of, like dictionary of mathematics terms, you know, that’s very useful” (personal communication, July 12, 2006). In conclusion, Paul enjoyed the material benefits of the professional development programs and the related experiences.

**Paul’s overall view of the Comprehensive Curriculum.** Unlike many other mathematics teachers, Paul was aware of the upcoming implementation of the *Comprehensive Curriculum* in advance and of the reform materials which led to that change. He described the Model Curriculum Framework as “the birth right” of the Comprehensive Curriculum. One of his colleagues was a part of the group of teachers who worked on both projects and informed him of the developments. When he referred to the changes of the past three years, Paul commented that Cotton parish “has always been anticipating something like that” (personal communication, July 12, 2006). Paul has always had a positive view about the *Comprehensive Curriculum*, “because we will have ready-made lessons, we have immediate resources, we have practice materials for the students. You don’t even have to have a textbook for you to implement the *Comprehensive Curriculum*. ” Paul sincerely assumed that the majority of teachers put as much time and energy into their preparation and teaching as he did: “Yes, of course, the *Comprehensive Curriculum* does require several materials: manipulatives and like household materials that you need, but who doesn’t do that anyway. You know, we all do that” (personal communication, July 12, 2006). However, his assumption was not confirmed by my classroom observations in this study.

Paul acknowledged that some of the activities, which he called optional, expected students to use materials or resources such as PowerPoint, computers, or digital cameras which they may not have access to or own. In that sense “sometimes the *Comprehensive Curriculum* has not been tailored to our special ways that all the students have equal opportunity in learning
the *Comprehensive Curriculum*” (personal communication, July 12, 2006). Paul felt that this issue was addressed during the first year of implementation when the teachers were told they can replace the *Comprehensive Curriculum* activities with their own as long as they addressed the same GLEs. Paul took advantage of that freedom yet he documents what he does and sends his substitute activities to the school board office for approval. He felt confident that he did a good job addressing the same GLEs as the activities he replaced: “I make it a point to follow [the *Comprehensive Curriculum*] not verbatim but to follow the framework itself, to follow the activities, to follow the GLEs, because these are the ones that they are gonna be tested” (personal communication, July 12, 2006).

Paul found the *Comprehensive Curriculum* useful for new teachers as well as retiring teachers “that need content update, they’ve been doing the same old stuff over and over.” The *Comprehensive Curriculum* offered such teachers a “more effective strategy” to teach mathematics (personal communication, July 12, 2006). The new curriculum was also very useful for teachers who wanted more professional development as the parish offered PD for implementing the *Comprehensive Curriculum*. Paul related to the new curriculum because its implementation reminded him of the time he created a physics curriculum in the Philippines. He felt that as a teacher he was also constantly doing active research with his students, experimenting with what works and what does not work in the classroom. As a result of such research and experimentation he, along with fellow teachers and university faculty and graduate students, was “able to come up with a curriculum complete with, of course, practice exercises, lesson plans, tests, activities, visual guides, modules” (personal communication, July 12, 2006).

Paul identified several characteristics of the *Comprehensive Curriculum* that he found positive and helpful for his teaching. The sequencing of the *Comprehensive Curriculum* made
sense to him more than the sequencing in some of the textbooks that he had used previously. He also liked the suggested timelines for completing each unit because previously he might have spent too much time on certain lessons. He found the *Comprehensive Curriculum* activities good in general and some truly excellent. He liked the variety in the types of activities—hands-on, cooperative learning, technology-infused. Some of the activities were so good that Paul “never thought about an activity like that.” Another feature of the *Comprehensive Curriculum* was the pre-set assessment:

> It doesn’t only have paper-and-pencil, you know, formal written assessment, it has summative assessment, it has practice exercises, it has suggested assessment and then guidelines into making a new test, which I’ve always been, you know, so weary about. It’s like what am I gonna put on my test, how am I gonna word this, how is the state going to ask a question regarding this topic. Now, at least I know how they’re gonna ask it because it’s on the *Comprehensive Curriculum*. (personal communication, July 12, 2006)

Paul trusts the Department of Education to include on state tests items similar in form to those his students are seeing in the *Comprehensive Curriculum*: “You know, they’re not gonna put it on the curriculum unless they’re gonna put it in that context or whatever” (personal communication, July 12, 2006). He expresses his uncertainty about how exactly to teach a certain topic when he is not sure in what form the problems on that topic will be presented on the state tests. So the *Comprehensive Curriculum* is very helpful in the sense that it gives him a direction of how to approach the topics and what the students should expect to see on the state tests.

Paul also identified some of the drawbacks of the *Comprehensive Curriculum*, although he said that there were not many. He found some of the activities to be “just lifted out of the book” (personal communication, July 12, 2006), simply textbook exercises. Another problem was with the mistakes in the curriculum that he had to identify and correct usually prior to giving
the activities to the students. At times, he noticed some of the mistakes only in the course of
doing the activities because he did not have time to look closely at the problems or exercises that
came with the activities. Paul blamed the mistakes and lack of careful proof reading on the rush
to complete the curriculum. He periodically checked the state website to see the updates and
corrections to the Comprehensive Curriculum.

Paul disagreed with the claims that the Comprehensive Curriculum is independent of the
textbooks and believed that “you always have to have a textbook because some of the things are
just outlined for the teacher and you have to get a textbook” (personal communication, July 12,
2006). There is a definite need for using a textbook along with the Comprehensive Curriculum
in order to “define things, work out problems, give out examples.” The Comprehensive
Curriculum activities are accompanied by a list of references, “where they lifted the activities
from,” but they lack “specific resource materials.” This lack of resources places an added
pressure on conscientious teachers to seek additional materials to prepare their lessons. For
example, Paul found himself consulting five calculus textbooks to see which one most closely
matched the activity he was considering using with his students. He brought some of his
textbooks and reference materials from the Philippines and he felt fortunate to have them as
resources. He also had additional textbooks, more than the average mathematics teacher,
because he chaired the school mathematics textbook selection committee and received sample
copies from publishers.

According to Paul, sometimes the students do not understand why the teachers want them
to learn something, and why there are performance assessments, and projects. The students are
always complaining and they are opposed to doing more work. However, Paul’s reply to them is
“You would thank me for doing this to you, you would thank me for sticking to the
Comprehensive Curriculum and not depriving you of all these opportunities that you’re supposed to get” (personal communication, July 12, 2006). So Paul is used to putting up with student complaints and can address them when they arise. He felt that eventually students concede:

And after some time, the next thing you know they already accepted the Comprehensive Curriculum. That, hey, it’s gonna be a part of this, we’re gonna be tested on this and we should thank our teacher, he’s doing this for us. Math teaching is a lot of prep, or whatever. (personal communication, July 12, 2006)

Overall, Paul brought up only minor problems with the Comprehensive Curriculum and its implementation. As a very conscientious teacher, he was able to identify a variety of drawbacks but did not have any substantive criticisms. He felt that he was responsible for making the curriculum work and teaching his students well no matter what.

Paul’s observations of teachers using the Comprehensive Curriculum in the schools.

Paul felt some negativity about the Comprehensive Curriculum on the part of other teachers. He acknowledged that the Comprehensive Curriculum is “overwhelming” and the implementation of so many activities in such a short span of time could be “unimaginable” (personal communication, July 12, 2006). Having so many activities leaves little or no time for lecturing, which should be part of the instruction. Paul even draws on his experiences as a college student and how in all of his schooling lecturing and classroom discussion have been an integral part of the teaching and learning process. He feels that students need some lecture in order to be able to do the Comprehensive Curriculum activities.

The teachers had to prepare extensively in order to implement the Comprehensive Curriculum compared to teaching the way they were used to teaching mathematics. The Comprehensive Curriculum was very new to them because they were doing new activities that they may not have tried in the classroom before. With the previous curriculum, the teachers probably required minimal or no preparation at all, because after teaching it for several years
they probably could “replay the lesson” (personal communication, July 12, 2006) in their head. They could use the practice worksheets they had prepared in previous years. These are some of the reasons why the teachers may “feel sad about the Comprehensive Curriculum.” Paul himself had felt overwhelmed at times with the Comprehensive Curriculum. In order to avoid causing such discomfort to teachers Paul suggests that the Comprehensive Curriculum be introduced gradually and he vividly described what a rushed introduction to the Comprehensive Curriculum can be like:

Nobody wants to be stabbed immediately, right away. I mean you always want always, you know, hey you always have to soften the skin, rub it with alcohol, or whatever. But no, no alcohol whatsoever, no pre-treatment, just stab with a needle and inject the Comprehensive Curriculum; nobody wants to be poked with a needle right away. (personal communication, July 12, 2006)

He proposes that the Comprehensive Curriculum is first introduced in 1st, 4th, and 9th grade. He realized that if they only started with 1st grade, it would take too long to implement, a whole generation, “so there is no immediate pressure on everybody to do their work” (personal communication, July 12, 2006). Some teachers may not take the changes seriously because they would consider them to apply only for the certain grades, so “there should be some sort of check-and-balance.” In other words, teachers may not act responsibly unless they know that there will be some kind of accountability.

In response to the teachers who wish they could teach the way they have been teaching for years, Paul questions whether their old activities and lessons meet the GLEs, and especially those standards on which the students will be tested by the state. Also, he doubts that the old lessons would necessarily target the skills they are supposed to target as well as prepare the students for college and vocational work.
Paul commented on the support the teachers received from the school administration, the parish and the state. He commended the school for their efforts to implement the *Comprehensive Curriculum* by purchasing the needed materials, resources, reference materials and establishing a monitoring system “to make sure that everybody is following the *Comprehensive Curriculum*” (personal communication, July 12, 2006). To ensure that all teachers are following the *Comprehensive Curriculum* the school offered “school-wide professional development to fit the *Comprehensive Curriculum*.” Shortly before the implementation of the new curriculum teachers began using portfolio assessments. Upon the completion of a certain grade the students bring their portfolios to the new teachers so they can become familiar with their academic performance in past years. The school paid the teachers for the extra time they spent discussing and critiquing the unit tests. The school also offered in-school and out-of-school tutoring, “a support system for those who cannot meet the standards, the expectations of the *Comprehensive Curriculum*” (personal communication, July 12, 2006). Joanne, the highly skilled educator, was a representative of this support system and Paul found her very helpful. She observed classes, offered instructional support and was responsible for making sure the mathematics teachers at Bayou High School had the materials they needed to implement the activities. The parish had also been supportive by providing the school with the needed finances. The state did not even provide every teacher with a copy of the *Comprehensive Curriculum*. They gave the parish a hard copy and a “soft” copy of the *Comprehensive Curriculum* and left it to the parish to make copies of the CDs for the teachers. The state was responsible for correcting the mistakes and posting updates of the *Comprehensive Curriculum* online.

Prior to using the *Comprehensive Curriculum*, the students would get lost during his classes, “there were times before that, you know, we would jump from one topic to another and
fail to find a connection between the two,” “we’re just moving on to the next chapter and that’s the only reason I’m gonna tell them why we are doing this lesson” (personal communication, July 12, 2006). When he used the *Comprehensive Curriculum*, Paul found the transitions between topics more gradual, “there’s direction. The students know where to go. They have a guide now, I mean, today they know what they’re gonna be taught. Last year who knows what the teachers will come up with.” The teachers cannot be as spontaneous about what they are teaching when they follow the *Comprehensive Curriculum*. Paul also finds the new curriculum more rigorous which is a reason for the students to dislike and even hate the *Comprehensive Curriculum*. “Of course every teacher wants rigor in their class and that’s what we’re trying to push, you know rigor” (personal communication, July 12, 2006). Paul expressed his desire to have all of his students go to college and he thought that this was everybody’s dream. He is not discouraged by the fact that the students hate the *Comprehensive Curriculum*: “not everything that the students hate is not good for them. You know, they just hate it because they are kids, they are kids, and they want to go to school and just sit down and listen to the teacher and do nothing.”

The teachers were overwhelmed with the *Comprehensive Curriculum* and therefore they had negative attitudes toward its implementation. Paul felt that the teachers would have felt better if initially they were given “a set of framework, like a guideline, an outline, a syllabus” (personal communication, July 12, 2006). That way the teachers would know what they needed to cover. Then the next step would be to give the teachers activities that go along with the syllabus that they have already used. That would be a more gradual introduction to the changes. “And then once they have accepted those two, the syllabus and the activities, and merged that, and made the curriculum out of it” (personal communication, July 12, 2006). Paul felt that in
order for the implementation to succeed “there should always be a gradual transition.” A more moderately paced implementation would have benefited both teachers and students.

William.

**A social studies teacher turned mathematics teacher.** William’s path to becoming a mathematics teacher was non-traditional. Following his high school graduation, he enrolled at Southern Delta University as a social studies education major. His first job was teaching Louisiana history and physical education. He found out that Bayou HS needed a mathematics teacher because they had a hard time hiring and retaining certified mathematics teachers. During his first year teaching mathematics William was not certified yet. Since he was already a certified grades 6-12 teacher in social studies, all he had to do was take a content test for a different subject area and he would be certified in it. He took the mathematics certification test and after he passed the test he was certified to teach mathematics for grades 6-12. Although he was certified in both social studies and mathematics, since there was a greater need for certified mathematics teachers, he was teaching mathematics. William was also a “highly qualified” teacher because he had his degree in social studies education. He was also automatically considered highly qualified in mathematics after he passed the mathematics content area test. When he first started teaching mathematics, William had some doubts about how much he enjoyed doing that although he considered himself to be good in mathematics.

In the summer of 2006 William was getting ready for his 4th year of teaching at the same parish. He had taught 7th and 8th grade mathematics since he started teaching there. Since the high school was closing, and the new consolidated school would be K-8th grade, William would be teaching mathematics at the upper grades: 6th, 7th, and 8th grade.
Williams’s impressions of the introduction of the Comprehensive Curriculum. William felt that the Comprehensive Curriculum was introduced all of a sudden. He said that while he liked the idea of it and he saw the importance of the Comprehensive Curriculum, he did not like the way it was introduced. It felt to him like a top-down decision that “came down as a surprise and a shock to a lot of teachers” (personal communication, July 19, 2006). Many of districts were unsure if the Comprehensive Curriculum was mandatory or suggested from the state department of education: “I think nobody seemed like they can really get a clear picture.” Close to the beginning of the 2005-2006 school year the districts (and the teachers) became aware that they were expected to implement the Comprehensive Curriculum, a change “that created a lot of confusion and probably some hard feelings” (personal communication, July 19, 2006) among some of the teachers.

William had heard some of his colleagues suggest that the Comprehensive Curriculum should have probably been introduced one year at a time. In that case the implementation would have taken a total of twelve years and it would have been much more gradual. William was sure that such a slow implementation would take too long to get to the junior high and high schools. He also wished that there would have been clear information on the expectations and specifics of the implementation of the Comprehensive Curriculum. William described the Lousiana state department of education’s decision to implement the Comprehensive Curriculum as “ambitious.” Something went wrong with the chain of command because the state gave the districts the order to implement the Comprehensive Curriculum and made it their responsibility to make sure that the Comprehensive Curriculum was being implemented: “More or less saying, “we’re not gonna come in and make sure that you’re doing it, but it is your responsibility to do it” (personal communication, July 19, 2006). That way the implementation was left up to the parish and
William is convinced that the parishes’ commitment to the implementation of the Comprehensive Curriculum varied widely across the state. In some places the Comprehensive Curriculum may have been “pretty much a dead document.” Since the state department surrendered their power over the Comprehensive Curriculum they really did not have a way of going back and checking how the implementation was proceeding.

William’s school district was ahead of other districts in hearing about the Comprehensive Curriculum. They had several workshops on the Comprehensive Curriculum the summer before it was implemented, “but it was still so much so fast” (personal communication, July 19, 2006). He describes the implementation:

It was still a lot of growing pains with it, there was a lot of hard feelings, a lot of arguments, a lot of teachers, you know, of course you have your teachers that don’t like the change. You have teachers that have their own activities, you have successful teachers who have been having wonderful results doing what they’re doing, and then all of a sudden they are being made to change, to do something else, when they’re having successful results.

William wished that the Comprehensive Curriculum would be revised somehow so that teachers would find it more user-friendly and thus it might become more acceptable to the majority of the teachers. He felt that the school administration did everything they could to help with the implementation to the Comprehensive Curriculum and to make it easy on the teachers. He sympathized with the administrators because this was a mandate that they received from the state and everything was done so last-minute. Even if the Comprehensive Curriculum was not introduced in the last minute, the emphasis placed on it and its importance were not made clear until just prior to the beginning of the school year. The administration was really good about providing the teachers with the money needed to buy the materials for the activities. Before school started the teachers attended meetings by grade level and made a list of the materials they would need. They received everything they had requested. The principal and the district
administrators made sure that the teachers got whatever they asked for. William described this supplying the teachers with the needed materials as being “tremendously supportive” (personal communication, July 19, 2006).

William received mixed messages about the implementation of the Comprehensive Curriculum. At some school meetings he was told to do every single activity. On other occasions he was told that he could pick and choose which activities to use with his students. The school’s elementary supervisor for grades K-5 told him to follow the Comprehensive Curriculum as it was. The secondary supervisor, grades 6-12, told him that he could use the activities selectively. This discrepancy caused some hard feelings among the teachers because some of the elementary teachers felt that the expectations were not the same of all teachers. William attributes this confusion and misunderstanding to the lack of clarity from the state department (personal communication, July 19, 2006). William said that he tried to follow the timeline of the Comprehensive Curriculum but he would not do every single activity in it.

William’s overall view of the Comprehensive Curriculum. William described the Comprehensive Curriculum as “very confusing” and “a little backwards” (personal communication, July 19, 2006). This unfavorable opinion of the Comprehensive Curriculum is due to the way it was organized. In order to make sense of the new curriculum, a person needs to look at the entire Comprehensive Curriculum, “[look] at the whole picture,” because it is not organized like the regular textbooks and curricula that teachers are used to working with. Teachers are used to working with materials that are “split into units and then each unit is in lessons and then in the lessons you have activities.” The way the Comprehensive Curriculum was set up it was unclear to the teachers what the students were expected to master and what they need to just be introduced to. In some of the Comprehensive Curriculum activities the students
got exposed to material that was to be addressed in more detail later. William thought that the reason behind this discrepancy was that when the students encounter the same material later they would feel that they had already done some work on it and it would not be totally new for them. However, if the teacher is not aware of this aspect of the curriculum and has not looked ahead at the whole Comprehensive Curriculum, there might be some confusion. The first time the teacher comes across an activity that uses new content the teacher may feel that he has to teach the mathematics behind the activity while this may not really be the case. The Comprehensive Curriculum activity is simply there to expose the students to new content and new ideas that they will study in depth later on. Therefore, “you have to look at the entire picture before you really get in and start to teach anything” (personal communication, July 19, 2006). “And that’s a little bit confusing because a lot of teachers don’t take the whole thing, which is a tough task, because it’s a lot of activities in it.”

William advises teachers who have not yet used the Comprehensive Curriculum to not be intimidated and negative about it. He thinks that “if you’re out and you ask 90% of the teachers about the Comprehensive Curriculum they’re gonna start cussing and ranting because they hate it” (personal communication, July 19, 2006). William warns about thinking negatively about the Comprehensive Curriculum because the students would sense that as the teachers would not do a good job teaching the curriculum. Implementing the Comprehensive Curriculum gets better as the teachers stay positive and focused. William also advises that the teachers find someone who can help them: “don’t try to just wing it on your own” (personal communication, July 19, 2006).

With the implementation of the Comprehensive Curriculum there has been a renewed focus on what students need to know or at least the material on which the students will be tested over in the state exams. William finds this especially true of teaching students who are not at
grade level. The teacher may be tempted to give up on teaching such weak students what they need to know for their grade level, “so I think it’s challenging teachers that might have gotten a little lazy over the years to refocus” (personal communication, July 19, 2006). William thinks that some teachers may have retired early because of the Comprehensive Curriculum “but if they had that kind of mindset they probably needed to retire anyway.” The Comprehensive Curriculum has also made some teachers “re-evaluate the way that they teach, and what they expect from their students.”

When I first suggested that the Comprehensive Curriculum could be described as “student-centered”, William did not know what I meant. He thought that that was so because “the students would do a bunch of the work” (personal communication, July 19, 2006). He went on to say that

Good teaching is not doing one thing too much or not doing one thing at the expense of everything else. Have some activity, have a little time, because there’s some students who like the structure of sitting in rows and listening to the teacher. And you can have other activities, you can have hands-on activities for some students who do better with the hands-on. So I think that’s the important thing, is incorporating a variety of strategies, and you know you can have some student-centered, some teacher-centered, and your types too. But most of the activities are cooperative groups, having the students making things, using their hands. That’s what the bulk of the activities are about in the Comprehensive Curriculum, so I’d agree with that [the Comprehensive Curriculum is student-centered].

William found inconsistencies between what the Comprehensive Curriculum is encouraging: student involvement, hands-on activities, and the nature of standardized testing: “It is kind of crazy that they have all these hands-on activities where you talk and you do this to figure things around, but when you have a test it’s got to be ‘shh, don’t say anything.’ I don’t know why that is” (personal communication, July 19, 2006).

William described the Comprehensive Curriculum as “cookie-cutter, where it’s the same thing for everybody” (personal communication, July 19, 2006), as he had heard others describe
it. However, he saw that description as a positive characteristic of the curriculum because if students left one parish and enrolled in another they would be learning similar things, if not the same. However,

I think that at the same time, you’re also assuming teachers don’t have personalities because there are some teachers that, you know, due to their personality, their styles, or whatever, do certain type of activities, they might not be effective as doing other types of activities. And I’m not saying that that’s giving a teacher an excuse to lecture all day, you know, I think if you’re that inflexible then you probably don’t need to be in education, if all you can feel comfortable is lecturing. But I think that there are some teachers, I’m sure that everybody would admit, they are just naturally gonna do better doing hands-on activities or they’re gonna do better putting students in groups than other teachers would. (personal communication, July 19, 2006)

In this respect William finds the Comprehensive Curriculum “a little too inflexible in its current form” because some of the expectations of teachers may not play on their strengths.

William’s use of the Comprehensive Curriculum. William faced a multitude of challenges during the initial implementation, many of which were beyond his control. For example, he was unsure what to do with the Comprehensive Curriculum when his students were not at grade level, yet according to the Comprehensive Curriculum he was to teach at grade level: “So you have to kind of water down, you have to teach some prior knowledge, you have to teach them the basics before you can actually teach them that activity in the Comprehensive Curriculum” (personal communication, July 19, 2006). Striking a balance between what he knew was best for the students and what he needed to teach proved difficult.

The abundance of activities in the Comprehensive Curriculum can be felt especially by teachers who teach multiple grades or more than one subject, which was the case with William. After the school consolidation and re-structuring William was going to teach the 6th, 7th and 8th grade mathematics courses, which meant that he would have to use the Comprehensive Curriculum for each one of these grades and prepare different materials. In the summer of 2006
there was even the possibility that he might teach Algebra I, in which case he would have to work with four different levels of the *Comprehensive Curriculum*, “four different sets of activities every day” (personal communication, July 19, 2006). He would also be the only mathematics teacher to teach these upper elementary grades. Similarly, prior to the consolidation William was the only teacher teaching 6th- through 8th-grade mathematics at Delta High School. This isolation was going to continue after the consolidation as well. At least when the high school existed he had a chance to talk infrequently with one of the high school mathematics teachers, Paul, who was also the mathematics coordinator/department head. Paul shared with William some of the activities he used with his students when he taught at the junior high in the parish seat for a year prior to moving to Delta High School. After the school consolidation William would be the only mathematics teacher at the school as anyone else teaching mathematics would be an elementary teacher and would teach all the other subjects at their respective level.

William started out the first academic year with the *Comprehensive Curriculum* by doing the activities as he was told: “I followed it word for word exactly” (personal communication, July 19, 2006). However, he realized that he was going to fall way behind if he continued implementing the *Comprehensive Curriculum* in this manner and thus began to use only activities that he thought would be helpful in presenting content to his students. He alternated between *Comprehensive Curriculum* activities and his own lessons. William was also confused on what exactly he was supposed to be doing: using all the activities or picking and choosing. He did not consult his superiors about his decision to cut down on the number of activities he actually did with his students. The motivation behind his decisions was the success of his
students: “what I think is best for my students,” “the way that I think that the students will understand it the best” (personal communication, July 19, 2006).

The Comprehensive Curriculum does not follow the same calendar or sequencing of topics as the regular textbooks. William felt that his district took advantage of this and the fact that if the teachers were implementing the Comprehensive Curriculum they probably would not use the textbook daily. Every year the school adopts a new textbook for one of the main content areas. In the 2005-2006 academic year Bayou High School was to adopt a new mathematics textbook. Since the administrators knew that the Comprehensive Curriculum will be implemented and the focus on textbooks would be less than in previous years, they chose not to buy a textbook for each student. Instead they got classroom sets which had to stay in the classroom. So William could not send his students home with extra work or remediation because he was afraid that they might lose the textbook. William felt that he could still use the textbook but not in the same way as before. For example when he chose an activity from the Comprehensive Curriculum he could still go to the textbook and look up the content that the activity addressed. Another disadvantage of using the Comprehensive Curriculum was the lack of ready-made problem sets and worksheets. William remarked that “you have to scavenge and find stuff on your own to supplement their activities and their lessons” and “they don’t offer a lot of supplementary materials” (personal communication, July 19, 2006). William felt fortunate to have additional resources other than the textbook that he could use with the Comprehensive Curriculum activities. He pointed out that although the new curriculum offered some assessment ideas at the end of each unit they were not like the tests that he was used to giving his students at the end of the textbook chapter. He felt that he could come up with a test like that “fairly easily” (personal communication, July 19, 2006).
William’s observations on testing the Comprehensive Curriculum material and teacher accountability. The district expected the teachers to administer unit tests upon the completion of each unit. These tests consisted of 25 multiple-choice questions and 2 constructed response questions that covered the material from a given unit. The teachers created their own tests and the graded tests were turned in to the district. William was convinced that no one there looked at these tests. The reason the tests were collected was to have them as evidence that the teachers were implementing the Comprehensive Curriculum in case someone questioned the district.

William was somewhat concerned that the students at the magnet school in Cotton parish would do better than the regular students on such unit tests because that school is “for the better students” (personal communication, July 19, 2006). So he hoped that “if they looked at the results, they took that type of stuff into an account.” With many students who were below grade level, William knew that the test scores were unlikely to be as high as those of more advanced students.

Another way for the district to feel like they were doing something and doing what the state Department of Education expected of them was the introduction of school monitors. They came through the school twice and checked the teachers’ lesson plans, a process which William described as “very, very informal” (personal communication, July 19, 2006). They watched William teach a class for about ten minutes and looked at his lesson plan “to make sure you have some Comprehensive Curriculum activities.” William felt that by using the unit tests and the school monitors the district could convince the state Department of Education that they were implementing the Comprehensive Curriculum as expected if they were asked to account for their implementation: “So really they were covering their selves, and also it made sure that the teachers weren’t just doing their completely own thing” (personal communication, July 19,
Therefore, the monitors and the district were pleased with William’s lesson plans which included Comprehensive Curriculum activities. However, there was no way for them to determine by just looking at the lesson plans that he was not doing every single Comprehensive Curriculum activity as he might have been expected to do. This was especially true as he might not have even done the activities on the days they were listed on his lesson plan. The fact that the monitors were not too strict about details made their presence less frustrating for the teachers (personal communication, July 19, 2006).

The first year of the implementation of the Comprehensive Curriculum coincided with the destruction inflicted on the state by the hurricanes Katrina and Rita. William was unsure about the exact impact of the hurricanes on the implementation of the Comprehensive Curriculum. However, he believed that the hurricanes “added to the confusion especially with teachers being transplanted” (personal communication, July 19, 2006) as well as students. The transplanted students could have made a big difference because the teacher might have been forced to “completely re-do the way they’re teaching” if the students are not at grade level, unlike the other students in the class. Despite his uncertainty of the impact of the natural disasters, he believed that the implementation of the Comprehensive Curriculum not only did not help to improve his students’ performance on the state test but possibly even hurt their performance.

William was unfamiliar with the Comprehensive Curriculum beyond the grades that he taught. He had heard that at the elementary level the Comprehensive Curriculum had a lot more activities than at the junior high or high school level, but he did not have a chance to familiarize himself with the mathematics curriculum at these grade levels. He was also unsure whether or not other states have something like the Comprehensive Curriculum. William believed that
“Louisiana is ahead of the game when it comes to assessments and things like that” (personal communication, July 19, 2006). He recalled hearing recently that the state got an A for standardized tests and student assessment: “We always kind of seem to be doing well in that, we don’t necessarily do with our performance.” His observations were confirmed by the National Assessment of Educational Progress for 2005-2006 which rated Louisiana as above average in the category of assessment.

Susan.

Getting good science in the classroom. Susan was both a middle school science teacher and a teacher educator involved in many professional development programs. She became a teacher because many of her relatives were teachers, including her mother. Her move from a middle school science teacher to a teacher educator is quite a story. Her seventeen years as a teacher in a rural school in Madison Parish, Louisiana brought her public acclaim and provided her an opportunity to visit other schools. While a science teacher, Susan was selected as Louisiana Teacher of the Year which allowed her to get involved with an NSF grant on professional development. Susan’s eyes were opened wide and she learned of a possible way to improve conditions in her own school.

Susan’s involvement with professional development and the Comprehensive Curriculum. Susan holds a Master’s degree in elementary education, as well as certification in supervision. She is considered to be “highly qualified” because of all the content hours she has completed over the years. Susan served on the committee that wrote the Grade-Level Expectations (GLEs) that the Comprehensive Curriculum is based on.

In recent years Susan has been involved with a local professional development academy and in particular she focused her work on the professional development of mathematics and
science teachers. This professional development has been dictated by the various school systems with which she worked. The professional development programs that she helped organize were always influenced or grounded in the national standards.

For the PDM professional development project, we were not able to use many activities that differed from the Comprehensive Curriculum. The teachers were so concerned about knowing more about the new curriculum and doing some of the activities before school started, that they would not have taken part in the workshops, had the workshops not addressed the activities of the Comprehensive Curriculum. That caused the instructors to prepare more to address this need. But there would have been little use for introducing other meaningful activities because the teachers may not have been allowed to use them in their classrooms.

Susan’s observations of the nature of the Comprehensive Curriculum and its implementation. Susan recalled that after the introduction of the grade-level expectations (GLEs) some superintendents requested a more specific curriculum that models the GLEs, a curriculum that teachers can follow in their classrooms. That became the Comprehensive Curriculum. Using a textbook would be much easier than using the new curriculum because you don’t have to come up with your own problems and everything in the textbooks is already structured and organized. Susan doesn’t find the Comprehensive Curriculum as a whole to be innovative, maybe just select lessons/activities. Most of it is still very traditional. Susan wished that the content areas were more integrated within the Comprehensive Curriculum.

Susan noted that different school systems’ implementation of the Comprehensive Curriculum varied widely in its first year (personal communication, July 7, 2006). Some attempted to follow the Comprehensive Curriculum literally as it was written, while others allowed for varying degrees of interpretation and flexibility. The stricter the systems were about
the implementation, the more turned off by the curriculum the teachers were, and the more likely they were to leave teaching, take an early retirement or move to a different state. Some of the teachers quit even before trying out the *Comprehensive Curriculum*. The teachers felt unappreciated and as if they were being told what to do.

When I asked her, Susan could not name immediately positive changes associated with the implementation of the *Comprehensive Curriculum*. A primary concern, especially related to the mathematics *Comprehensive Curriculum*, was that the activities were not presented in a logical fashion. They did not build on the way the content is usually sequenced. The teachers did not feel comfortable with the activities and did not know exactly how to run the activities with their students. Also, the curriculum was not consistent across the grades. For example, in one of the elementary math grades, all activities expected the use or integration of literature while the remaining grades made little use of literature.

Susan felt that there were many other activities that could have been used to teach mathematics, beyond the ones given in the *Comprehensive Curriculum*, and that students and teachers would have found them beneficial (personal communication, July 13, 2006). But they may not have been used due to the strict implementation of the *Comprehensive Curriculum*.

**Andrea.**

*A teacher born for professional development.* Andrea had taught middle school mathematics for six years at two different public schools in Louisiana following her graduation from Southern Delta University with her Bachelor’s degree in elementary education (certified for grades 1-8). She also holds a Master’s degree in elementary education, and was working on her 6-12 certification in mathematics, in addition to pursuing her Ed. D. in curriculum and instruction. If she were to pursue the “highly qualified” status, she would be highly qualified in
science and in mathematics after completing several additional mathematics classes. When Andrea taught seventh grade and eighth-grade algebra her biggest responsibility was preparing her students for the LEAP test.

Andrea attended small schools in a small community in LA. She felt that she was prepared for college by her school and most of her teachers were certified. Her mathematics instruction was very traditional with no emphasis on understanding or use of hands-on materials. Andrea credits her involvement in professional development programs with her exposure to such non-traditional instructional methods. She enjoyed professional development so much as a teacher that in the past she even considered moving to Arizona to pursue a Ph. D. or Ed. D. in staff development.

At the time of the interview Andrea was a site coordinator for two NSF projects where she worked with science, social studies and technology teachers and coordinators. Previously, she was a site coordinator for the mathematics professional development project that was addressed in this study for 6th through 12th grade teachers. Andrea had been working with teachers and various professional development programs (LaCEPT, LaSIP, LINCS) through Southern Delta University for the past 2 years. She worked closely with about 20 rural teachers who were part of the 46 teachers who engaged in the professional development project under study.

Andrea’s initial impressions of the GLEs and the Comprehensive Curriculum. When planning and preparing for professional development workshops, Andrea often refers to the NCTM standards, the GLEs and the activities/lessons available through NCTM. Andrea first heard about the Comprehensive Curriculum, the Model Curriculum and the GLEs from her graduate school professors and while teaching 7th grade during a workshop where representatives
from the district made the announcement of the upcoming reforms. She felt that the representatives were not knowledgeable about the changes and unsure of what was coming. Andrea thought that this announcement was premature because it was at least a year before any of these changes came about. She and her classmates and colleagues were confused how the GLEs compared to the benchmarks and standards they had been using so far. They were told that the GLEs were in addition to the benchmarks and standards already in place, not their replacement. She found all this very abstract because many of these changes were not developed yet when they were announced. Andrea wished she had the big picture instead of looking at all these “little bitty parts without having any idea what the total end product, what the whole purpose of it was for” (622-623). The familiarization with the GLEs before the introduction to the Comprehensive Curriculum was frustrating and confusing. Only after she was familiar with the Comprehensive Curriculum, could Andrea appreciate the GLEs, since the Comprehensive Curriculum is based on them. The Model Curriculum Framework (MCF) was available briefly between the introduction of the GLEs and the Comprehensive Curriculum, but it is no longer referred to and many people have forgotten about the MCF by now.

Initially, Andrea was excited when she heard about the Comprehensive Curriculum, because she thought it would be “complete” (653) as its name suggested. She was disappointed when she was told later that the Comprehensive Curriculum is the “bare minimum” and not telling teachers “exactly what we needed to do” (personal communication, July 10, 2006). So, she found the Comprehensive Curriculum not comprehensive at all and it seemed to her more like a framework than a curriculum. Andrea noted that prior to the Comprehensive Curriculum, many teachers needed guidance planning their lessons using the curriculum guides and applying
the standards and benchmarks. Teachers who were poorly prepared, who lacked content knowledge, would struggle to fill in the gaps that the Comprehensive Curriculum left.

*Andrea’s observations of teachers’ reactions to the Comprehensive Curriculum and associated professional development.* Andrea had the opportunity to observe teachers in several settings. She worked with them closely during the professional development workshops where she served as one of the co-presenters and organizers of the sessions. She also served as the on-site coordinator for the majority of the middle school mathematics teachers and some of the high school teachers who participated in the program. Andrea wished that the individual school districts had held professional development meetings for at least a week prior to the beginning of the school year so that the teachers could become familiar with the Comprehensive Curriculum. She also advocated the hiring of a support person to help with the implementation on a regular base.

The teachers’ response and use of the Comprehensive Curriculum varied widely during the first year of implementation. Andrea found that the expectations of the district leaders, the superintendents and the supervisors shaped to a large extent the use of the Comprehensive Curriculum by the teachers. Andrea felt that since the teachers knew her from the on-campus component of the professional development project, they were honest in admitting how much they used the Comprehensive Curriculum in their classrooms. Some did not use the Comprehensive Curriculum at all, others occasionally picked an activity they thought was appropriate for what they were teaching, and several teachers attempted to do all the activities in the given order. Andrea found the later group’s efforts to be a mistake: “wasn’t a good thing, because the Comprehensive Curriculum was not sequenced very well, in math” (personal communication, July 10, 2006). The teachers who were better prepared to teach mathematics
and were more experienced, those with a strong content background in mathematics, were likely to do a better job with the *Comprehensive Curriculum*. Then there were those teachers who didn’t really know how all that will work together, many times they tried to teach something and it wasn’t until they would really try to do the activity that they realized they don’t know enough to do this activity. (personal communication, July 10, 2006)

By January, which to many signifies the unofficial beginning of test preparation in Louisiana, “most of our teachers had abandoned the *Comprehensive Curriculum*”:

either they had abandoned it earlier because of their difficulty with working with it and their curriculum supervisors and superintendents had said “trash it”, or, in this state you may have realized we have this big push towards the test. They abandoned it and gone back to their test preparation by January or so. So there was not really, I would say, out of our teachers a real concerted effort in implementing the *Comprehensive Curriculum*, for a variety of reasons (personal communication, July 10, 2006)

The teachers were confused about what they were expected to do with the *Comprehensive Curriculum*. One of Andrea’s professors, who had taught her about the new curriculum, told his class that the *Comprehensive Curriculum* was never mandatory, but it was highly recommended. One curriculum specialist from Tensas parish told Andrea that while the *Comprehensive Curriculum* was not mandatory, 99% of the districts had decided to use it. The districts felt that “at least if we use what the state has given us, then we’ll have some recourse if scores don’t go well” (personal communication, July 10, 2006). The teachers were told to integrate the *Comprehensive Curriculum* with what they were already doing. Different schools and teachers interpreted this mandate differently. In some districts the teachers were told that they could skip activities, if they replaced them with equivalent ones that covered the same GLEs. But then the issue became who would ensure that the teachers are substituting the activities correctly. Thus it was easier for the districts to just tell teachers to use the *Comprehensive Curriculum* as it is. The school districts were given the option to develop their own curriculum to use instead of the *Comprehensive Curriculum*. However, all but one or two
decided to go with the new curriculum instead. Some of the superintendents had lost touch with the classroom and were mainly focused on improving the LEAP test scores. So the teachers were being told that they are expected to implement a “great, deep, total change all on your own” (personal communication, July 10, 2006) with hardly any assistance but possibly the treat of penalties for failing to implement the Comprehensive Curriculum.

Andrea’s views of the implementation of the Comprehensive Curriculum. The first year of implementation of the Comprehensive Curriculum coincided with the devastation from Hurricanes Katrina and Rita. Andrea did not blame the lack of success of the implementation on the natural disasters:

I was just like really appalled at how many things that were done in the implementation, and of course, every district did things slightly different, but overall I think that when you think about this is a massive change that we’re trying, second order, deep, deep change that we’re trying to implement that I just think that there are so many principles of change theory that were violated. (personal communication, July 10, 2006)

Andrea said that the school districts, especially New Orleans, had many issues prior to the hurricanes. She criticized the implementation of the Comprehensive Curriculum:

when you implement, when you introduce something new to teachers, or to anybody, there are these levels of concerns, states of concern, that everybody goes through. What does this require of me? How is this going to, how much more time am I going to have to spend (?)? Exactly what does this mean? And those things weren’t well thought out before they were placed in front of the teachers. (personal communication, July 10, 2006)

In addition to raising several questions which remained unanswered for many teachers, Andrea questioned the whole nature of the changes faced by teachers: “It was just too much of a change without the support that was needed, without the information that was needed, without the time that was needed” (personal communication, July 10, 2006). Andrea believes that the implementation of the Comprehensive Curriculum calls for long-term changes that could take 5 to 8 years to take place, and that too much was expected too quickly in the first year of
introducing the *Comprehensive Curriculum*. She blamed the lack of resources and support on the unsuccessful implementation of the *Comprehensive Curriculum*. The teachers felt that there was a lack of support. The school budgets were not supplemented to take into account the growing needs of the teachers because of the *Comprehensive Curriculum*.

Andrea sides with the teachers: “I just think that teachers are getting fed up because teachers feel like little pawns in this accountability game that are being just, you know, jerked around without much consideration” (personal communication, July 10, 2006). The teachers were presented with many changes over a short period of time. First, they were told about the GLEs, the following year the reforms included the Model Curriculum Framework, which was followed by the *Comprehensive Curriculum*. Most of the teachers did not even get a copy of the *Comprehensive Curriculum* until days before school started. The teachers felt that the state was just mandating what they should be doing, without offering the support needed for them to be successful: “You can mandate change, and it can work, but if you want to push it and just, you know, make all these changes happen within a matter of a year, where are the people to support?!?” (personal communication, July 10, 2006). Andrea felt that each district should have identified at least one person who would help the teachers with the *Comprehensive Curriculum* in the classrooms on a full-time base. This person could have served as a liaison between the teachers and the district representatives and helped with a smoother transition to using the *Comprehensive Curriculum* in the schools.

Another question which Andrea raised was about the quality of the implementation:

I know we want change, we need reform, and we need to get test scores raised as quickly as possible, but I just don’t think that a lot of this was used in a way, and I mean you can have the greatest, we know that, we give teachers some great activities, but having these things and not implementing them properly doesn’t do much good. (personal communication, July 10, 2006)
The teachers expected to get a “pre-packaged deal” that was all-inclusive: the content, standards, benchmarks and cooperative learning activities are all part of the package.

Andrea believes that the Comprehensive Curriculum should be re-written. She feels that if it keeps the name “Comprehensive” then the curriculum should be a lot more comprehensive than what was initially. Furthermore, the activities need to be arranged in a more logical and chronological manner that coincides with the order in which the content is usually taught. Also, some of the activities need to be rewritten, because they either contain incorrect information or do not make sense altogether. Additionally, the issue of supplies for many of the activities needs to be addressed. Teachers need to receive help in generating appropriate problems for activities and be given financial resources to have the needed supplies.

According to Andrea, Louisiana “has got a lot of accolades about how impressive they are as far as working towards accountability and trying to change and raise the student scores” (personal communication, July 10, 2006). However, she does not think that the Comprehensive Curriculum was handled well, although she expected there to be problems with the implementation initially. The teachers were basically handed a binder containing the Comprehensive Curriculum for their respective grade and expected to follow it on their own. The school districts were not given any additional funding to help with the implementation. In fact, many of the districts whose teachers participated in the PDM professional development project did not have $35 per day to pay substitutes so that the teachers could learn more about the Comprehensive Curriculum. Andrea wished that overall the state would step in and provide more funding for the implementation of the Comprehensive Curriculum.

Some of the activities in the Comprehensive Curriculum that Andrea was really impressed by were hands-on activities where the students were able to discover patterns for
themselves and make connections with real-life situations. In these activities the teachers acted as facilitators and did not rely on worksheets and rote memorization of formulas. The Comprehensive Curriculum activities forced the teachers to think about how the content related to real life. The students would not have been exposed to such real-life activities if it were not for the Comprehensive Curriculum, “they left knowing more math and understanding more how it relates” (personal communication, July 10, 2006). Such hands-on activities enhanced the students’ learning and their understanding of the mathematics content.

Andrea noted that some of the Comprehensive Curriculum activities did not work well in the classroom. That was due to a combination of factors: (1) the poor description of the activity in the Comprehensive Curriculum (missing or incorrect information) and, (2) the inability of the teachers to modify the activity in a way that it can be used in the classroom (usually attributed to the teachers’ poor content knowledge and insufficient planning and preparation for the execution of the activity). For example, an activity was difficult to do because it required integrating literature and the book it used was not available anywhere in our geographic area. Other activities required the use of the Internet, and some of the teachers did not have computer access especially for their entire classes. Lack of resources/materials could easily prevent teachers from using certain activities and teaching the associated content. This was especially the case with science teachers who did not even attempt some of the activities due to lack of materials.

Among the activities from the Comprehensive Curriculum that Andrea saw done in the classrooms she visited, she was particularly impressed with a 6th grade activity on the 100 days of school, where each day the teacher and her students talked about the number of the day. The teacher did not take a lot of the class time every day yet she explored many different directions with her students in discussing primes and composites, factoring, area, perimeter, and rectangular
arrays. She “just really milked it for all it was worth” (personal communication, July 10, 2006). This was one of very few examples of successfully implemented activities that I had on record for the first year of the implementation of the *Comprehensive Curriculum*.

Andrea likened the first year of using the *Comprehensive Curriculum* to her first year as a teacher. Everything was new, and since she had never taught before, she had to develop everything from scratch. But then the following year was easier for her because she had already had some experience with things that worked and things that did not work in the classroom.

Andrea felt that with the implementation of the *Comprehensive Curriculum* the state Department of Education told the teachers what they were supposed to do and left them to figure out on their own how to accomplish that. Many principals and teachers had predicted that LEAP scores would go down because of the *Comprehensive Curriculum*. They felt that there was a gap between the activities, i.e. missing content. That is why many teachers abandoned the *Comprehensive Curriculum* “in order to teach the skills that would be on the test” (personal communication, July 10, 2006). The pressure to have high test scores on the state tests was on the teachers’ minds on a regular basis.

Andrea felt that the teachers should have had access to a resource person whenever they needed help. Someone who “should have been trained, know the idea of what is the point to this, what is the whole goal behind, what is the theory behind this *Comprehensive Curriculum*” (personal communication, July 17, 2006). That person would have been in the classrooms every day and would have made sure that the teachers were actually using the *Comprehensive Curriculum*. As it was, there was no one to make sure that the *Comprehensive Curriculum* was used. Not only that, but there were principals and superintendents who did not buy into the *Comprehensive Curriculum* and within weeks told the teachers to trash it (601). Andrea
concluded that the implementation of the Comprehensive Curriculum needs to be a systemic effort. However, there were many levels on which the implementation seemed disconnected and isolated. For example, in general the teachers did not have the materials that they needed to run the activities. Even the instructors at the PDM professional development program had to familiarize themselves with the Comprehensive Curriculum on their own when they prepared for the second year of PDM, and Andrea felt that it is unfair to teachers to expect that from them with so little support and so quickly:

I think that the biggest problem with the Comprehensive Curriculum was the method of implementation. It was done, in my opinion, very poorly. And it relied on a lot of people like us to just take it upon ourselves to, you know, rather than actually think it through the process and setting the right wheels in motion and the right people, and the right place, I think that the Comprehensive Curriculum with the implementation was almost set up for failure. (personal communication, July 17, 2006)

The teachers were only able to see the big picture as part of PDM and they were frustrated “because they knew they were missing something, they weren’t quite sure what and how to fill in the gaps” (personal communication, July 17, 2006). Andrea felt that a lot of effort was placed into putting the Comprehensive Curriculum together, such as using outside consultants, “then it’s like you just don’t even think about the implementation and change theory.” The changes that teachers are expected to make in implementing the Comprehensive Curriculum were very drastic: “you’re making people not only change their practices but in order to do that you’ve got to change the way we think, totally.” The implementation was very imperfect:

I mean, this should have been, no expense should have been spared to really implement this and then we still had to realize that it will take a matter of years to reach any type of organizational or institutional, I mean, this doesn’t happen overnight and it just seems like somebody totally ignored the process. (personal communication, July 17, 2006)
Both the teachers and professional development staff were disappointed that the first year of the implementation had many flaws and realized that a successful implementation will take years.

**Andrea’s views of the nature of the Comprehensive Curriculum.** Andrea identified both content and pedagogical aspects of the *Comprehensive Curriculum* which distinguished it from the previous curricula that the teachers used. She described the *Comprehensive Curriculum* as “problem-based learning.” “which is very different from traditional “here is your lecture, here is this, and now work the problems” (personal communication, July 17, 2006). For her, the *Comprehensive Curriculum* is “student-driven, activity-based.” Andrea thinks that the theory behind the *Comprehensive Curriculum* is very good. The *Comprehensive Curriculum* is forcing teachers and students to do things differently. It’s forcing more communication. All of the things that we say in our Model Curriculum Framework that we want students to do—the problem solving, the communicating, the relating to real world, you know, all these things are more likely to happen with the *Comprehensive Curriculum* rather than with the textbook. (personal communication, July 17, 2006)

The *Comprehensive Curriculum* does not look like a regular textbook. There are no colors, other than black, very limited and simple illustrations. Andrea said that that was because the *Comprehensive Curriculum* was intended for the teachers and not for the students. The lack of any student materials, like a workbook or worksheets, is another example of the lack of resources. Andrea wished there were attractive student products as she wondered whether or not there are plans to develop some such materials. Again, she commented that even the state department is missing the big picture, “[s]ometimes they’re flying by the seat of their pants” (personal communication, July 17, 2006). This lack of vision and advanced planning impeded the implementation of the *Comprehensive Curriculum*. 
The *Comprehensive Curriculum* was not only different from the other materials and curricula that teachers had used, but “it was total change, it was not the norm” (personal communication, July 17, 2006). The *Comprehensive Curriculum* is “not just slightly different, somewhat totally and completely different.” Andrea noted that many of the PDM teachers have been teaching for over 20 years and they have been teaching the same way year after year. These teachers were content with the test scores that their students have been receiving based on their teaching. Andrea even described the test scores as “good” and “great” (personal communication, July 17, 2006). Therefore it is only natural for the teachers that they would not feel like implementing the *Comprehensive Curriculum*.

**Andrea’s work with teachers as part of PDM.** Andrea worked with the mathematics teachers in several capacities. She was one of the primary organizers of the two-year professional development program. She planned out some of the content and pedagogy covered in the middle-school and high-school level and served as a presenter during the workshops. During the academic year, Andrea served as one of the two on-site coordinators who observed the teachers in their classrooms and provided feedback to the teachers and the Louisiana state Department of Education.

When Andrea visited the PDM teachers in their classrooms, the majority of the teachers felt comfortable asking her questions only about the content covered at the workshops. For example, the first year of the professional development program the content emphasis was on geometry and measurement, and these were the usual questions she got, despite the fact that she was a mathematics teacher herself and as such was comfortable with the entire curriculum. Andrea described these experiences as isolating:

So it was just too much disconnection. We were disconnected from the systems, we tried everything we could to support, but it was just like they didn’t get it. And then they just
kind of connected us only with algebra, geometry, and the things that we had specifically covered during the summer. So I just think that there needs to be more cohesiveness. (personal communication, July 17, 2006)

Andrea suggested that in order to solve these problems, each district should have a curriculum person or coordinator who is also in charge of professional development for the district. That person would hopefully be accepted better than outside professional development specialists and he/she would be in the classrooms and closely working with the teachers in that district. Andrea believed that this is how PD should be done, especially based on the research that she was familiar with during her graduate studies.

In helping the rural teachers, Andrea felt that they could not put aside what they were doing in their classrooms prior to the Comprehensive Curriculum and thus her job was to help them integrate the new curriculum with their regular curriculum. She offered suggestions and ideas on how they could use their textbook as a resource and how the Comprehensive Curriculum activities fit in their lessons. She felt that what she told them was just suggestions because the teachers did not have to do anything she told them. Some of the teachers were open to the changes and open to receive help while others wanted to figure things out on their own and refused help even when they were clueless.

Andrea was able to help a few more teachers this year compared to the first year of the professional development project because she felt that they were more open to listen to her suggestions and seek her help. She worked closely with several of the teachers during the two years of the PD project because these teachers were unfamiliar with teaching mathematics. One of these teachers had taught English Language Arts for many years until she was told that she would be teaching 8th grade mathematics. Two other teachers were moved from 4th grade to 8th grade mathematics. The first year of the professional development project Andrea had to
“actually help them sequence what they would teach when” (personal communication, July 17, 2006). That was one thing she did not have to do the year the Comprehensive Curriculum was implemented. When Andrea worked with a teacher on sequencing during the first year, they started by looking at the LEAP test and Andrea pointed out what proportion of the test was devoted to what content topics, and Andrea told the teachers to focus on teaching these areas. Andrea felt that sequencing was also needed to some extent with the Comprehensive Curriculum because many of its activities were not sequenced well. The content required to do a certain activity was sometimes not taught until several units later. Andrea thought that the goal of the Comprehensive Curriculum was to “fill in that gap, just give less guess work for the teachers” (personal communication, July 17, 2006). Andrea found the Comprehensive Curriculum successful in achieving this goal in some instances and failing at others.

During its second year the presenters at PDM addressed the Comprehensive Curriculum by using actual activities from the curriculum. That was done in part due to the fact that “we had the Comprehensive Curriculum police with us for about a week” (personal communication, July 17, 2006), i.e. representative from the state Department of Education were present to ensure that the teachers were being exposed to the Comprehensive Curriculum because that was the main goal of LINCS for that year. Thus all the work that was done with the teachers on-campus was done with a focus on the Comprehensive Curriculum. Instead of considering what aspects of algebra we should cover, we looked at the Comprehensive Curriculum instead. We were under pressure to use the new curriculum because the PDM project would have lost teachers if it did not address the Comprehensive Curriculum because that is what the teachers were told that they had to do in their classrooms. The teachers would not have come to learn of some great activities if they felt that they could not use them in their classrooms but had to focus on the
Comprehensive Curriculum instead. The pressure was not just on the teachers but also on us, the faculty and professional development specialists. The Comprehensive Curriculum was abstract to many of the teachers at first, because they had not experienced it previously. The more they saw of the curriculum and its activities, “the more they were beginning to get the idea of what was expected and what the curriculum included” (personal communication, July 17, 2006). Andrea felt that the PDM teachers were a little more prepared for the Comprehensive Curriculum but not by much.

At the beginning of the two-week professional development session in the summer of 2005 the presenters at the workshop copied and distributed exact activities from the Comprehensive Curriculum so that the teachers would know what it looked like and know what to expect. They tried to communicate the expectations that the state department had of the implementation of the Comprehensive Curriculum, although the teachers did not perceive them as representatives of the state department. The teachers were getting mixed messages because some said that they had to do every activity while others were told that they could substitute activities. Thus at the workshop the presenters also showed them how to substitute activities using the same GLEs: “So we tried to be as thoughtful as possible about every aspect of the Comprehensive Curriculum and what the teachers were going to face” (personal communication, July 17, 2006). Andrea truly associated with the teachers and had a lot of understanding about what they were going though:

Me, myself, I kind of put myself in their position, how I would feel, what would be mine concerns working as teacher working with this and we tried to attack those or address those in the workshop. And even continue during the school year after they had seen it and it had been put in their hands. (personal communication, July 17, 2006)

Andrea thought that many of the teachers found the PDM program important and beneficial. Others thought it was a waste of time. Andrea felt that there were two projects going
on (as part of professional development M), but they were evaluated as one. There was a
difference between the junior high school teachers and the high school teachers in their
perceptions, backgrounds, and experiences. The high school teachers felt neglected the second
year because they were used to working with a full-time on-site coordinator the first year. That
person was very “touchy, feely, pull-you-along, make-sure-you-know-everything” (personal
communication, July 17, 2006) kind of person and she really looked out for the teachers. But she
did not continue working with them because of budget cuts that no longer allowed for her full-
time position. “And we’re left with people [this included my part-time position with the high-
school teachers] who were trying to do more than what they should be trying to do” (personal
communication, July 17, 2006). Another issue is that during the on-campus component of PDM
I worked with the junior high teachers, yet I was responsible for the academic year follow-up of
mostly the high school teachers and I never really had a chance firsthand to see what they were
exposed to and learning during the on-campus meetings. Andrea felt that the high school
teachers did not like the lack of a full-time on-site coordinator, although “we did a great job
being with the situation that we had” (personal communication, July 17, 2006), i.e. not having
the money to hire full-time on-site coordinators. She noted that the teachers “don’t care about
that or they don’t even know about why, they just see the difference and notice the difference.”
Similarly, the teachers were not told why the professional development program did not run for
its third consecutive year as it was initially planned.

The goal for PDM, as Andrea described it, was to have a positive impact not only on
teacher performance but also student achievement. Both of these aims were hard to measure to
determine the impact of this professional development project. The way the project was
evaluated was in terms of LEAP scores. However, this evaluation method was very flawed. In
most cases, there are only one or two teachers per school who participated in PDM. Andrea noted that “even if they increase their scores, is that really going to show up with the overall scores of the schools?!” (personal communication, July 17, 2006).

According to Andrea, professional development for the implementation of the Comprehensive Curriculum should have been state-wide or district-wide, because such an initiative was not something that only the mathematics teachers who were part of PDM had to address. Since PDM was not associated with the teachers’ districts or the state department of education, teachers saw it primarily as a way of making some money in the summer. PDM was not comprehensive and school-wide, and

Overall, the teachers don’t buy into what they don’t want to do, which I’m not saying is good or bad, I’m just saying that’s just the way they feel because it’s something new, you know how people are about change. But on top of that they feel like they don’t own it. To them, this is equivalent to a mandate. (personal communication, July 17, 2006)

The teachers had a feeling that the Comprehensive Curriculum was something out of their control and PDM became the same way once it had to be focused on the Comprehensive Curriculum. In this context Andrea mentioned that “teachers shouldn’t feel boxed in” (736) as many of the teachers felt that they did not have a choice about the new curriculum and the direction that the professional development program was taking.

**Andrea’s views on testing and the Comprehensive Curriculum.** Andrea felt that teachers concerned with their students’ performance on the state standardized tests may like the Comprehensive Curriculum. The state LEAP test is a lot more like the Comprehensive Curriculum than are the regular textbooks, because LEAP “is totally word problems and they’re based on a setting that a middle school student should be familiar with” (personal communication, July 17, 2006). Andrea found the LEAP test and the Comprehensive Curriculum much more real-world than the workbooks that the students usually use in class. She
felt that it is important to teach topics so that students know how and when to use them in the real world. Otherwise, “I haven’t really empowered you for your life.” In order to be successful on the LEAP test, students needed to have a deeper understanding of the concepts and be able to apply them, and not just be exposed to them: “This is the issue that we’re trying to teach too much and we’re not really teaching anything” (personal communication, July 17, 2006). If the curriculum offered more in-depth insights into the content, the students’ understanding of the material may increase.

Joanne.

An English teacher turned mathematics content leader. Joanne is a former English teacher who is in charge of the mathematics instruction at Bayou High School. She is certified to teach English and social studies and she is highly qualified in these two content areas, but not in mathematics. After graduating from Southern Delta University she taught 9th, 11th and 12th grade English for 13 years at the high school from which she graduated. Then she went to work at Bayou High School and she had been there for 4 years by the summer of 2006. She held the position of a Highly Skilled educator or Content Leader/Coach for mathematics. At Bayou High School Joanne taught a variety of subjects and she was in and out of the classroom. She taught model lessons and assisted the teachers when they need help. Sometimes she filled in for other teachers when needed, for example when a teacher was attending a professional development workshop.

Joanne comes from a farming family. She attended the same small rural school through 8th grade. Joanne went to college about 20 years after she graduated from high school and majored in English at Southern Delta University. She got married before she graduated from high school and waited for her youngest child to start kindergarten before she went to college.
She was unsure if she could handle college and did not know at first what area of study she would pursue. She thought about being a teacher after she drove the school bus and had some experience working as an aide and tutor at several schools. She talked to some teachers who tried to discourage her from being a teacher because of the low pay and the discipline problems that they had to deal with but Joanne never regretted going into teaching.

Joanne found mathematics to be challenging and out of her comfort zone, but she believed that learning mathematics helped her in her work with high school students. When she is unsure how to answer some students’ math questions she checks with her colleagues. English is Joanne’s love although she enjoys mathematics as well. Joanne did not usually teach mathematics classes but she mostly observed and assisted the teachers by working one-on-one with students who were struggling in mathematics classes.

**Joanne’s involvement in PDM.** Joanne was very involved in various professional development projects mostly as a participant. She also informed other teachers of her school about professional development opportunities and encouraged teachers to attend. Joanne found out about PDM through LINCS since attending professional development in the summer is a LINCS requirement. Joanne was a little apprehensive at first because she was not sure if she could keep up with the other teachers. However, she really enjoyed her involvement in the PDM program and learned a lot. The first year she did homework every night in order to learn the material. She worked with the middle school group because she felt that she did not have the background for the high school material. She felt that the other middle school and high school teachers already knew the material because they were mathematics teachers and their content preparation was superior to hers. The second year Joanne started out in the high school group because the middle school group was too large already. She felt that she was being left behind
because she did not feel comfortable interrupting the sessions to ask questions and thus holding the class back. She felt that the college instructors were not there to teach the content but to teach methods and techniques for teaching students the content. As a student, Joanne was not exposed to some of the content that students learn in high school mathematics classes nowadays. Therefore, the material covered at the workshop was hard for her. So after several people stopped attending the middle school workshop, Joanne joined that group.

As part of PDM, Joanne learned new ways for teaching mathematics other than lecturing and solving problems at the blackboard. She saw techniques that were totally new for her and thought that had she seen some of those when she was a student she might have been more interested in mathematics. While she was good at mathematics as a student, “a lot of it I memorized for the sake of memorizing it and for the sake of the next test” (personal communication, July 11, 2006). Therefore the mathematics was meaningless for her and she did not value what she learned because Joanne did not see how she would ever use it. Joanne also appreciated that the university instructors introduced the teachers to “concrete ways to teach abstract ideas” and learning “why this is so, and how this is so, and learning ways to teach that to the students, it was just, it was just eye-opening for me” (personal communication, July 11, 2006).

Joanne said that the teachers were able to apply everything they learned in PDM with their students. The students benefited from the teachers’ preparation: “I saw students that when I first came here thought they could not do math, just blossom and grow, and be those eager students who are raising their hand and trying to work problems” (personal communication, July 11, 2006). Unfortunately, I was unable to encounter such eager students during my classroom observations. Joanne was also very excited about all the materials they were able to order and
purchase through the grant. For each year of the PDM summer workshop every teacher was allowed to order up to $150 worth of educational supplies for their classroom.

Some of her colleagues who are mathematics teachers were impressed by how much she has learned through LINCS and the related professional development workshops. Joanne felt that she learned a lot of mathematics too. She likes to try new approaches for teaching different topics. She tried the new approaches especially with special education students and came up with some ideas which were new to the other mathematics teachers. Joanne found out that many of the special education students did well in mathematics although they did not have good reading skills.

*Joanne’s introduction to the Comprehensive Curriculum.* Joanne first heard about the Comprehensive Curriculum the year before it was implemented. She remembers the Model Curriculum Framework that the teachers were given the previous year. It was a unit or parts of units that the teachers could try out in their classrooms and some teachers piloted the framework. Joanne thought that the activities that were included in the framework were good ones. The teachers were told that that was just the framework and that the curriculum was being developed to go along with the framework. Joanne knew that Bayou High School would be using the Comprehensive Curriculum because during a meeting at her school the parish leaders had said that the parish will use the Comprehensive Curriculum as its curriculum. The teachers at Bayou High School came up with timelines and tried to become very familiar with the Comprehensive Curriculum. The teachers realized early on that they would have to cover a lot of material. Joanne felt that that was particularly true in social studies where there was so much history to be covered. The teachers had to make some choices in what to cover and how much time to spend on different topics. Joanne feels that the planning prior to the beginning of the school year was
to be credited for the implementation of the *Comprehensive Curriculum* that they were able to accomplish during the school year. During the school year the teachers had professional days where they would work strictly on the *Comprehensive Curriculum*, as part of their district professional development and the students would have no school on these days.

Planning for the implementation of the *Comprehensive Curriculum* was very different from how teachers usually plan their lessons. Joanne thought that teachers had to read an entire unit ahead of time and get very familiar with it. They could no longer plan on a small scale as they used to prior to the *Comprehensive Curriculum*: “You can’t do one week at a time, it’s a unit at a time” (personal communication, July 11, 2006). The teachers had to plan ahead and collect materials for the whole unit. In mathematics, the teachers should also look ahead and know where the next unit would take them. Teachers had to be willing to invest a lot of time in preparing to teach the *Comprehensive Curriculum*: “If you prepare, if you spend 90% of your time preparing and 10% of the time teaching, it’s gonna work a lot better than if you’re not prepared” (personal communication, July 11, 2006). Teachers also needed to remember that they “have to do some teaching too,” maybe in the form of fifteen-minute lectures, and “build that content background knowledge for the students” (993) before they can do the *Comprehensive Curriculum* activities. Joanne was certain that teachers would feel pressed for time trying to prepare for the *Comprehensive Curriculum* activities and regular lessons. Joanne really liked what the district LINCS coordinator had suggested to do to identify important GLEs to cover. The LINCS coordinator brought forms that the teachers could use to identify how many times a given GLE was covered in the activities of any given *Comprehensive Curriculum* unit. In that way the teachers could determine which GLEs they needed to focus on more and probably review later, and which ones were less important. Joanne felt that overall the teachers needed to
“see the overall picture” (personal communication, July 11, 2006) and become really familiar
with the *Comprehensive Curriculum* at first, before they started planning.

Joanne mentioned that an English teacher who had worked on the framework and the
*Comprehensive Curriculum* told her that they “never intended for this [the *Comprehensive
Curriculum*] to be the Curriculum” (personal communication, July 17, 2006). Instead, the
*Comprehensive Curriculum* was supposed to offer the teachers ideas for activities to do in the
classroom. The schools should have probably waited before using the *Comprehensive
Curriculum* and instead had some schools pilot it first.

I think the state probably jumped the gun and decided this is what we’re gonna do and
we’re gonna push it through no matter what, instead of trying, you know, letting a couple
of schools try it. They tried the Framework, but, you know, just to say we have a
curriculum for all four subject areas and you’re going to use those, I think they needed to
back off and wait a while. So I am kind of eager to see, you know, exactly how they do
plan to use it in the future, what they’ll say in the future, especially after they’ve had a
chance to look at state test scores and see if indeed they’ve risen or declined. (personal
communication, July 17, 2006)

Joanne was anxious to get the teachers’ impressions of the new curriculum after they
used it for a year. Furthermore, she was curious to see the impact of the *Comprehensive
Curriculum* on students’ state test scores.

**Joanne’s observations of the role of the school administrators in the implementation of
the Comprehensive Curriculum.** Among the participants in the PDM, Joanne was in a unique
position to work closely with school and district administrators as well as teachers. She
appreciated that the school administrators made it possible for the teachers to have professional
development days and that the administrators sat down with the teachers to help them and to see
what they needed. Joanne spoke very respectfully and submissively of the Bayou High School
administration and found the administrators very helpful and supportive of what the teachers
were doing. The school administrators also followed up with the teachers and would ask them:
“How did it work for you? What do we need to do to change that in the future?,” “What do you all need for the Comprehensive Curriculum? We’ll get you whatever you need. Do you need help with this? Did you need supplies for this? What do you need?” (personal communication, July 17, 2006). Joanne felt that school administrators “need to be as knowledgeable as they can about what’s in the Comprehensive Curriculum and, for the most part, you know, they are very knowledgeable.” By expressing an interest in what the teachers were doing and working closely with them, the teachers had confidence that the administrators knew what they are going through with the Comprehensive Curriculum, this is a “morale booster for the teachers.” Part of the support for teachers at Bayou High School was Joanne herself. Using her as an additional resource when needed was something that very few schools had available for their teachers.

Teachers were expected to have the materials and resources needed to run the activities. Some of these were costly, especially when everything was added up together, and others that the teachers could make on their own may be very time consuming. Cotton parish is poor and cannot afford to buy everything needed for the Comprehensive Curriculum. Also, the teachers were poor although many of them would buy materials for their classrooms out of their own pocket. Nonetheless, Cotton parish still ordered many supplies and Bayou High School did too. They spent some of the LINCS money to buy math supplies as well. They had looked at the Comprehensive Curriculum enough in advance to even form committees which made lists of materials that they would need. Joanne made many purchase requests before the end of the school year prior to the implementation of the Comprehensive Curriculum.

Cotton Parish had said from the beginning that they would follow the Comprehensive Curriculum. They even went as far as setting up a weekly timeline of what would be covered each week. To stay accountable, they had monitors from other schools who checked that the
Bayou High School teachers were actually doing the *Comprehensive Curriculum* activities. The monitors reviewed the lesson plans that the teachers had written and confirmed whether or not the teachers were doing the *Comprehensive Curriculum* activity they had planned. Joanne was not sure what happened if there was a discrepancy between the lesson plans and what the monitors observed in the classroom, but she felt certain that the teachers were held accountable. Joanne was going to serve as a monitor at another school: “they were going to send me to another school” (personal communication, July 17, 2006) but then it was decided that instructional facilitators needed to be at their own schools and assist the teachers there.

At the beginning, the teachers at Bayou High School were instructed to follow the *Comprehensive Curriculum* verbatim. Eventually, however, the teachers were told to use some of the *Comprehensive Curriculum* activities and some of their own, but to keep notes on the ones they used. They were told to keep track of the activities that worked and those that did not as well as any changes they would recommend making to the activities. The teachers also filled out forms on which they reported the students’ scores on each unit test. They also submitted the unit tests to the monitors and completed end-of-semester reports which included not only grades but also percentage of students passing the course. Joanne felt that the teachers were “held pretty accountable” (personal communication, July 17, 2006) due to the presence of the monitors and the required detailed paperwork.

Following the initial implementation of the *Comprehensive Curriculum* during the 2005-2006 academic year, Cotton parish decide to continue to use the *Comprehensive Curriculum* for the following academic year, but they were more lenient with the implementation requirements. They changed the policy so that teachers were allowed to pick and choose which activities from the *Comprehensive Curriculum* they used in their classrooms. The teachers could also substitute
some of the activities as long as they paid attention to the GLEs and make sure that the new
activities addressed the same GLEs as the original activities.

Bayou High School had school monitors during the first year of the Comprehensive Curriculum implementation. The parish had decided to have school monitors as it “really pushed the Comprehensive Curriculum” and “just to ensure that all teachers used the Comprehensive Curriculum” (personal communication, July 17, 2006). The monitors were teachers from other schools in the parish such as the largest district high school, “just to ensure that we were implementing the Comprehensive Curriculum” (415). When the teachers were monitoring their colleagues at other schools they had substitutes such as administrators, other teachers or people like Joanne. Someone from Bayou High School went to the largest district high school in return. The monitors looked at the lesson plans to check whether the teachers included activities from the Comprehensive Curriculum and then whether or not the activities were actually executed in the classroom. The activities did not have to be done necessarily on the days they were listed on the lesson plans but close enough. The monitors’ visits were unannounced. The monitors concluded that some of the teachers were using the Comprehensive Curriculum and some were not. The teachers’ supervisors followed up on the monitors’ conclusions and tried to inquire of the teachers how they were doing with the implementation of the Comprehensive Curriculum.

Joanne felt that the administration and the monitors were “very strict” (personal communication, July 17, 2006) about following the lesson plans and doing the activities from the Comprehensive Curriculum, yet they allowed for about an extra week’s deviation from the lesson plans. They did not consider it a problem if the teachers did not follow through any given day with what they had stated in their lesson plans they were going to do. Initially Joanne was
going to be a monitor and she attended several meeting, but then it was decided that she really needed to stay at Bayou High School and help her colleagues.

Joanne feels that her school, Bayou High School, did all that it could to implement the Comprehensive Curriculum. The teachers in the four main content areas addressed in the new curriculum first met together by subject matter and talked about what materials they needed to implement the Comprehensive Curriculum, set timetables, and examined the Comprehensive Curriculum. They ended up weeding out some of the activities because they lacked the technology needed to run the activities. This was especially true when they students were expected to have access to the technology at home. The schools were given extra money to purchase materials for the Comprehensive Curriculum activities, and Delta HS did that. The only problem that Joanne saw at the beginning was with newly hired teachers who were not there for the planning and were told about the Comprehensive Curriculum the week before school started. These teachers were not prepared although new teachers at the parish go through “intensive training and mentoring and, you know, hand-holding, whatever it takes” (personal communication, July 17, 2006) during their first year. Joanne feels that Delta HS “tried everything we knew and I’m sure we did much more than other schools and other districts did.”

Joanne’s views of the nature of the Comprehensive Curriculum. According to Joanne, some of the activities would not work well in the classroom because the teachers do not have the resources needed to run the activities. For example, a number of the activities require computers for PowerPoint presentations. Most of the students at Bayou High School do not have computers at home and they have limited access to a small computer lab at the school. Other activities are unrealistic, like expecting 6th-grade students to write a research paper for science class during the first week of the school year, something that might only work in a gifted class. Joanne felt that
instead of focusing on such an advanced task the teacher should get to know the students during the first week and build some background content knowledge instead.

Joanne also felt that the *Comprehensive Curriculum* would be good for more experienced teachers who are not open to new ideas, “stuck in the rut” (personal communication, July 17, 2006). Some of these teachers may be bored or have students who are bored, and thus the *Comprehensive Curriculum* may offer some different activities in their classrooms: “And that’s the point of fun, the point of fun in school is not just to have fun, it’s to have fun and learn at the same time” (personal communication, July 17, 2006). The new activities may bring more variety and fresh ideas to teachers who seek something fun to do with their students and also address some of the mathematics content at the same time.

Joanne felt that the *Comprehensive Curriculum* did not relate as well to the students at Bayou High School as it may have related to more affluent students. For example, in English the students were supposed to learn “the classics,” but Joanne would also like them to study something else to which they can relate. With some of the classics, the students “don’t have the experiences to get anything out of it at all, so a lot of it is very difficult” (personal communication, July 17, 2006). Thus the teachers have to come up with creative ways to relate this material to the students. For example, when teaching Romeo and Juliet, teachers “can talk about the gangs, you know how there were gangs in the story.” Joanne wonders if the *Comprehensive Curriculum* was written by teachers who worked with Honors or gifted students, and maybe lost touch of what the regular average students are like. Nowhere does the *Comprehensive Curriculum* offer teachers “a chance to go back and re-teach things or to reach the kids that you haven’t reached before” (personal communication, July 17, 2006).
Initially Joanne thought that the *Comprehensive Curriculum* would help teachers who do not know how to teach or do not know what students need to know or teachers who spend too much time on their favorite topics. She finds the idea behind the new curriculum to be a good one and there are things it that she likes, but she does not find it to be a comprehensive curriculum at all: “The knowledge base is not there, the background is not there, and if teachers don’t know what they’re doing they can really, they can really mess up that *Comprehensive Curriculum*” (personal communication, July 17, 2006). Also, teachers need to realize that although the *Comprehensive Curriculum* is from the state department, it still has mistakes in it that the teachers should try to avoid teaching to the students.

Joanne recalled the textbooks she had as a student in which a stronger emphasis was placed on memorization, practice and drill, and the knowledge base which she finds missing from the *Comprehensive Curriculum*. Joanne feels that people from her generation “have a better all-around knowledge than the students today do, because we did continue to work on concepts until they were mastered” (personal communication, July 17, 2006). Based on her experiences as a student, she feels strongly that students need to work on concepts until they master them. If they do not, even if they come back and revisit the concepts, it is not the same as mastering them the first time around. Joanne feels anxiety when she is re-taught something she had not mastered earlier. The philosophy of re-teaching has changed over the years because now teachers want their students to be introduced and exposed to many topics and master them later, perhaps by repetitions of the same material. Joanne disagrees with this strategy because she feels that students may become afraid of the material and be uptight about learning it because they did not understand it the first time they saw it. She wishes that the material were taught to students in greater depth and they were expected to learn it once and for all.
On the other hand, students today are taught more how to think for themselves and how and why some of the rules are the way they are, while Joanne was told, “OK, this is the way it is, don’t ask questions” (personal communication, July 17, 2006). In recent times, Joanne has understood some things that she never understood before but had just memorized. She finds it good that students are being taught not just the rules but why the rules are the way they are, as well as being shown concrete examples of abstract ideas.

Joanne described the *Comprehensive Curriculum* as hands-on, project-based, student-centered and involving a lot of group work. When she observed classrooms, Joanne felt that some of the teachers thought that they had to be doing the talking in the classroom, otherwise she might think that they were not doing a good job. However, Joanne believes that the classrooms did not have to be teacher-centered and that “the person doing the work is the person doing the learning” (personal communication, July 17, 2006). Therefore, in a student-centered classroom, the students are doing the learning. Despite its positive characteristics, the *Comprehensive Curriculum* is missing “a chunk” and “if you’re not a really good competent teacher you’re not going to like that” (personal communication, July 17, 2006). Some incompetent teachers may think that the *Comprehensive Curriculum* is all they need to do in class.

Joanne had done firsthand some of the English activities from the *Comprehensive Curriculum*, but she also has some of her own activities that she believed were at least as good as the ones in the *Comprehensive Curriculum*. She wished that she could still use in the classroom some of the activities which she had accumulated and tried with students over the years. She felt that her own activities were also innovative and student-centered. A teacher may consider the *Comprehensive Curriculum* innovative “if you don’t have ideas” (personal communication, July 17, 2006). However, teachers need to have the autonomy to decide which *Comprehensive Curriculum*
Curriculum activities to use because they may have even better activities than the ones in the Comprehensive Curriculum. In that case, the new curriculum could be very restrictive for experienced or creative teachers. As a teacher, Joanne wants to have the leeway to do what she knows is best for her students. She knows that she has received training for her job and wants to be allowed to “think for myself and decide what works and what doesn’t work, or let me decide how to teach things” (personal communication, July 17, 2006). Her message to administrators is: “We have some creativity, you’ve trusted me enough with this classroom, let me use what I know.” The implementation of the Comprehensive Curriculum seemed to threaten teachers’ autonomy and independence.

**Joanne’s views of testing and the Comprehensive Curriculum.** Due to standardized testing, Joanne experienced some stress as she performed her duties as a content coach. The implementation of the Comprehensive Curriculum increased some of her concerns about student performance. For example, she knew that some schools did not use the Comprehensive Curriculum and she wondered how their state test scores would compare to the scores of the schools that implemented the Comprehensive Curriculum.

In an effort to provide teachers with sample assessments, the Comprehensive Curriculum had some assessments built in. Each unit was accompanied by follow-up suggested assessments. Many of these assessments were in the form of projects and activities. Joanne felt that these assessments by themselves would not be a good way to evaluate what the students know: “that may not be a true picture of what the students are learning” (personal communication, July 17, 2006). Most of them did not come with a rubric and Joanne also questioned whether or not the students would “meet the rubric.” Joanne felt the need to use also paper-and-pencil tests in addition to the project assessments. She thought that most students would do well on the
Comprehensive Curriculum project assessments and that projects would be difficult for the teachers to grade objectively. Joanne did not trust the “new” alternate assessments because she thought that most students would do well on them because they did not have to work as hard on the projects as they would for traditional tests. In addition, tests are supposed to be somewhat unpleasant and not fun like the projects:

You know, if they knew everything you asked them to do, you know, what else can do you except give them a good grade. And certainly that helps students who work hard but are just on the border line, at least that helps them to get a passing grade. But I don’t think that helps the student who is motivated and the student who works hard. I don’t think, I mean it’s padding the grade, to be honest. And I don’t think that motivates them to do the best that they can do. OK, I need to work harder because I need a better grade, and I don’t think that projects do that. I think that projects are fun and you can learn something from them and I think they’re good and they have their place but I don’t think they should be the ultimate assessment or the only assessment. (personal communication, July 17, 2006)

Once every other month all district teachers met together in groups by content area, i.e. the mathematics teachers, the English/Language Arts teachers, etc. At these group meetings the teachers discussed what worked and what did not work. They planned ahead for the future and put together some materials and unit tests for the Comprehensive Curriculum. Joanne was concerned that if there were comprehensive unit tests for the entire parish that would be given year after year, students would eventually get a copy of the test. She did not want the students to memorize the exact problems and their answers, but instead learn how to do problems based on the concepts that they know they will be tested on. On the other hand, if teachers are writing their own unit tests, they will inevitably be wondering: “How am I going to be perceived if my scores are all low and a teacher at another school’s scores are all high?” (personal communication, July 17, 2006). If teachers do not want to get in trouble and are worried how they will look in the eyes of the administration if their students’ test scores are too low compared to other teachers’, or if their percentage of passing students is comparatively low, they may be
tempted to write easier tests. Joanne felt that “there are too many ways to pad things” (personal communication, July 17, 2006) and distrusted how teachers may handle the administration of the unit tests.

**Joanne’s view of teachers’ implementation of the Comprehensive Curriculum.** Joanne raised some questions about how other teachers implemented the new curriculum. When asked how she would describe the implementation of the Comprehensive Curriculum Joanne stated:

There were problems with the Comprehensive Curriculum simply because, um, when you take somebody else’s lesson plan and try to implement that it’s kind of forced, fake. If you’re not in on the planning and from the ground up, I don’t think you do as good a job as you do if you do the planning. (personal communication, July 17, 2006)

According to her, some of the concepts covered in the Comprehensive Curriculum and some of the hands-on activities were really good. However, teachers and maybe even district representatives had a misunderstanding about the Comprehensive Curriculum. Teachers did not realize that they needed to do some teaching and background work prior to or along with the activities in the Comprehensive Curriculum. They thought that the activities were sufficient, that “the activities were the teaching” (personal communication, July 17, 2006).

Numerous confusions arose among teachers about the implementation of the Comprehensive Curriculum. As Joanne saw reported, “some teachers even just totally abandoned the Comprehensive Curriculum after a while, some struggled and tried to do the work” (personal communication, July 17, 2006). Joanne expected that the district state scores would suffer due to the implementation of the Comprehensive Curriculum. She gave an example of an excellent 4th grade teacher who felt that she did not do as good of a job teaching this year as she had done in the past and that was because she had tried to incorporate the Comprehensive Curriculum. Introducing the new curriculum into the classroom would have been better if the
teachers were allowed to pick and choose the activities to use in their classroom based on what they knew their students needed:

There isn’t any one curriculum that’s going to reach all students everywhere and I think that’s where the teacher comes in to play. She knows the students, she knows what’s going to work with her students or if she doesn’t, she’s gonna feel it out and find out what’s going to work for hers, but it doesn’t give any autonomy to be yourself, to incorporate what you know, or your specialty. (personal communication, July 17, 2006)

According to Joanne, the teacher is the “key to education” (personal communication, July 17, 2006), and not the curriculum. On the positive side, the Comprehensive Curriculum encourages the teachers to move to different topics and not stay on the same topic for too long and teachers are encouraged to cover different new material. However, if the Comprehensive Curriculum is followed exactly, teachers will not have a chance to do any other additional activities that are beneficial for their students.

Joanne thought that in the first year of its implementation, the negative aspects of the Comprehensive Curriculum outweighed the positive ones. One obvious drawback was the many mistakes in the new curriculum. During the professional development days on which the teachers met during the school year, they would bring up mistakes that they had come across in the new curriculum. Teachers from each subject area filled out standard forms and then gave them to their district contact person who then forwarded these to the state Department of Education. Some of the teachers e-mailed mistakes directly to the state Department of Education contact person. Joanne was unsure when the changes would be reflected in the Comprehensive Curriculum but she knew that revisions were supposed to be made. For example, some of the corrections and revisions could be seen in the updated online version of the Comprehensive Curriculum.
Many of the teachers felt from the beginning of the implementation that the *Comprehensive Curriculum* was not going to work out in their classrooms and thus they did not put the effort to make it successful. Other teachers did not see the activities as simply an enhancement to their teaching and failed to recognize that the *Comprehensive Curriculum* is not “the meat and bones of the learning” (personal communication, July 17, 2006) but it offered opportunities for enrichment. Joanne did not mind trying the *Comprehensive Curriculum* but she was afraid that it would not work. Once she reviewed the new curriculum she realized that it did not contain the content background that the students needed. Thus she realized that the *Comprehensive Curriculum* was not the curriculum, but it offers extra things for the teachers to do in the classroom.

Joanne had heard some teachers say that they do not need the hassle of the *Comprehensive Curriculum* and that since they are at a point where they can retire, they would just retire. Joanne felt that some of these teachers were quite good, yet they felt they were being stripped of their individuality and creativity. It was almost as if they were being told that they are no longer good teachers and they need to follow the *Comprehensive Curriculum* in order to be good teachers, because the *Comprehensive Curriculum* is the only good teaching: “This one thing is good teaching, and everything you’ve done in the past is not good” (personal communication, July 17, 2006). After first hearing about the *Comprehensive Curriculum*, Joanne felt that it would be good for new teachers “because they’ll know what to teach.” After she worked with the *Comprehensive Curriculum* for a while she realized that it is not good even for new teachers because they would be misled into thinking that the *Comprehensive Curriculum* is all they have to teach:

A new teacher coming in, having to do that, it just, it probably gives them a bad picture of education, first of all. And a bad picture of what it is they’re expected to do. You
know, I’m afraid they’ll be trained to be not so good teachers because they’re thinking, “OK, we can play games, we can do all this,” and I’m not saying it’s not good to play games. It is good to play games, but you can’t do that all the time. (personal communication, July 17, 2006)

New teachers would get the wrong idea from the Comprehensive Curriculum that teaching is all about playing games, “they still have to do the work, they still have to do the hard part, the not-so-fun part.” New teachers are “so struggling to survive anyway” (personal communication, July 17, 2006) that they would be overwhelmed trying to use the Comprehensive Curriculum. As a teacher, Joanne usually tries to strike a balance with her students. She would play some games with them as long as they get some work done too.

New teachers may think that the Comprehensive Curriculum is all that they have to teach. Teachers who lack the content knowledge would also experience problems. Joanne felt that teachers should know and understand the content at a much higher level than the level at which they are going to teach it. Teachers would have a difficult time explaining the material to their students if they do not possess a mastery of the content. Teachers who lack the content knowledge need to consult and research resources to teach the material. With these concerns in mind, Joanne thinks that the Comprehensive Curriculum would need to be revised significantly, “there’s going to have to be some major work on the Comprehensive Curriculum” (personal communication, July 17, 2006), in order for the teachers to continue to use it.

Themes
This section provides a discussion of the themes that I identified from examining the teachers’ and teacher educators’ responses to the state-wide implementation of the Comprehensive Curriculum and the professional development associated with the new curriculum. I delved in the teachers’ attitudes about and experiences with the Comprehensive Curriculum and examined these in contrast to their classroom practices. In particular, I explored
the impact of a professional development program in supporting the teachers’ needs during the systemic reforms. The three themes that emerged were addressed by both the teachers and the teacher educators. The first theme is “the Big Picture,” which addresses the need for clarity at two different levels—macro and micro—as the participants tried to make sense of systemic reforms. The “Expectations” theme refers to teaching and how the teachers negotiate the mandates as they make sense of the reforms: What is mandatory and expected and what is not? What do the teachers really have to do in the classroom and what is optional? The last theme of “Alignment” is presented from the point of view of the state Department of Education and the school districts.

**Big Picture**

The teachers involved in this study experienced challenges as they found themselves at the center of a systemic reform which involved the implementation of the new *Comprehensive Curriculum*. Despite the teachers’ understanding of the need to improve student performance on standardized tests and despite the supposedly apparent alignment among the *Comprehensive Curriculum*, the instructional practices and the professional development program, the teachers felt confused. All of the target interview participants either directly spoke about or alluded to failing to see “the big picture.”

The big picture referred to the need for clarity in educational goals and the teachers’ desire to make sense of the changes they faced. Two levels of big-picture issues emerged: a macro- and a micro-level. On the macro-level, teachers were trying to make sense of the new curriculum in terms of the other significant changes they had experienced in the past several years: the introduction of mathematics content standards, the grade-level expectations, and the *Model Curriculum Framework* in addition to the overall emphasis on improving student test
scores. On a less visible, micro-level, the teachers expressed their disappointment with the lack of a micro view of the big picture. This theme applied directly to the Comprehensive Curriculum—it's organization, content, and the presentation of the content.

Both levels of the big-picture issue were summed up by one of the target interview participants, William, who taught upper junior high school mathematics at Bayou High School. William was one of a large number of rural mathematics teachers who started out teaching a different subject, in his case—social studies. He was a caring and thoughtful teacher who was trying to make sense of the changes he faced. He commented about the systemic changes, and especially the implementation of the Comprehensive Curriculum:

I don’t know the reason why they’ve done what they’ve done, I’m sure they [State Department of Education] have good reasons for doing it. But they, you know, all of a sudden, you know, they created this, which I’m sure they’ve been working a lot, they created this Comprehensive Curriculum and in the course of a summer they said, “Ok, districts, you have to teach this. Get this to your schools, get this to your teachers, we have to start implementing this.” And I think it came as a surprise and a shock to a lot of teachers, well, a lot of districts. I think up until the last minute a lot of districts were still wondering and it seemed like there was some confusion because a lot of people were trying to decide, “OK, is this mandatory, the Comprehensive Curriculum? Or is this a suggestion from the state department?” And I think nobody seemed like they can really get a clear picture: Do we have to do the Comprehensive Curriculum or is it optional? I think at the last minute it started to get clear that it was gonna be mandatory, they were gonna have to implement this. And that created a lot of confusion and probably some hard feelings about some of the teachers (William, personal communication, July 19, 2006)

William shared the concerns of many of the teachers who participated in this study and the quote above cuts across both the macro- and micro-views of the big picture theme. The teachers could make little sense on their own of how different aspects of the systemic reform fit together and of the changes in the educational goals in general. They wished that their superiors—school and district administrators, state department of education staff—had provided them with some sort of an outline and given them an advance notice of all the changes that they
were to face. Instead, the teachers became aware of a new big change every year, which substantially impacted their plans and classroom practices.

**Macro view of the big picture.** When the teachers were faced with the implementation of the Comprehensive Curriculum and the limited support network, many of them tried to make sense of the new developments on their own. In particular, they revisited the broad educational goals that they had set for their students in light of the state and district mandates and expectations. The mathematics teachers professed their awareness of and familiarity with the implementation of the Comprehensive Curriculum, the GLEs and the national standards for teaching mathematics in the survey which was administered to the forty-six teachers who participated in the 2006 summer professional development program. Overall, the teachers knew that the Comprehensive Curriculum was part of the big educational picture, however they were not sure what it was because they felt that the big picture kept changing.

William referred to a lack of big picture but he did not use the term directly. He felt that the state wanted to make changes in the educational goals and it had good reasons to implement these changes. However, William was under the impression that teachers failed to understand the good intentions of the state. Joanne, William’s mathematics content leader, had the opportunity to glean insights into the changes from both from the teachers’ and administrators’ perspectives. She is an example of a teacher who gradually got her bearings and began to figure out the big picture.

The following paragraph is an example of how she interpreted the big picture:

But as we studied and we realized where we were headed, we actually had a focus for where we were headed. We knew what LINCS was about and what we needed to do in here and then go back to the classrooms and do it. I feel that it’s that going back to the classroom and implementing, and then coming back and discussing how this worked or didn’t work, or what we can do to improve. And knowing where that’s leading based on the scores, that has really helped. (Joanne, personal communication, July 11, 2006)
Joanne reflected on the implementation of the *Comprehensive Curriculum* in terms of her work with LINCS and the school’s efforts to improve the students’ mathematics state test scores.

William’s point that many teachers were unclear about the educational goals is exemplified by Andrea. A former middle school mathematics teacher and current professional development organizer and presenter, she also made connections between the *Comprehensive Curriculum* and the previously established standards at the state and national level. When planning and preparing for professional development, Andrea often referred to the NCTM standards, the GLEs and the activities/lessons available through NCTM.

Andrea’s initial exposure to the *Comprehensive Curriculum* was earlier than most of the other teachers. She first heard about the *Comprehensive Curriculum*, the Model Curriculum and the GLEs as a college student and while teaching 7th grade during a workshop where people from the district made the announcement. She felt that the district representatives were not knowledgeable about the changes and unsure of what was coming. Andrea thought that this announcement was premature because it was at least a year before any of these changes came about. She and her classmates and colleagues were confused how the GLEs compared to the benchmarks and standards they had been using so far. They were told that the GLEs were in addition to the benchmarks and standards already in place, not their replacement. She found all this very abstract because many of these things were not developed yet when they were announced. Andrea wished she had the big picture instead of looking at all these “little bitty parts without having any idea what the total end product, what the whole purpose of it was for” (Andrea, personal communication, July 10, 2006). Seeing the GLEs before the *Comprehensive Curriculum* was frustrating and confusing. Once she was familiar with the *Comprehensive Curriculum*
Curriculum, Andrea could appreciate the GLEs, since the Comprehensive Curriculum was based on them.

Andrea said that the school districts, especially New Orleans, had many issues prior to the hurricanes. She criticized the implementation of the Comprehensive Curriculum:

When you implement, when you introduce something new to teachers, or to anybody, there are these levels of concerns, states of concern, that everybody goes through. What does this require of me? How is this going to, how much more time am I going to have to spend? Exactly what does this mean? And those things weren’t well thought out before they were placed in front of the teachers. (Andrea, personal communication, July 10, 2006)

Overall, Andrea was unhappy with how the implementation took place. She wished she could go to someone who knew the idea behind the new curriculum and what the goals were behind the Comprehensive Curriculum. However, she was disappointed that no one seemed to be able to show her the big picture: “It was just too much of a change without the support that was needed, without the information that was needed, without the time that was needed” (Andrea, personal communication, July 10, 2006). Andrea felt that the teachers should have had access to a resource person whenever they needed help. Someone who “should have been trained, know the idea of what is the point to this, what is the whole goal behind, what is the theory behind this Comprehensive Curriculum” (Andrea, personal communication, July 17, 2006).

The teachers wished they had more direction in what they were doing and knew what the reasoning behind the new curriculum was. However, they were disappointed that the support network was lacking and no one seemed to know what exactly was going on with the implementation of the Comprehensive Curriculum.

Micro view of the big picture. In this section I discuss how teachers made sense of the new curriculum and its implementation. The micro view of the big picture is in terms of the
nature of the curriculum itself. I examine its organization, content and the presentation of the content, as well as provide two detailed examples of issues that arose during the implementation.

The subdivision of the new curriculum into units that differed from the major textbook publishers’ materials created confusion for the teachers as they strove to find a way to integrate the Comprehensive Curriculum with their already-established curriculum plans for the 2005-2006 academic year. The activity-based curriculum with its lack of clear content presentation was in stark contrast to any of the textbooks and curricula with which the teachers were familiar. William sums the challenge of using the new curriculum itself and the lack of a big picture on the curriculum level in this interview excerpt:

Another problem, I hope I can say this the way I mean it, you know, split into units and then each unit is lessons and then in lessons you have activities. Um, and unless you really waded through the Comprehensive, and looked at the whole picture, if you take one little piece at a time, it’s very confusing and it seems like it’s a little backwards. I can’t think of an example right now, but sometimes you’re struggling to know, OK, what does the Comprehensive Curriculum want the students to master and what are they wanting you to just introduce. (William, personal communication, July 19, 2006)

Thus teacher confusion and frustration with the implementation of the Comprehensive Curriculum can also be attributed to the curriculum itself and not only to the macro view of the big picture. Several aspects of the Comprehensive Curriculum were difficult for the teachers to understand, internalize and adopt in their teaching. These were the organization of the material, or lack thereof, the presentation, and lastly, the content. By organization I am referring to the structure of each course’s mathematics materials. The structure includes, but is not limited to, the division of each set of materials into units and the distribution of the grade/subject-appropriate activities within these units. The presentation refers to the visual appeal of the materials. The content addresses the topics and grade level expectations (GLEs) included in the curriculum as well as the importance placed on them. Since each the four content areas included
in the *Comprehensive Curriculum* was written by different teachers, it also lacked consistency and uniformity across the grades. These problems can be identified in the areas of organization, presentation and content choices.

**Organization**

The *Comprehensive Curriculum* was based on the Louisiana Model Curriculum Framework, the state standards and the GLEs. There was a set of materials for each one of the four main content areas: mathematics, science, social studies and English/language arts for each grade K-12. These materials were subdivided into units and each unit included a number of activities as well as some possible assessments for the end of the unit. Each unit began with brief sections entitled: Time Frame, Unit Description, Student Understandings and Guiding Questions. Following these was a list of the GLEs that were addressed in that particular unit.

Both the “instruction” and assessment components of the *Comprehensive Curriculum* were non-traditional, unfamiliar and quite different from the curricula the teachers were used to employing in their classrooms. To the teachers, the *Comprehensive Curriculum* simply lacked a way of delivering the knowledge. The activities either offered ways of practicing already learned material or exploring unfamiliar topics. The assessments were very open-ended and project-based, which was in stark contrast with the state’s standardized assessments and typical classroom exams.

Since all teachers were supposed to use the same curriculum and a similar time frame, one would think that such mandates would provide a uniformity in the pace and quality of instruction. However, although each activity referenced related GLEs, it was unclear where and how the activity fit with the already adopted textbooks, which varied from school to school. The teachers were unsure how to combine the activities with what they normally did in the classroom.
as they followed the textbooks. Many of the teachers were unable to see how the new curriculum fit with the regular textbooks, especially if they tried to use the curriculum along with the textbooks.

The Comprehensive Curriculum activities were placed in thematic units which did not correspond directly with the teachers’ textbook units or chapters. This discrepancy was a reason for concern for many teachers who were comfortable with their textbooks’ structure and had used it for years to prepare their students for the state’s standardized tests. The arrangement of the activities of the Comprehensive Curriculum would have invariably lead to a rearrangement of the topics the teachers covered, and many feared that the Comprehensive Curriculum was not written and presented in a way that would enable the previous level of practice for standardized tests. The problems with the Comprehensive Curriculum would further be exacerbated if the students did not perform as well on the state assessments following the use of the reform curriculum. So many of the teachers, and especially their superiors—principals, district specialists and superintendents, were concerned that the students would not learn the material as well as they would with the regular curriculum and this failure would be reflected in the students Louisiana Educational Assessment Program (LEAP) and Graduation Exit Examination (GEE) test scores. Lower test scores would in turn reflect poorly in the teachers’ teaching evaluations and would affect how their colleagues and superiors perceive them. Thus the teachers were anxious about using the new curriculum with its different structure because they feared what impact this would have on the students’ performance and how such a pullback would reflect on them.

Although the activities were supposed to be taught in the order in which they appeared in the Comprehensive Curriculum, that order was not consistent with the usual logical structure for
introducing new topics and concepts. This “disorganization” was very confusing for teachers and students, because the teachers ended up exposing their students to activities even though their students lacked enough content knowledge to benefit from the activity. So the teachers decided to teach some of the content addressed in the activity and then formally teach the topic again later in the school year when it came up in the regular curriculum.

After a close examination of individual activities, I better understood the trepidation of the teachers. I realized that even consecutive activities often varied widely in level of content difficulty, execution time, and preparation. Teachers were accustomed to a gradual increase in difficulty and rather uniform execution and preparation times. Some activities addressed a single GLE while others addressed a combination of up to six GLEs. Teachers were accustomed to addressing only one or two GLEs at a time. The teachers were not provided with an estimated time for preparation or for execution of an individual activity, and therefore they had little idea of what to expect prior to actually implementing the activity and finding out for themselves.

The logical structure and organization often associated with mathematics textbooks was clearly lacking. Teachers were used to starting a school year, and starting a new unit, with a brief review of previous material. Review helped establish a connection between the students’ prior knowledge and new material. However, the Comprehensive Curriculum included no stated expectations of what the students should know prior to each activity and the teachers were unclear whether they were supposed to teach the prerequisite knowledge or expect that the students were already comfortable with it.
Presentation

In addition to the lack of organization, the presentation of the material in the

*Comprehensive Curriculum* was unappealing. The activities were presented in paragraph form, with an occasional table and rare picture or illustration. The descriptions of the activities were verbose, yet frequently lacking essential details. Overall, the *Comprehensive Curriculum* material appeared awkward to teachers who were used to following a textbook.

Many teachers and educators would agree that writing a good activity is challenging, especially because activity write-ups are so different from the typical mathematics lesson found in a typical textbook. Unfortunately for those who had to implement the *Comprehensive Curriculum*, the activities presented were far from complete. They resembled scaffoldings—they hold great potential, yet alone could be useless. Each activity briefly mentions what the teacher has to do, yet there is no list of materials needed, background knowledge required, or sample problems and questions. Figuring out how to come up with these is left to the teachers. Many of the problems call for the teachers to come up with numerous problems and examples on certain topics. In addition, the teachers have to come up with appropriate assessments in addition to the limited offerings at the end of each unit.

Since the *Comprehensive Curriculum* was activity-based and student-driven it appeared to be very different from the regular textbooks. Some teachers thought that the *Comprehensive Curriculum* would allow them to expose their students to real-life situations and hands-on activities, instead of the usual worksheets and notes. These characteristics would have distinguished it from their mundane textbooks, which are published by Glencoe the majority of the time, as well as the often-used *Mountain Math*.
Although the Comprehensive Curriculum’s presentation was in stark contrast to the adopted textbooks, it looked more like a monotone Word document with default options than a collection of real-life activities. The document lacked pictures and illustrations, wide margins, worked out examples and problems to be assigned. The overall presentation was unappealing.

**Content**

The Comprehensive Curriculum lacked the content exposition of a typical textbook. The only indication of what the content is entailed in each activity could be derived from the title of the unit, possibly the name of the activity, the applicable GLEs and then occasional terminology included in the body of the activity. There were no definitions and no explanations of content topics. In that sense the Comprehensive Curriculum was just a collection of supposedly thematically-organized activities. It lacked drill and practice exercises, as well as a description of prerequisite knowledge base and background information for teaching the content.

This lack of a content exposé misled some teachers into treating the Comprehensive Curriculum as if it were content-free. They thought that the activities in the Comprehensive Curriculum would be fun for the students and easy to implement. However, they quickly realized that this was the case only when the students knew the topics that were prerequisite for the successful execution of the activities. Otherwise the teachers found themselves struggling to halt the activity in order to teach the students what they needed to know in order to make sense of the activity and then continue the activity. Some of the teachers were misled by the content-free and project-based nature of the Comprehensive Curriculum and thought the curriculum was too easy for the students.

The nature of the activities themselves was quite disappointing with very few exceptions. The activities were trivial rather than innovative. Most of them were poorly written with
confusing wording and typos. Mathematical errors were also present. Furthermore, the Comprehensive Curriculum failed to portray mathematics in a logical manner. Some of the earlier activities were more complicated and required a greater understanding of the content than activities that occurred later in the curriculum.

The very lack of solid content in the Comprehensive Curriculum allowed for some unforeseen teaching and learning experiences. With the usual textbooks, the students were learning mathematics in a compartmentalized manner. The students did well while they were learning a certain section, unit or topic. However, once they were faced with an assessment in which the problems were mixed from several topics they performed much worse. This problem of compartmentalization is eliminated in the Comprehensive Curriculum because there is no clear indication in the activities of what the exact content is. It is unclear whether that was an intended goal of the Comprehensive Curriculum curriculum and was impossible to determine because of how mixed the topics were across subjects and grades. However, the organizing of activities can hardly be as prescriptive as a structured textbook curriculum. In that sense, the very disadvantage of the loose structure and organization of the Comprehensive Curriculum actually could have ended up being of possible advantage for the exposure to and learning of various topics as the same time. In this sense both the teachers and the students would have to think independently from a textbook and develop problem solving skills as they identify connections between activities and the underlying mathematics.

With the Comprehensive Curriculum activities the students were exposed to the same content multiple times in different contexts because the same topics were interspersed into different activities and units. Initially the students saw a brief glimpse of a topic as they were introduced to an activity and then later they had a chance to revisit the same topic, and eventually
master it. Thus the *Comprehensive Curriculum* had characteristics of a spiraling curriculum, although there was no indication that it was purposefully meant to be that way.

**Mathematics Content Stories.** After observing dozens of mathematics classes and spending about one hundred hours in professional development activities, I keep going back in my mind to the following two stories. These stories embody the complex nature of mathematics as described and enacted by the majority of the teachers who took part in the professional development program. I was directly involved in the first story, Equilateral Right Triangles, and the second story, Proper Mixed Numbers, was retold to me by the director of the professional development program. Both of these stories demonstrate the complexity of the teachers’ strongly held beliefs about mathematics and some of the issues that were present prior to the introduction of the curriculum.

**Equilateral Right Triangles.** During the professional development summer institute the teachers became familiar with many activities from the *Comprehensive Curriculum* which involved the algebra and measurement content standards as those were the focus of the program. I was co-teaching the middle school group of teachers with another colleague from the mathematics department. We used many activities from the new curriculum and also additional materials and ideas we had for addressing the middle school mathematics curriculum. On one occasion I wanted the teachers to engage in some hands-on work as we transitioned from plane to solid geometry, and therefore I brought toothpicks to the classroom. We explored plane geometry by constructing familiar shapes with toothpicks and discussing their properties. A discussion of the perimeter and area of geometric shapes ensued.

Following the routine discussion of geometric figures I challenged the teachers to create four congruent equilateral triangles with six toothpicks. I had facilitated this activity on several
occasions with students and pre-service teachers and I thought I could predict the kinds of things they would try. One of the answers that they suggested was the following star-shaped figure constructed with six toothpicks.

![Star-shaped geometric figure]

*Figure 2. Star-shaped geometric figure*

We discussed the number and triangles and concluded that this geometric figure did not meet the requirements, especially since it was difficult to guarantee that the smaller triangles were equilateral. In search for another possible construction, several teachers proposed the following geometric figure.

![Square with diagonals]

*Figure 3. Square with diagonals.*

This geometric figure was indeed constructed with six segments and the teachers described it as a square with its diagonals when I was drawing it on the board for the whole class.
to see. I encouraged them to look closely at their toothpick creation and check on the lengths of the toothpicks and how the figure held together. The following two modified versions of the above picture emerged.

![Figure 4](image-url)

*Figure 4. Two examples of possible correct constructions using six toothpicks of equal length.*

The teachers had noticed that the toothpicks did not fit together perfectly to create a square with two diagonals without either the diagonals being too short or too long. We looked together at their first suggested drawing and briefly mentioned that because of the Pythagorean theorem the legs of a right triangle which are equal in length to the sides of the square will always be shorter than the third side, the hypotenuse, which was equal to the length of the diagonal of the square. Thus the teachers noted that two triangles formed when a square is cut by a diagonal cannot have all sides of the same length. Then we went back to the original question which dealt with the construction of four equilateral triangles.

Just as I was encouraging the teachers to think outside the box (literally!) one of the veteran teachers, Alma, remarked that we had constructed four equilateral triangles already. She drew our attention to the original picture of a square cut by both diagonals and insisted that the four small triangles were equilateral. Several other teachers immediately pointed out that we could not possibly construct that geometric shape with toothpicks of the same length. However, Alma insisted that no matter which one of the four pictures we constructed, we would have four
congruent equilateral triangles. I drew an enlarged picture of one of the triangles in question on the board and then proceeded to rotate it so that it appeared in more standard textbook orientation.

![Figure 5. Two different orientations of isosceles right triangles.](image)

Alma continued to insist that the triangle was equilateral and had no problem with the apparent fact that it had a right angle. Since the professional development session was taking place in a computer lab, I asked the teachers to look up the definition of an equilateral triangle online and one of them read it out loud to the rest of the class. The definition clearly stated that in an equilateral triangle all the sides had to be the same length. We also looked closely at the angle measures and concluded that two of them were 45° and the bigger one was 90°. Then another teacher brought up the theorem that if two sides of a triangle are of equal length then the angles opposite these sides have the same measures as well and that an equilateral triangle would have three equal angles. This theorem brought up the question of the existence of equilateral right triangles. Despite this contradictory evidence, Alma remained unconvinced that there was a problem with her solution and insisted that she had correctly constructed four congruent equilateral triangles.

The other teachers insisted that I show them “the solution” and I drew their attention to my original hint of thinking outside the box. We had already spent a couple of hours discussing
plane geometry and measurement, so I presented them with the following construction of a tetrahedron.

![Two-dimensional rendering of a tetrahedron.](image)

*Figure 6. Two-dimensional rendering of a tetrahedron.*

Following a brief afternoon break I returned to class with an inflated spherical balloon and demonstrated the existence of equilateral right triangles in non-Euclidean geometry similarly to this illustration.

![A right equilateral triangle in spherical geometry.](image)

*Figure 7. A right equilateral triangle in spherical geometry.*

*Note. From “Spherical Trigonometry,” by Wikipedia*

No matter how hard I tried to persuade Alma, she left the program that day insisting that her initial construction was good enough for the original problem I had presented. As I commented earlier, Alma was one of many teachers who held firmly to problematic mathematical ideas and was unmoved by contradictory evidence which was presented in haste.
She might have been open to explore this topic further at her own pace, however the structure of the professional development program did not make it possible for us to revisit the topic or work one-on-one with teachers during the on-campus sessions. Later, she worked with a different on-site coordinator, Andrea, and I was unable to confirm whether or not she believed that she could have a right equilateral triangle in Euclidean geometry. Furthermore, the fact that the question that I posed during the session was non-traditional might have confused her although she could have known her definitions well. In conclusion, Alma was unable to articulate her thinking and the conflict stayed at an unresolved level and this lack of clarity on a key mathematics topic could possibly be damaging to students. Fortunately, other teachers realized that Alma was possibly misconstruing something and tried to interfere in a collegial manner.

Proper Mixed Numbers. On a different occasion the professional development director, Susan, serving as on-site coordinator, observed a middle school mathematics class. The topic of the day was the conversion of mixed numbers to improper fractions. The teacher presented an example of the conversion in which she claimed to follow a standard algorithm. The on-site coordinator immediately noticed a problem with an example which read as follows: \( \frac{4}{5} = \frac{20}{25} \). Later, when students were busy with seatwork Susan asked the teacher to step in the hallway with her and inquired about the method used to establish this equality. The teacher calmly responded that she used an algorithm that she was taught a long time ago. She added that she had taught all sixth-graders at the school this method earlier that day.

Susan pointed out to the teacher that on the left-hand side of the equality she had something that was bigger than five, yet the quantity on the right-hand side was less than one and suggested that the two quantities could not possibly be equal to each other. The teacher insisted that she simply followed an algorithm which involved multiplying and adding some of the
quantities given. Susan proceeded to show pictorially that \( \frac{4}{5} \neq \frac{20}{29} \) by demonstrating each quantity and then went on to show the teacher how to derive the algorithm for converting mixed numbers to improper fractions from the picture. The teacher respectfully watched but remained steadfast in her belief that she had performed her algorithm correctly. I still wonder if the teacher continued to teach her students her generally incorrect algorithm and I question why she seemed to make sense of the situation at the time.

The middle-school teacher felt that she understood the algorithms in the past since she was taught this algorithm and had used it for years. She had a deeply held conviction about the procedure for converting mixed numbers to proper fractions and the problem in this situation was her inflexibility. Susan was not aware of the realities of mathematics being an expression of intelligence. She felt that mathematics has to do with following algorithms and identified with mathematics as a set of procedures.

Both of these stories illustrate how ingrained the teachers’ beliefs about the nature of mathematics were prior to the implementation of the Comprehensive Curriculum. The introduction of the new curriculum coupled with these beliefs raised new issues for the teachers and their practice. The implementation of the Comprehensive Curriculum brings these two stories closer to home and raises new issues. For example, the teachers who participated in this professional development program were very different in their content preparation and teaching background. Older teachers may not be comfortable with some of the newer mathematics and may have a weaker background.

These stories demonstrate that the teachers hold ingrained views that prevent them from a more alive or real view of what mathematics is about. The Comprehensive Curriculum and the associated professional development program are perfect for addressing these kinds of problems.
The two examples above show that the workshop is not accomplishing its goal of addressing certain content and easing the teachers’ transition with the implementation of the Comprehensive Curriculum. In these two particular cases the professional development program did not reach the teachers at the moment in which they exhibited some confusion about mathematics content and its presentation to students. However, professional development in general is important to get teachers in the spirit of mathematics although this particular program failed to immediately change the teachers’ thinking about certain mathematics concepts and the teaching of these concepts in the classroom.

Many teachers remarked after they began using the Comprehensive Curriculum that they wished that they had a better idea of the overall nature of the new curriculum—it’s structure and organization, prior to delving into it. The activity-based, student-centered curriculum differed greatly from the textbooks the teachers used. The new curriculum, similarly to what Ross and his colleagues (2002) observed in their study of a different curriculum, embodied several main characteristics of mathematics education reform, namely its broader scope, access for all students to “all forms of mathematics”, exposure to complex, open-ended problems, and the use of manipulatives and computers.

Even the few teachers who actually saw the new curriculum as part of the professional development program the summer before the beginning of the initial implementation only got a fragmented view of the curriculum. Recall that the foci of the professional development program for the year were algebra and measurement. The Comprehensive Curriculum was a new addition and because it was new to the professional development staff and the university instructors, the staff had no time to gain an overview let alone explain it to the teachers. The focus of the professional development program became the classroom applications of the reform
curriculum. Ross and his colleagues (2002) identified in-service and professional development programs as the most effective agents for promoting reform changes. Had the teachers been presented with a more general overview, big picture, of the new curriculum and how it fit with the other systemic changes—such as assessments and standards, they might have been at greater ease with its implementation.

Despite the influence that a professional development program can exert on teachers, such a program alone cannot promote reform ideals. Zucker and his colleagues (1998) reported that professional development programs driven by systemic reforms only reach highly motivated teachers such as William and Paul. Among the other helpful yet less promising methods were technology implementation and curriculum alignment. The teachers who were target participants in this study were highly motivated to perform well in the classroom and succeed at improving their students’ test scores.

**Expectations**

In this study many stakeholders held different levels of power and say in the decisions that were made concerning the implementation of the *Comprehensive Curriculum*. The majority of the decisions that had a lasting impact on teaching and practice began at the state Department of Education and school district levels. Professional development staff and university faculty were also faced with some decisions. Last, but not least, were the rural teachers, students and their respective rural communities which were affected by the systemic reform. The participants in this study communicated explicitly and implicitly their expectations of the changes they faced. The chart below illustrates the stakeholders in this reform effort and the directions of the expectations.
Although it is possible that other expectation pairings existed, the expectations presented in this chart reflect the expectations that emerged during the study. The teachers were by far the most actively involved group, at least in the sense that five other groups of stakeholders (State Department of Education, school administrators, professional development staff, university faculty, and the community) held expectations of them and that the teachers held expectations for three other groups (students, school administrators, and the professional development staff). Since this study focused on the teachers’ responses and most data was collected from teachers, they naturally emerged as the focus of the expectations theme.

In this section I discuss the two primary sets of expectations that emerged in this study. The poorly communicated expectations that administrators and other education stakeholders held of the teachers and the ongoing practices of the teachers contributed to the teachers’ confusion and their reported dissatisfactions with how matters were handled regarding the implementation of the new curriculum. The teachers’ expectations of their students’ performance and the
teachers’ expectations of their learning experiences were both an important part of the perceived failure of the implementation of the Comprehensive Curriculum.

**Administrators’ expectations of the teachers’ performance.** The administrators’ expectations of the teachers’ performance represented the political aspect of the expectation pairings. The successful communication of these expectations could have clarified for the teachers the answers to the following questions: What were the teachers supposed to do with the new curriculum? Were they accountable for this curriculum (is it mandatory or not)? The theme of the administrators’ expectations of the teachers relates closely to William’s sense making of the big picture:

> But they, you know, all of a sudden, you know, they created this, which I’m sure they’ve been working a lot, they created this Comprehensive Curriculum and in the course of a summer they said, “Ok, districts, you have to teach this. Get this to your schools, get this to your teachers, we have to start implementing this.” And I think it came as a surprise and a shock to a lot of teachers, well, a lot of districts. I think up until the last minute a lot of districts were still wondering and it seemed like there was some confusion because a lot of people were trying to decide, “OK, is this mandatory, the Comprehensive Curriculum? Or is this a suggestion from the state department?” (William, personal communication, July 19, 2006)

The teachers felt that the state was just mandating what they should be doing, without offering the support needed for them to be successful: “You can mandate change, and it can work, but if you want to push it and just, you know, make all these changes happen within a matter of a year, where are the people to support?!” (Andrea, personal communication, July 10, 2006). The teachers’ response to and use of the Comprehensive Curriculum varied widely during the first year of implementation. Andrea found that the expectations of the district leaders, the superintendents and the supervisors shaped to a large extend the use of the Comprehensive Curriculum by the teachers. Andrea felt that since the teachers knew her from the on-campus component of the professional development project, they were honest in
admitting how much they used the *Comprehensive Curriculum* in their classrooms. One of their main complaints was that they were being told that they are expected to implement a “*great, deep, total* change all on your own” (Andrea, personal communication, July 10, 2006) with hardly any assistance but possibly the threat of penalties for failing to implement the *Comprehensive Curriculum*.

Susan, the mathematics content leader at Bayou High School, identified several issues with the administrators’ expectations of the teachers. One of them had to do with the training, recruitment and retention of teachers in rural schools:

> There’s no place for them to live, there’s nothing for them to do, and so once they’ve had a taste of the big city, you know, they don’t want to go back. So one of the things that rural systems are doing in a lot of cases is trying to take people who are already established in the community, who have a degree in anything, get them in the school, get them teaching. And then they’ll pay for them to go back and get certified to teach, or go through the alternative certification program. And in some cases that’s producing some good people, but in many cases what it’s doing is perpetuating the situation that’s already bad, because so many of those people are products of that system. And because they didn’t go through traditional education program in college where they were out and exposed to other schools, the only schools they’ve ever seen are the ones that they attended. (Susan, personal communication, July 13, 2006)

Susan felt that administrators should expect more of the teachers and that the teachers need to be trained in traditional teacher education programs. Furthermore, exposure to diversity—schools and students different from their own—would enhance the teachers’ preparation for classroom teaching. Susan felt that the administrators set the tone for the expectations and their leadership is a critical component for encouraging teachers’ professional growth:

> You know, I think a lot of that comes from the climate that’s established in the school. And that comes from your leadership. Whether it’s administrative leadership or those teachers that have natural leadership quality, but if there’s a climate in the school where innovation is valued and professional growth is expected, then teachers are gonna do that. Or they’re gonna go somewhere else because they’re not gonna feel like they’re part of the system, but if you’re in a system where, you know, you’ve got to beg and plead for a
day off to go to a professional conference or, you know, your administrator is so hung up on your lesson plans being written according to an ancient format, um, that you don’t really have the opportunity and the time it takes to develop new and innovative lessons, um, then, you know, you don’t have those things going on. It’s just what’s valued. If those things are not valued, then they’re not going to be there long. Somebody may try, but it won’t happen long, for long. Another thing too is if you were to go out into one of those schools and you certainly have a wealth of experience and knowledge, and you start trying and doing all these things that you know are the right way to do and they’re still doing things the old way, you know, you’re gonna feel uncomfortable with the reaction you are getting a lot of times. And then, you know, after a while, if you plan on staying, you’re gonna quit doing that and start doing what everybody else is doing. Especially young people, if the old ones, old experienced teacher, older experienced teachers don’t see any value in what the new ones are doing, then they’re gonna start doing what the older experienced teachers have been doing. (Susan, personal communication, July 13, 2006)

Susan believes in the importance of setting an example for teachers. If the administrators and other power figures value teachers’ experience and encourage the teachers to grow professionally then she expects that the school climate will improve. Students would also benefit from the administrators’ increased expectations of teachers.

**Teachers’ Expectations of Students’ Performance.** Many of the mathematics teachers who participated in this study had clear expectations of what they hoped to accomplish with their students during the 2005-2006 year. The mathematics teachers at Bayou High School in particular had worked on their goals for the year as part of a school-wide professional development aimed at increasing students’ test scores on the state assessments. However, despite their plans for improving student scores, the teachers’ expectations of their students remained low as they failed to include any mention of increasing or promoting student understanding of the mathematics content. The consistent lack of assigned and graded homework that was based upon the teachers’ assumptions that students were irresponsible and lacked the self-discipline to complete homework was an undeniable sign of these low expectations. The teachers whose classrooms I observed truly believed that the students would
not complete the homework and thus chose to avoid the complications that might arise if homework were assigned. They never mentioned in our personal communications the benefits that homework might have brought to their students.

Many of these concerns for student learning were evident in rural schools. William described the majority of his students as rural, “most of them live on the back roads, in the cotton fields, and in all different towns” (William, personal communication, July 19, 2006). The students and their families are poor. William thought that what sets his students apart from other students was that the students at Bayou High School wanted to come to school. For them school was a major socializing tool. Otherwise they may not have other children their age to play with and be around. William viewed this interest in schooling as both a “blessing and a curse.” The students tried to “get all their socializing and play time in” while they are at school and thus they do not focus on their studies. For this reason, and because education is not valued by their families, the students usually are not very good in the academic subjects, “there’s no repercussions at home” (William, personal communication, July 19, 2006). The majority of the students did not have computers at home and even if they did, they might not have had Internet access. William was not sure whether or not the students could get Internet access in the isolated areas where they live.

The concern about student apathy toward learning is especially evident among rural teachers. One of the main challenges that William experienced was the fact that his students’ families did not place much value in education because they may not find it applicable to their daily lives:

They didn’t need it much for what they did working on farms, share cropping, doing that types of jobs that they needed to do, and I think we are still fighting that even today is parents and students not understanding the importance of an education to better yourself. (William, personal communication, July 19, 2006)
William suspected that the parents may not read to their children at home and that they may not check to make sure that the students have done their homework. The parents also did not come to see the teachers regularly and inquire about their children’s progress. Therefore, the students sense that their parents do not have high expectations of them: “they’re not stressing the importance of education to their children and that’s a drawback” (William, personal communication, July 19, 2006).

His junior high students were very much like he was at that age and William felt that he can relate to them. They were not thinking about what they would do when they graduate from high school, and thus they were not as serious about learning as other high school students who might be considering taking the ACT or going to college. William repeated his vague suggestions for motivating the junior high students: “what you try to do is you try to show them the importance of it”, “what you just try to do is just general things, you try to show the value of what you’re teaching, how it’s important to you”, “you try to make the lessons as interesting as possible, you try to use manipulatives and you try to relate things to them”, “generally you just try to motivate them by, um, making the lessons interesting and making it relevant to them” (William, personal communication, July 19, 2006). However, after observing his classroom on several occasions I felt that most of these plans for motivation remained only in the planning stages. The instruction was very procedural and teacher-centered, and the students were often disengaged.

The implementation of the Comprehensive Curriculum was in addition to the challenge of working with rural students in a rural setting. William was unsure what to do with the Comprehensive Curriculum when many of his students were not at grade level, yet according to the Comprehensive Curriculum he was expected to teach at grade level: “So you have to kind of
water down, you have to teach some prior knowledge, you have to teach them the basics before you can actually teach them that activity in the *Comprehensive Curriculum*” (William, personal communication, July 19, 2006). In this case his expectations of the students and his teaching goals clashed with the expectations that the administration had of his teaching.

Probably the most difficult situation in the classroom was when teachers who graduated from rural schools and obtained alternate certification taught in rural schools. Susan observed many such teachers in the classroom in her role as a mathematics content leader and participant in LINCS and she noted:

They’ve never seen anything different, so they think, you know, when that’s all you’ve seen you don’t know that there is anything better out there. They don’t know about professional organizations and how important it is to belong to those, to get exposed to, to teachers from other schools, just the networking there. (Susan, personal communication, July 13, 2006)

The rather sudden announcement of the imminent implementation of the *Comprehensive Curriculum* brought some confusion to the teachers’ plans for the 2005-2006 academic year. Most of them had expected to continue making small changes to their established classroom curriculum in an effort to boost student test scores. By all accounts, the implementation of the *Comprehensive Curriculum* was considered a top-down initiative. However, as Horn (2004) noted, in order for educational change to take place, teachers need to feel that they are empowered stakeholders in the process of change. Instead, the Louisiana teachers felt powerless and were disengaged with the process. Although the teachers were engaged in numerous discussions and conversations, many of which were part of professional development programs, those conversations occurred only after the imminent or on-going implementation of the new curriculum was in place. The teachers were not included in the decision making process that prompted the creation of the *Comprehensive Curriculum* and the subsequent decisions about its
implementation. The tensions and conflicts that I described earlier in the answers to the two research questions were aligned with expectations based on Horn’s model of top-down/expert driven systems.

Need for Alignment

In the present study the reform efforts associated with the implementation of the Comprehensive Curriculum were supposedly part of the alignment of curriculum, instruction and professional development. The teachers were already familiar with the state mathematics standards and the associated grade-level expectations. They were already briefly introduced to the Model Curriculum Framework which was meant to provide a transition between the standards and a curriculum based strictly on these standards, the Comprehensive Curriculum.

Despite the somewhat gradual introduction of the GLEs, Model Curriculum Framework and the Comprehensive Curriculum, teachers encountered difficulties as they tried to make sense of the systemic reforms. William, for example, identified a discrepancy between what the Comprehensive Curriculum was encouraging: student involvement, hands-on activities and the nature of standardized testing: “It is kind of crazy that they have all these hands-on activities where you talk and you do this to figure things around, but when you have a test it’s got to be ‘shh, don’t say anything.’ I don’t know why that is” (William, personal communication, July 19, 2006).

The first year of implementation of the Comprehensive Curriculum coincided with the devastation from Hurricanes Katrina and Rita. Andrea did not blame the unsuccessful implementation of the Comprehensive Curriculum on the hurricanes, “I was just like really appalled at how many things that were done in the implementation, and of course, every district
did things slightly different, but overall I think that when you think about this is a massive change that we’re trying, second order, deep, deep change that we’re trying to implement that I just think that there are so many principles of change theory that were violated” (Andrea, personal communication, July 10, 2006) However, she noted the dramatic change as she worked closely with many middle and high school mathematics teachers as they tried to implement the new curriculum.

A curriculum alignment, like the one intended by the Louisiana Department of Education, is reported to help the promotion of reform ideals such as those mentioned by Zucker and his colleagues (2002). However, since Zucker and his colleagues considered professional development to be the most promising factor for increasing the classroom application of reform ideals, my study of the professional development proved to be of major importance.

The professional development program in which the rural mathematics teachers participated was in part to blame for the lack of alignment and discontinuity that the teachers faced. Similarly to Gellert’s (2008) conclusion, the connection between the teachers’ teaching practices and the professional development activities that I participated in was truly complex. A professional development program which could have contributed to the dissemination of the mathematics reform ideals could have aimed at creating collaboration and cooperation (Gellert, 2008), communities of practice (Crockett, 2002; Gellert, 2008), establishing a continuum of experiences (Mundry et al, 1999) or trained teachers as leaders (Loucks-Horsley et al, 2003). Instead, the professional development program addressed in this study aimed at achieving none of the above listed characteristics.

The roles of the university instructors, professional development staff, and in-service teachers who participated in the professional development project were clearly defined. The
mathematics faculty served as content experts, while the professional development staff was in charge of organizational issues and limited classroom applications of the content especially in terms of addressing multiple ways of teaching the same topic. Although the university instructors and professional development staff had some interactions, each group felt that it had a certain predetermined role to play in the in-service experiences of the teachers.

Vast differences existed in the philosophies and goals of these two groups of stakeholders. The university faculty operated under the premise that they had to teach the teachers the algebra and measurement content which the teachers in turn would teach to their students. The professional development staff members were more concerned with showing the teachers new and different ways of introducing the content. Furthermore, with the emergence of the Comprehensive Curriculum, the professional development staff was especially focused on working with the teachers on the new curriculum as much as possible, while the university faculty felt almost indifferent to the new curriculum. The university instructors felt that with or without the new curriculum they were still responsible for ensuring that the teachers knew the underlying content which was independent from the materials used to present it to students.

Both the entrenched and isolated roles and responsibilities for teacher development and the differences in the philosophies and beliefs between the university mathematics instructors and the professional development staff are examples of the issues related to building a continuum of professional learning experiences identified by Mundry and her colleagues (1999). Without this continuum mathematics reform efforts would at best be slowed down.

Issues that fall under the three themes of Big Picture, Expectations and Allignment contributed to the lack of success of the implementation of the new curriculum during the first year. I can only discuss the first year of the Comprehensive Curriculum because my study
concluded with the end of the 2005-2006 academic year. So it is possible that implementation was halted altogether or that changes that were made were sufficient to perceive the curriculum’s implementation as successful. However, for the duration of this study the results of this systemic reform were undesirable. More successful implementation would likely have involved a quality systemic reform such as the one described by Fullan (2001). In this case an entirely new and cohesive K-12 curriculum might have been the focus. In addition to defining a successful implementation, Fullan described three possibilities that he deemed a waste of time, energy and resources.

Two of the three cases are applicable in the discussion of the implementation of the Comprehensive Curriculum. The first problem is that a “flawed” program was being implemented. The other issue is that a “flawed” program is rejected. These two issues may appear to contradict each other at first, although once we are familiar with the specifics of the teachers’ implementation of the new curriculum we can easily see both sides of the meaning behind this issue with the “flawed” programs.

The flaws of the implemented program were clearly identified by the participants during the 2005-2006 academic year. The teachers had issues with the organization of the curriculum, its presentation, and the content included in it. They expressed dissatisfaction and confusion with the implementation rules which varied widely by school, district and possibly even by content area. Despite any initial implementation efforts, the majority of the mathematics teachers abandoned the program several months after its introduction in August 2005.

The apparent failure of the implementation possibly could have been prevented if the three themes: Expectations, Big Picture and Alignment were addressed at the local, district and state levels. The expectations of the teachers’ implementation of the Comprehensive Curriculum
held by other stakeholders such as school and district administrators, the state department of education, professional development staff and university mathematics instructors were too broad and vague. The teachers were simply expected to implement the curriculum, yet they lacked the moral support from their superiors. Furthermore, the students’ parents were not involved in any way in the decision making and lacked the preparation to back up the new curriculum.

Hardly anyone involved in this study had a full grasp of the big picture. The teachers were not sure how this new curriculum matched what they were doing so far and especially how it would prepare their underprepared students for the demanding state assessments. The teacher educators and professional development staff were unsure how to advise the students. Even if some of the plans for informing the teachers and providing them with information about how the new curriculum fit with their classroom practices were available, the devastation caused by hurricanes Katrina and Rita postponed these plans. The state’s financial situation became bleaker following the natural disasters and contributed in part, or at least speeded up, the decision to merge two area elementary schools with Bayou High School and form Bayou Junior High School instead. The merger led to the closure of the area elementary schools, and the re-directing of the high school students to the high school in the only large town (population 30,000 people in 2000) in the parish.

I also came to realize that participation in professional development activities had become no more than a habit for many teachers. The participants in this study had an abundance of professional development opportunities from which to choose. Universities, school districts, state and government programs were vying for their attention and participation. Most of the professional development opportunities were broad and failed to take into account the individual teachers’ needs and expectations. Many of the teachers were just going through the actions,
attending professional development instead of truly participating in it. Some even considered summer professional development as primarily a source of summer income and participated minimally.

In closing, three themes emerged from the examination of the teachers’ responses as they began the initial implementation of the Comprehensive Curriculum. The first theme was about the expectations that interested parties had of teachers as well as the expectations teachers had of other stakeholders in the reform efforts. The lack of and the teachers’ desire for a big picture in dealing with systemic reforms formulated the second theme. The last theme dealt with the alignment among professional development, teachers’ beliefs, standards and the Comprehensive Curriculum. The issues that fall in these three categories contributed to the challenges associated with the initial implementation of the Comprehensive Curriculum.
Chapter 6

Teachers’ and Teacher Educators’ Views of Professional Development and Reforms

This chapter includes analysis of quantitative and qualitative data which reveals insights about the teachers’ and teacher educators’ views of professional development and systemic reforms. As mentioned in the beginning of Chapter 5, recall that in the beginning of the study I administered a survey to the forty-six teachers who attended the professional development workshop. The teachers answered the same questions at the beginning of the two-week summer institute as well as at its completion. In this chapter I discuss the results of the survey and the fact that they suggest that a large part of the attitudes and difficulties with the implementation of the CC actually reflect perennial difficulties in teachers’ attitudes toward what they are doing in school, mathematics and teacher professional development. Hence, I first discuss the survey results which provide a glimpse into the teachers’ beliefs and dispositions prior to the actual implementation of the new curriculum. The survey analysis is followed by a brief discussion of the teachers’ journals which they kept during the 2005 summer institute and the classroom observations which took place during the 2005-2006 academic year. Then I discuss the five target participants’ general perceptions about professional development and reforms based on the interviews conducted in the summer of 2006, followed by a general discussion of what I gleaned from other teachers during my visits and observations. The general discussion includes two recurring themes as well as recommendations for future reform implementations.

Surveys

The survey was initially administered on the first day of the two-week professional development summer institute. Then on the second-to-last day of the institute an abbreviated
version of the survey was administered again. The survey consisted of demographic and academic background questions (omitted from the second administration of the survey) as well as questions pertaining to the teachers’ familiarity with standards, the nature of mathematics, use of technology, and teaching mathematics, in particular algebra and measurement. Some of the questions addressed the teachers’ plans for the new academic year, their expectations of their students, the teachers’ overall pedagogical approaches and a typical lesson profile. The majority of the questions were adopted directly from the 2003 TIMSS teacher questionnaire. The remaining questions were slight modifications from the same questionnaire designed to better address my research questions and the specific content addressed in the professional development program, namely algebra and measurement. The results of the demographic questions were included previously in the description of the start-up study in Chapter 3. A discussion of the remaining results follows in several sub-categories: technology, educational objectives, use of pedagogical elements, assessment practices, content preparation and readiness, and nature of mathematics. Statistical tests were utilized to determine whether or not there were any statistical differences in the responses in the pre- and post-tests, as well as between the groups of rural and urban teachers. Since there were no significant differences in the means on the overwhelming majority of survey items, the responses on the two administrations of the survey are combined.

**Technology.** On technology related topics all teachers allowed their students some use of calculators in the classroom. The teachers reported that they permitted their students to use calculators during mathematics lessons. However, the majority of teachers restricted student use. The students used calculators most often to solve complex problems, and less frequently, during the majority of the lessons, to check answers, do routine computations and explore algebra
concepts. These results were supported in part by my classroom observations during the 2005-2006 academic year. Further discussion is provided in the observations section following the analysis of the survey.

**Teachers’ educational objectives.** On the first day of the summer institute the teachers completed a survey about their expectations of their students, their plans for the next academic year, and their readiness to teach certain mathematics topics. They were asked to state how much emphasis they plan to place on a list of fifteen student objectives for the next academic year. The possible responses were each assigned a numerical value as follows: None (1), Minimal Emphasis (2), Moderate Emphasis (3), and Heavy Emphasis (4). The mean responses on each objective were computed for the forty-five teachers who took the pre-survey. Their answers are recorded in the table below from heaviest emphasis to no emphasis based on the mean of teacher responses.
Table 5

Survey Question # 16

<table>
<thead>
<tr>
<th>How much emphasis will each of the following student objectives receive?</th>
<th>Mean Score (pre- and post-tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn how to apply mathematics in real-life situations</td>
<td>3.918</td>
</tr>
<tr>
<td>Learn how to solve problems</td>
<td>3.905</td>
</tr>
<tr>
<td>Prepare for standardized tests</td>
<td>3.765</td>
</tr>
<tr>
<td>Learn to reason mathematically</td>
<td>3.765</td>
</tr>
<tr>
<td>Increase students’ interest in mathematics</td>
<td></td>
</tr>
<tr>
<td>Learn mathematical concepts</td>
<td>3.7525</td>
</tr>
<tr>
<td>Learn how mathematics ideas connect with one another</td>
<td>3.507</td>
</tr>
<tr>
<td>Learn to explain ideas in mathematics effectively</td>
<td>3.471</td>
</tr>
<tr>
<td>Develop students’ computational skills</td>
<td>3.446</td>
</tr>
<tr>
<td>Prepare for further study in mathematics</td>
<td>3.154</td>
</tr>
<tr>
<td>Learn to perform computations with speed and accuracy</td>
<td>3.152</td>
</tr>
<tr>
<td>Learn mathematical algorithms/procedures</td>
<td>3.059</td>
</tr>
<tr>
<td>Understand the logical structure of mathematics</td>
<td>2.941</td>
</tr>
<tr>
<td>Review material from previous years</td>
<td>2.706</td>
</tr>
<tr>
<td>Learn about the history and nature of mathematics</td>
<td>2.258</td>
</tr>
</tbody>
</table>

Notice that the nature of mathematics received little emphasis but this is not surprising if these teachers are among the majority of high school teachers whose tendency is to see mathematics from an absolutist perspective (Ernest, 1991). And for this same reasoning the history of mathematics and the understanding of the logical structure of mathematics may
appropriately be deemed less important than learning how to solve problems and apply mathematics in real-life situations. The relatively strong emphasis on preparing students for standardized tests indicates that the pressure of testing takes precedence over students’ learning to reason mathematically and make connections within mathematics, and even over what I observed most often in the classrooms, learning mathematical algorithms and procedures. This question asked what the teachers plan to emphasize whereas the next question asks teachers to look back and indicate in relative terms, how often they have already implemented aspects of instruction.

**Use of pedagogical elements.** In the following question the teachers were asked about the frequency of performing certain pedagogical characteristics of mathematics instruction. The possible responses were each assigned a numerical value as follows: Never (1), Rarely (2), Sometimes (3), Often (4), and All or almost all mathematics lessons (5). Their mean responses are organized in the table below from most to least frequent.
Table 6

*Survey Question # 17*

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Mean scores (pre-and post-tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Require students to explain their reasoning when giving an answer</td>
<td>4.349</td>
</tr>
<tr>
<td>Engage the whole class in discussion</td>
<td>4.186</td>
</tr>
<tr>
<td>Allow students to work at their own pace</td>
<td>4.163</td>
</tr>
<tr>
<td>Help students see connections between mathematics and other disciplines</td>
<td>4.023</td>
</tr>
<tr>
<td>Pose open-ended questions</td>
<td>3.907</td>
</tr>
<tr>
<td>Assign mathematics homework to be done at home</td>
<td>3.905</td>
</tr>
<tr>
<td>Ask students to consider alternative methods for solutions</td>
<td>3.884</td>
</tr>
<tr>
<td>Ask students to explain concepts to one another</td>
<td>3.814</td>
</tr>
<tr>
<td>Introduce content through formal presentations</td>
<td>3.780</td>
</tr>
<tr>
<td>Ask students to use multiple representations</td>
<td>3.442</td>
</tr>
</tbody>
</table>

This question pertained to the teachers’ typical lesson profile and pedagogical approaches. I was surprised to find out that the teachers place such a high importance on students’ explanations of their reasoning while the teachers themselves rarely provided a meaningful and logical explanation during the lessons that observed. The teachers placed a weak emphasis on the use of multiple representations, although representation is one of the five NCTM (2001) process standards. The statement itself appeared quite abstract and may be part of the reason for the low ranking. Another surprising response was the frequency of homework assignments especially since the majority of the teachers never assigned homework because they thought that the students would not work on it. The next question addresses this and other forms of assessments that the teachers employed.
**Assessment practices.** The teachers were asked about various methods of assessing student progress that they employed in their classroom. The possible responses were each assigned a numerical value as follows: Never (1), Rarely (2), Sometimes (3), Often (4), and All or almost all mathematics lessons (5). The mean responses are represented in the table below from most to least frequent.

Table 7

*Survey Question # 18*

<table>
<thead>
<tr>
<th>How often do you assess student progress in mathematics in each of the following ways?</th>
<th>Mean Scores (pre- and post-tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask students questions during large group discussions</td>
<td>4.488</td>
</tr>
<tr>
<td>Use assessments embedded in class activities to see if students are “getting it”</td>
<td>4.419</td>
</tr>
<tr>
<td>Review student homework</td>
<td>4.405</td>
</tr>
<tr>
<td>Observe students and ask questions as they work individually</td>
<td>4.395</td>
</tr>
<tr>
<td>Observe students and ask questions as they work in small groups</td>
<td>4.233</td>
</tr>
<tr>
<td>Grade student work on open-ended tasks using defined criteria (e.g. a scoring rubric)</td>
<td>3.857</td>
</tr>
<tr>
<td>Conduct pre-assessment to determine what students already know</td>
<td>3.721</td>
</tr>
<tr>
<td>Give tests requiring open-ended responses (e.g. descriptions, explanations)</td>
<td>3.667</td>
</tr>
<tr>
<td>Review student notebooks/journals</td>
<td>3.500</td>
</tr>
<tr>
<td>Have students present their work to the class</td>
<td>3.349</td>
</tr>
<tr>
<td>Review student portfolios</td>
<td>3.244</td>
</tr>
<tr>
<td>Give predominantly short-answer test (e.g. multiple choice, true/false, fill in the blank)</td>
<td>3.048</td>
</tr>
<tr>
<td>Have students assess each other (peer evaluation)</td>
<td>2.905</td>
</tr>
<tr>
<td>Have students do long-term mathematics projects</td>
<td>2.429</td>
</tr>
</tbody>
</table>

Teachers observing students working individually was a common practice during my classroom observations and this practice also ranked high on the list of teachers’ assessment practices. Note that all of the lower ranked responses referring to students’ open-ended
responses, portfolios, presentations, projects and peer evaluations can clearly be distinguished from the more frequently preferred teacher-centered forms of assessment. The teachers’ avoidance of dialogue and joint construction of knowledge with the students confirms the teachers’ view of mathematics as set and value-free (Ernest, 1991). An important assessment practice that is missing from the list above is the use of standardized assessments such as the Louisiana Educational Assessment Program (LEAP) and the Graduation Exit Examination (GEE) tests. In later interviews the target participants referred to these assessments as a frequent point of discussion at faculty meetings aimed at improving student performance.

**Content preparation and readiness.** In addition to assessment practices, the teachers were asked about their readiness to teach certain mathematics content, mostly pertaining to the content standards of algebra and measurement. As mentioned previously, these two standards were the content focus for the second, and last, year of the professional development project. The possible responses were each assigned a numerical value as follows: Very Ready (1), Ready (2), and Not Ready (3). The mean responses were organized in the table below from ‘very ready’ to ‘not ready.’
Table 8

Survey Question # 19

<table>
<thead>
<tr>
<th>Topics</th>
<th>Mean scores (pre- and post-tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considering your training and experience in both mathematics content and instruction, how ready do you feel to teach these topics at the middle/junior high level?</td>
<td></td>
</tr>
<tr>
<td>Estimation of length, circumference, area, volume, weight, time, angle, and speed in problem situations</td>
<td>1.588</td>
</tr>
<tr>
<td>Numeric, algebraic, and geometric patterns or sequences (extension, missing terms, generalization of patterns)</td>
<td>1.623</td>
</tr>
<tr>
<td>Equivalent representations of functions as ordered pairs, tables, graphs, words or equations</td>
<td>1.635</td>
</tr>
<tr>
<td>Standard units for measures of length, area, volume, perimeter, circumference, time, speed, density, angle, mass/weight</td>
<td>1.635</td>
</tr>
<tr>
<td>Simple linear equations and inequalities</td>
<td>1.6634</td>
</tr>
<tr>
<td>Computations with measurement in problem situations (e.g. add measures, find average speed on a trip, find population density)</td>
<td>1.682</td>
</tr>
<tr>
<td>Attributes of graphs such as intercepts on axes, and intervals where the function increases, decreases, or is constant</td>
<td>1.882</td>
</tr>
<tr>
<td>Precision of measurements (e.g. upper and lower bounds of a length reported as 8 cm to the nearest cm)</td>
<td>1.977</td>
</tr>
<tr>
<td>Proportional, linear, and nonlinear relationships (travel graphs and simple piecewise functions included)</td>
<td>2.140</td>
</tr>
<tr>
<td>Measures of irregular or compound areas (e.g. by using grids or dissecting and rearranging pieces)</td>
<td>2.177</td>
</tr>
</tbody>
</table>

The majority of the choices for this question listed multiple concepts. Therefore the conclusions I draw are mixed. It is possible that some teachers ranked themselves “very ready” on a statement referring to teaching standards units of measure. Those teachers who read the entire statement may have posed, reconsidered their readiness and felt less ready to teach standards units of measure when they became aware of the long list of measures that was included in the statement. The middle schools teachers who reported their readiness on this list
of algebra and measurement topics were quite likely uncomfortable with the repeated references to graphs and functions. Although graphs and functions were addressed briefly during the professional development program, they were considered a minor topic by the instructors and therefore the teachers’ exposure to these topics was substantially less than for example, solving linear equations and inequalities.

In addition to inquiring about the teachers’ preparation to teach certain algebra and measurement topics, some of the survey questions dealt with the teachers’ pedagogical approaches. The teachers were asked to indicate their level of preparation in twenty areas of mathematics instruction. These categories pertained to technology use, teaching techniques, and focus on student learning. The possible responses were each assigned a numerical value as follows: Inadequately prepared (1), Somewhat prepared (2), Fairly well prepared (3), and Very well prepared (4). The various areas are listed in the table below from those area that the teachers felt most prepared to teach to those areas where they felt inadequately prepared, based on the mean response scores.
Table 9

Survey Question # 20

Please indicate how well prepared you currently feel to do each of the following in your mathematics instruction.  Mean scores (pre-and post-tests)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have students work in cooperative learning groups</td>
<td>3.476</td>
</tr>
<tr>
<td>Provide mathematics instruction that meets mathematics content standards</td>
<td>3.429</td>
</tr>
<tr>
<td>(district, state, or national)</td>
<td></td>
</tr>
<tr>
<td>Use calculators/computers for drill and practice</td>
<td>3.417</td>
</tr>
<tr>
<td>Teach mathematics with manipulatives, such as counting blocks or geometric shapes</td>
<td>3.417</td>
</tr>
<tr>
<td>Encourage students’ interest in mathematics</td>
<td>3.393</td>
</tr>
<tr>
<td>Teach problem-solving strategies</td>
<td>3.377</td>
</tr>
<tr>
<td>Encourage participation of females and minorities in mathematics</td>
<td>3.334</td>
</tr>
<tr>
<td>Take students’ prior understanding into account when planning curriculum and instruction</td>
<td>3.298</td>
</tr>
<tr>
<td>Use calculators/computers to demonstrate mathematics principles</td>
<td>3.281</td>
</tr>
<tr>
<td>Manage a class of students engaged in hands-on/project-based work</td>
<td>3.262</td>
</tr>
<tr>
<td>Make connections between mathematics and other disciplines</td>
<td>3.212</td>
</tr>
<tr>
<td>Recognize and respond to student cultural diversity</td>
<td>3.060</td>
</tr>
<tr>
<td>Use calculators/computers for mathematics learning games</td>
<td>3.048</td>
</tr>
<tr>
<td>Use the Internet in your mathematics teaching for general reference</td>
<td>3.024</td>
</tr>
<tr>
<td>Use calculators/computers for simulations and applications</td>
<td>2.988</td>
</tr>
<tr>
<td>Use calculators/computers to collect and/or analyze data</td>
<td>2.965</td>
</tr>
<tr>
<td>Use the Internet in your mathematics teaching for data acquisition</td>
<td>2.810</td>
</tr>
<tr>
<td>Lead a class of students using investigative strategies</td>
<td>2.763</td>
</tr>
<tr>
<td>Use the Internet in your mathematics classes for collaborative projects with classes/individuals in other schools</td>
<td>2.488</td>
</tr>
</tbody>
</table>

Some of the most telling responses had to do with technology in the form of computers, in particular the Internet, and calculators. The three statements pertaining to use of the Internet
when teaching mathematics received low rankings with two of them being at the very bottom of the list of twenty categories for teaching mathematics. These findings are in large part due to the lack of computers in the classrooms and the schools in general. Most of the schools had only one computer lab which usually was too small for a large mathematics class. The physical environment in many of the computer labs was not conducive to productive learning. To list just a few of the issues with Internet access and using the Internet for mathematics learning: the computers, and the student users, were facing different walls; the labs had no windows; the labs were overbooked; the computers were too old.

Many of the students lacked calculators and therefore the teachers could not take advantage of this form of technology. Possession of a classroom set of calculators, especially graphing calculators was rare. Although teachers felt very well prepared to use calculators for drill and practice, they missed out on opportunities to fully explore the capabilities of the calculators and challenge their students with more meaningful applications such as data collection and analysis, and other mathematical applications.

Nature of mathematics. The last question on the study was aimed at directly investigating the teachers’ perceptions of the nature of mathematics. The teachers were asked to express to what extent they agreed or disagreed with several statements. The possible responses were each assigned a numerical value as follows: Agree a lot (1), Agree (2), Disagree (3), and Disagree a lot (4). Their responses are listed in the table below based on the mean scores for the whole group from most agreeable to least.
Table 10

Survey Question # 21

<table>
<thead>
<tr>
<th>To what extent do you agree or disagree with each of the following statements?</th>
<th>Mean scores (pre-and post-tests)</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than one representation (picture, concrete material, symbols, etc.) should be used in teaching a mathematics topic</td>
<td>1.423</td>
</tr>
<tr>
<td>There are different ways to solve most mathematical problems</td>
<td>1.434</td>
</tr>
<tr>
<td>Modeling real-world problems is essential to teaching mathematics</td>
<td>1.456</td>
</tr>
<tr>
<td>Solving mathematics problems often involves hypothesizing, estimating, testing, and modifying findings</td>
<td>1.679</td>
</tr>
<tr>
<td>Students learn mathematics best when they ask a lot of questions</td>
<td>1.990</td>
</tr>
<tr>
<td>Mathematics should be learned as sets of algorithms or rules that cover all possibilities</td>
<td>2.303</td>
</tr>
<tr>
<td>Few new discoveries in mathematics are being made</td>
<td>2.645</td>
</tr>
<tr>
<td>Learning mathematics mainly involves memorizing</td>
<td>2.936</td>
</tr>
</tbody>
</table>

The highest ranked response on this question dealt with multiple representations. While the teachers believed that they should use multiple representations in teaching a mathematics topic, they earlier placed a low priority of students’ use of multiple representations on question sixteen of the same survey. A similar statement is the third one from the top which is about multiple ways of solving mathematical problems. Multiple representations was a concept that the instructors in the professional development program frequently employed in presenting algebra and measurement topics without necessarily making a concerted effort to address multiple representations. The instructors’ comfort and familiarity with the material allowed them to consider multiple approaches to the content material and try to make connections with the teachers’ previous knowledge.

Some confusion with the responses led to difficulties with the data interpretation on this and other questions. For example, the statement “Few new discoveries in mathematics are being made” is quite ambiguous for interpretation. Someone may agree with this statement because
they are unaware of new discoveries in mathematics. Others may express agreement because they think that other researchers and scientists who work for example in the areas of biology and chemistry contribute more new discoveries than mathematicians’ discoveries.

In addition to examining the teachers’ responses on the survey that was administered on the first day of the summer institute, I also studied the teachers’ responses on some of the same questions when the survey was administered twelve days later. I used Minitab to perform a paired t-test to look for significant differences in the responses prior to the beginning of the professional development program and at the end of the intense two-week summer institute. The test was applied to select responses on questions 16, 19, 20, and 21 which were directly related to my research questions. All but one of the twenty-three focus responses yielded results that were not significant (p>0.05, n=47). There was only a significant difference in the teachers’ responses when they expressed their agreement or disagreement with the statement: “There are different ways to solve most mathematical problems” (p=0.010<0.05; pre-test mean=1.581 and post-test mean=1.286).

Furthermore, I compared the responses of the rural and urban teachers separately and performed a two-sample t-test on the differences on questions 16 through 21. Very few significant differences at the .05 level of significance were recorded. Only two parts of question 16 and one part of question 19 yielded significant differences between the differences of the responses in the rural and urban teachers from the pre- and post-survey. The responses of the thirteen rural teachers different significantly from the responses of twenty-six urban teachers who completed both administrations of the survey on the following questions:

Question 16: How much emphasis will each of the following student objectives receive?

Learn mathematical algorithms/procedures (p-value=0.000)
Learn to perform computations with speed and accuracy (p-value=0.007)

Question 19: Considering your training and experience in both mathematics content and instruction, how ready do you feel to teach these topics at the middle/junior high level?

Computations with measurement in problem situations (e.g. add measures, find average speed on a trip, find population density) (p-value=0.021)

The remaining differences between the rural and urban teachers were not significant at the .05 level. The many large p-values from the two-sample t-test results suggest that there is no significant difference between the pre- and post-test responses of the rural and urban teachers. Based on the survey results there is enough evidence to suggest that the difference in the responses between rural and urban teachers is not significant and that the two groups have similar differences in their responses between the pre- and post-tests. Larger samples and/or further classifications (beginning vs. experienced teachers, middle vs. high school teachers) could possibly lead to significance.

The results of this survey, although somewhat disappointing, are in line with research on professional development. The pre- and post-surveys were administered only twelve days apart, yet the intense workshops did not prompt the teachers to change their core perceptions of the nature of mathematics and their ingrained beliefs about teaching and integrating technology in the classroom. Thus, it comes as no surprise that these beliefs and perceptions continued to guide them as the site coordinators observe their implementation of the CC. These beliefs and perceptions are discussed in further detail in the following sections.
Teacher Comments and Classroom Observations

This section contains a discussion of the teachers’ beliefs and perceptions about professional development and reforms as gleaned from their journals and my classroom observations.

Teacher journals. In addition to the survey data, the mathematics teachers who participated in this study provided further insightful feedback about their responses to and attitudes about standardized reforms and professional development. The teachers completed daily journals during the two-week summer institute in which they briefly reflected primarily on the content and its classroom presentation. The middle school and high school teachers responded to different questions. The instructors for the two groups did not coordinate the journal prompts although the questions focused primarily on the content covered and its classroom presentation. Some of the questions or prompts that were directed at the teachers were: Briefly explain how you have approached teaching proportions in the past and what seems to be the most difficult concepts about proportions for your students to understand; How do you plan to incorporate technology in your classroom in teaching linear functions and other functions this upcoming year; and What can be confusing about PEMDAS. Overall, the use of the journals provided the teachers with the opportunity to reflect on what they learned during the professional development program and reflect on their practices.

Only several questions warrant special attention in this section because the majority of the journal prompts were not closely relevant to the research questions. Of particular interest are the teachers’ responses to the following prompt from the middle-school teacher journals: Things I hope to gain from this workshop are… Twenty-three completed journals were collected from
the middle school teacher group. Their responses to the above prompt were categorized as follows:

(a) Learning about the *Comprehensive Curriculum* (4)
(b) GLEs (1)
(c) Subject matter/content/skills and strategies (4)
(d) Activities (8)
(e) Technology (2)
(f) Problem solving (1)
(g) Several possible unclassifyable alternatives (3)

None of the teachers mentioned being interested in curriculum. They may have heard about the new *Comprehensive Curriculum* activities and probably that is why they were interested in learning about the new activity-based curriculum and activities in general. Thus the teachers’ interest in activities could be interpreted as advanced advertisement for the new curriculum.

The remaining journal questions for the middle and high school teachers focused primarily on content and its classroom presentation. Among the addressed topics from algebra and measurement were the Pythagorean theorem, solving equations and inequalities, patterns and different types of functions. For the most part, the teachers’ responses to these content questions made references to procedural knowledge and regurgitated what was done during the professional development sessions. The superficiality of these answers and the lack of internalization of alternate ways of presenting the content became truly apparent during the subsequent classroom observations.
**Classroom observations.** The classroom observations yielded two sources of data. The first data source was the official observations protocols which contained quantitative data. Along with these protocols which the site coordinators completed as part of the accountability component of the professional development program, they also collected lesson plans, tests, worksheets and other relevant materials. Furthermore, I also kept my own field notes of each classroom visit.

A valuable source of quantitative data for this study, in addition to the survey, was the LaSIP Site Observation Protocol. I completed an observation protocol for each one of my site visits during the 2005-2006 academic year, for a total of almost forty classroom observation protocols. At each site visit when the site coordinators observed classroom teaching they filled out an observation protocol. As part of the observation they were expected to record all instructional strategies and highest level of cognitive activity that took place during every 5-minute observation period. I recorded the data from the thirty-seven observation protocols that I completed in an Excel spreadsheet. I was interested to find out what strategies the teachers used most often in the classrooms that I observed, as well as how challenged the students were to learn mathematics. The following two tables provide information on the types of instructional strategies defined by LaSIP and the highest cognitive level of student activity as well as the frequency with which they occurred.
Table 11

*Classroom Instructional Strategies*

<table>
<thead>
<tr>
<th>Name and Definition of Instructional Strategy</th>
<th>Code</th>
<th>Frequency (number of 5-minute intervals)</th>
<th>(Percentage of overall observation time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Discussion: Students in the context of the <em>whole group</em> do almost all of the speaking. The teacher is a <em>moderator</em>.</td>
<td>CD</td>
<td>524</td>
<td>(21%)</td>
</tr>
<tr>
<td>Teacher is Demonstrating: The teacher is modeling or demonstrating how to complete a problem or activity.</td>
<td>D</td>
<td>118</td>
<td>(5%)</td>
</tr>
<tr>
<td>Hands-on/Minds on Activity: Students are participating in an inquiry or other activity that involves manipulating materials.</td>
<td>HA</td>
<td>48</td>
<td>(2%)</td>
</tr>
<tr>
<td>Homework: The teacher is reviewing a previous homework assignment with the class or has given students time in class to work on homework.</td>
<td>HW</td>
<td>0</td>
<td>(0%)</td>
</tr>
<tr>
<td>Lecture: The teacher talks almost the entire time. If students participate verbally, their interactions are brief questions or answers to teacher comments or questions. “Lecture” may include teacher instructions to the class.</td>
<td>L</td>
<td>101</td>
<td>(4%)</td>
</tr>
<tr>
<td>Learning Center/Station: Students are working at various stations related to particular topics. This may occur in elementary classrooms, in laboratory classes, etc.</td>
<td>LC</td>
<td>0</td>
<td>(0%)</td>
</tr>
<tr>
<td>Lecture with Discussion: The teacher talks most of the time. This differs from lecture in that students are asking and/or responding with more than one word questions or responses. <em>There is a clear exchange going on between the students and the teachers.</em> LD differs from Class Discussion in that there is almost no student-to-student discussion.</td>
<td>LD</td>
<td>527</td>
<td>(21%)</td>
</tr>
<tr>
<td>Small Group: Structured small group with individual roles, group accountability, and group processing.</td>
<td>SG</td>
<td>90</td>
<td>(4%)</td>
</tr>
<tr>
<td>Seat Work: Students are working independently at their desks on an assignment.</td>
<td>SW</td>
<td>648</td>
<td>(26%)</td>
</tr>
<tr>
<td>Teacher Circulating and Interacting: The teacher circulates about the room, <em>interacting</em> with students.</td>
<td>TC</td>
<td>284</td>
<td>(11%)</td>
</tr>
<tr>
<td>Utilizing Digital Educational Media and/or Technology: The unique use of computers, calculators, videotapes, or other types of technology to enhance instruction, not to include viewing overhead projections or word processing.</td>
<td>UT</td>
<td>139</td>
<td>(6%)</td>
</tr>
</tbody>
</table>
### Table 12

**Student Cognitive Activity**

<table>
<thead>
<tr>
<th>Name of Cognitive Activity and Description</th>
<th>Code</th>
<th>Frequency (number of 5-minute intervals)</th>
<th>Frequency (Percentage of overall observation time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipt of Knowledge: Students are involved in the rote reception of information. This generally includes listening to a lecture, going over homework, or watching the teacher verify a concept through demonstration. The key feature in this category is that students are receiving information but not significantly doing anything with the information.</td>
<td>1</td>
<td>21</td>
<td>5%</td>
</tr>
<tr>
<td>Application of Procedural Knowledge: Students apply their knowledge. This typically involves students using what they have learned, doing worksheets, practicing problems, or building skills. The key feature in this category is that students are taking information and applying it or practicing.</td>
<td>2</td>
<td>332</td>
<td>78%</td>
</tr>
<tr>
<td>Knowledge Representation: Students manipulate information. This is usually a step beyond application. In knowledge representation activities, students will typically reorganize, categorize, or attempt to represent what they have learned in a different way. For example, students might take information from a lab activity or written assignment and represent it graphically. The key feature here is the reorganization or representation of information.</td>
<td>3</td>
<td>31</td>
<td>7%</td>
</tr>
<tr>
<td>Knowledge Construction: Students create new meaning. This typically involves creating new understanding or making new connections. Students might be generating ideas or solving new problems. For example, students might be using the results of three different labs and generating patterns that hold true in all three cases. The key feature of this category is that students generate new knowledge or meaning.</td>
<td>4</td>
<td>34</td>
<td>8%</td>
</tr>
<tr>
<td>Other: This category includes activities not included above, principally <em>when no learning is occurring</em> (e.g., during classroom disruptions or instructional time lost to classroom management activities)</td>
<td>0</td>
<td>8</td>
<td>2%</td>
</tr>
</tbody>
</table>

The discrepancy between the total numbers of 5-minute time intervals in both tables is due to the difference in the instructions for each classification. The site coordinators were instructed to record all instructional strategies used in each 5-minute interval and only the highest level of cognitive activity under the second classification. Therefore, there are several times
more responses in the first figure than in the second one. The classification in the first figure was difficult because although there were so many options, there were some classroom interactions which did not fall in either category. One such situation which occurred on several occasions was “students doing work on board.”

These two figures are consistent with my impressions of the roles of the teachers and the students in the rural mathematics classrooms that I observed. On one hand, the teachers’ predominant instructional strategies arranged by frequency were seat work, lecture with discussion and class discussion. The students spent more than two-thirds of their classroom time applying procedural knowledge. The rigidity of the teachers’ presentation of the material and the traditional nature of the classroom power structure ultimately affect the level of cognitive activity observed in the students. On the other hand, none of the teachers used learning centers (more common in science classes) or spent time discussing homework with the students during my observations. [I found out as I talked to teachers during my classroom observations that the majority of the teachers rarely assigned any homework because they felt that the students would not do it anyway.] Students rarely had an opportunity to represent or reorganize information in different ways. They infrequently made sense of new material by constructing their own knowledge and generate ideas. Overall, the teachers acted as the authority in the classroom and the students were mere receptive vessels that were supposed to absorb the information presented to them and apply it to routine problems.

Two additional classroom behaviors which were addressed in the instructional protocols were the effective use of calculators, especially TI-84, and the effective use of models/manipulatives. From the thirty-seven observation protocols which I completed, only eight reported a “definitely apparent” effective use of calculators and four “definitely apparent”
effective uses of models/manipulatives. Neither statement answer allowed for the possibility of a response of “not applicable.” The majority of the time my responses to these two classifications were “not apparent” or “somewhat apparent” or “not applicable.”

These observations of the teachers’ instructional strategies and the students’ level of cognitive activity are in sharp contrast with recent recommendations for classroom practices in mathematics education. NCTM, for example, encourages fostering students’ curiosity especially at the elementary level (NCTM, 2001). Teacher-centered classrooms, like the ones observed in this study, promote submission and uniformity as opposed to the student engagement and development of creativity that teachers should encourage.

The additional materials which I collected during the classroom observations along with the corresponding field notes provided additional insights into the state of mind of the teachers involved in the study. The majority of the written materials which I collected were worksheets or tests. I was struck by the inattentive and casual appeal of these materials. Most of the time they were either handwritten or very faded from aging and repeated copying, so much so that they were difficult to read. Most of these assignments emphasized independent seat work and procedural knowledge of mathematics. Very rarely did the problems deviate from standardized exam preparation format and aim at developing content understanding, effective communication of mathematical ideas, higher-order thinking and problem solving. The worksheets were often taken straight from Glencoe materials as Glencoe controlled the majority of the textbook market in that part of the state. These worksheets presented mathematics in a procedural manner and provided repetitive routine exercises which are more appropriate for independent practice and home schooling.
Several handouts and their content presentations stood out from the monotony of routine worksheets. All of them addressed standard curriculum but in an engaging way. Among the minority of challenging and inspiring assignments were several open-ended and less structured handouts. Robin, an experienced urban high school teacher, provided her students with an M&M activity in which her students made sense of the measures of central tendency—mean, median, and mode—by organizing some data in tables and charts and making initial predictions. On a different day the students were expected to work on their autobiographical icosahedrons. They were instructed to cut out, fold and assemble an icosahedron and then decorate and personalize each triangular face with personal information like their name, family, favorite book, favorite colors, favorite quote and free entries. Meredith, a rural high school teacher, created a multi-question project about statistic associated with the Space Shuttle. This group assignment included clear instructions for the solution methods and a grading rubric.

Another non-traditional assignment at the middle school level pertained to proportions. Nancy presented her students with a complete recipe for Chicken Andouille Gumbo which yielded eight servings. The instructions for the students were to re-write the recipe so that it would feed twelve people. At the high school level Paul gave his students a challenging assignment on inverse functions which employed multiple representations—using the Horizontal Line Test, graphing, tables, and algebraic methods. On a different day he presented his students with an open-ended assignment in which he integrated a current article from USA TODAY.

Following the completion of this assignment Paul noted:

The lesson helped the students understand how math skills in gathering and organizing data in tables and charts associate with journalism topics, business topics, their mother’s plans in going somewhere and would later on influence their decisions of travel in the future. The lesson promoted ownership of knowledge and skills for students. The activity gives the students an opportunity to voice their opinions regarding certain issues. (personal communication, 2006)
Most of these non-traditional assignments were characterized by their emphasis on real-life applications, although some of them were somewhat contrived. Yet, none of the lesson handouts directly referred to the GLEs which they addressed or made a direct reference to the Comprehensive Curriculum and the mandated activities.

**Target Participants’ Views**

This section includes the views and beliefs about professional development of the five target participants (Paul, William, Joanne, Susan, and Andrea) who were interviewed following the first year of implementation of the Comprehensive Curriculum. They share several integral commonalities—they have all been teachers at one time and they started out their teaching careers wanting to be teachers. None of them were really into administration, so they were still thinking from the teachers’ perspective or that of professional development organizers. Another common thread among all five is the LINCS theme. Prompted by my inquiries of their experiences with the No Child Left Behind, the target participants at times commented about the reforms in light of NCLB. Following the individual target participants’ views is the discussion of the themes that emerged in the analysis of the teachers’ and teacher educators’ perceptions of professional development and systemic reforms.

**Paul.**

*Importance of state and national curricula.* Paul describes NCLB as being “all for the students” (162) and challenging for the teachers. He repeatedly said that he was not afraid of NCLB and what it meant for him as teacher. He felt that NCLB targeted especially special education students and that it would especially benefit them. NCLB will mean more work for the teachers but everything is done in the name of helping and benefiting students:
The teacher will have to know, the teacher will have to cater to certain learning styles, to different, various learning styles. So that’s, so, I mean, this will mean more training for me, more knowledge, more information, more professional development for me. And plus that’s more funding for the school, where you can buy all equipment, manipulatives that are necessary for you to teach a lesson, whatever. (personal communication, July 12, 2006)

Paul wholeheartedly supports curriculum change from the top down. For him the changes are bringing many positive aspects for his professional growth as a highly qualified teacher. A curriculum is important because it provides teachers will valuable information such as “how much time and in how deep should you go” (538-539), “this is how you should go, this is what is expected” (539-540). Paul wisely concludes: “you always do better if you know what is expected of you”, which is in contrast to what happened with the CC, where the teachers were not told clearly and unambiguously what is expected for the implementation of the CC.

Paul’s complete personal commitment to large scale curriculum reforms. Paul is very honest as he describes reforms and gives reforms his all. He accepts for granted the claims that professional development is in service of implementing a state curriculum. Paul recalled that at the beginning of the school year that the administrators had the teachers fill out a form for professional development in which the teachers wrote about their professional growth plan. He shared his approach for organizing his goals:

And I always write there everything that I could write, you know, all the things that I could accomplish within a year, and to become highly qualified certified teacher. So, and I make it a point, you know, to do every single step and accomplish every one of them. It doesn’t matter how far in the year it is, the beginning, the end, the middle part, but I make it a point to do that. And it has helped me, the professional growth plan has helped me direct my plan to where am I gonna take, when am I gonna take this test, how many CLUs do I have to earn within this month, do I have to continue studying, or whatever. So it gives me direction and that’s very good. I mean, I think that, I hope that all school districts implement that or if it’s not into law, in Louisiana. (personal communication, July 12, 2006)
Paul feels that some of the teachers he worked with shared his commitment to professional development. Those who are negative say things like “this is too much work”, “the state is asking us for too much,” “we are doing so much already for our students.” He does not blame his colleagues who are not excited about all the changes, “but I would surely appreciate it if they would share the same views as I am as positively as they could with these new laws and with these new policies” (personal communication, July 12, 2006). Unlike most of them, he does not have an immediate family and major obligations outside of his job. He considers himself fortunate that he can focus on his job: “my main focus is basically myself, my own career and my professional development.”

When speaking about a curriculum in general, Paul says that “you always have to change your curriculum. The curriculum has to be dynamic. The generations, I mean the years change, the students change, the technology change, so does your curriculum” (personal communication, July 12, 2006).

Paul has high expectations of teachers in general: “everybody has to have some sort of background in curriculum writing, in understanding curriculum, and implementing curriculum” (personal communication, July 12, 2006). Somehow he assumes that all teachers are as driven and well-prepared as himself. Paul wished he knew how other states are doing with the implementation of a state-wide mandatory curriculum. He also expressed a desire to have a “national norm for curriculum,” “a national framework for curriculum.” The existence of such national norm or framework would ensure that the students are challenged. Paul thought that such a national framework would be similar to what NCTM offers and it would be for all subject areas, but not all states recognize the NCTM standards. If such a national framework for all subjects existed, the states would base their curriculum on it “but still tailor their own curriculum
to their state’s needs.” Different states have different needs, for example, farming might be a priority in Louisiana, but if students moved from one state to another they would not be at a disadvantage or deprived because they would still be learning the same things. Such students would face “a big barrier” and they would be likely to misbehave because they were not taught the same material and in the same way. With the Comprehensive Curriculum at least if a student moved from one school in Louisiana to another school in the state “they are learning the same skills” (personal communication, July 12, 2006). Paul wished that this uniformity could be extended for the whole country and not just on a local or state level, “We could target the same skills, we could do research because it’s nationally accepted.”

Paul thinks that having a national framework for all subjects is doable. He gives China as an example of a country that has such a framework. He dismisses that “the communism form of government is better in terms of education compared to democracy” (personal communication, July 12, 2006) and states that “freedom to learn is always the better.” In order for the United States to be “competitive with the rest of the world” there is a need for changes in education that would make things more united. Paul assumes that the changes are made for the betterment of the students:

We are fighting for our kids, we always have one, we only have one purpose: How are we gonna educate our kids better? And there’s no other purposes other than that. So why can’t we work all together towards that single purpose? (personal communication, July 12, 2006)

Paul’s responses to curriculum reforms and the associated professional development characterize him as an exceptional mathematics teacher. Not only is he fluent of the content but he was an extraordinarily positive attitude about all the changes that he faced for several years.
William

**Performance levels.** William is keenly interested performance levels and they influence his opinion on a variety of issues, including NCLB. When talking about NCLB, William identifies that “it’s definitely added pressure to what we’re doing” and “it’s made our work a little more difficult” (personal communication, July 19, 2006). However, he does not dismiss NCLB and says that the federal and state governments should expect more. In response to such mandates, Louisiana implemented its own testing, the LEAP and the newly introduced iLEAP. There are some problems with the tests, especially for students who start out at a very low level. They may not pass the tests, yet they may still learn a lot and improve a lot. So although the students do not pass the tests, that does not mean that the teacher failed in teaching them and bringing them to a higher level, “so you have to kind of keep things in perspective.” For example, the Bayou High School’s mathematics scores have significantly improved, but they used to be so low that there still is room for improvement.

William thinks that in the same way that some teachers hate the CC, some teachers also hate standardized testing because of the pressure. While he acknowledges that there are negative aspects of standardized testing, he wonders what teaching must have been like before the standardized tests. He thought that students may have graduated who could not read, “who had no business graduating high school” (personal communication, July 19, 2006). Their teachers may have been so fed up with them that they passed them because they did not want to have them in their classes for another year. With the rise of standardized testing the students could no longer graduate just because they got passing grades. Now they have to pass a test. William feels that the students who cannot pass the LEAP or GEE tests probably should not have a high school diploma anyway. He thinks that the tests are not difficult: “if you half-way paid attention
and you’re half-way on grade level” (personal communication, July 19, 2006). The standardized tests have “caught” many students who were graduating and prevented them from graduating before they were prepared.

When I asked him about the impact of the NCTM standards on his teaching, William acknowledged that he had a copy of the NCTM standards but he vaguely insisted that he mostly teaches from the LA content standards. Because the NCTM standards were introduced “before my time”, William was not very familiar with them. However, he remembers the GLEs being first introduced during his first or second year of teaching. For him, the GLEs “simplified the [LA] content standards … with all the letters and the numbers, they can be a little bit confusing” (personal communication, July 19, 2006). William feels that the GLES relieved him from having to delve into the content standards because he still felt like a “rookie” during his second year on the job.

William admits that there are some challenges to teaching in a rural area and he points out that many teachers may use that as an excuse. One of the main disadvantages is working with students who are underperforming and may not perform as he would want them to perform. However, he finds that this observation does not serve a purpose and tries not to focus on that. “So what we do is we focus on doing what we can do, not being scared of change, trying new things, trying to better your own self as far as your teaching practices go, and that’s why it’s a big push in our school to get as many teachers involved in summer workshops as we can” (personal communication, July 19, 2006). He described the teachers as “keeping ourselves busy trying to keep a bit of an edge to try to help our students do better because we know that they need it, because we’re weaker compared to maybe students from other areas.” After observing William’s classroom on several occasions I felt like much of what he said sounded to me too
much like slogans and seemed contrived. I am sure he had been hearing such talk over and over at endless meetings, but he does not seem to have sincerely internalized it. This reminded me of visiting the school around the time of the standardized tests in March when I met a group of students who were involved in making cheers, raps and posters for the school to boost the school spirit and pride in preparation for taking the state tests. I wished they had spent that time seriously preparing for the exam instead.

If there were a national curriculum, William feels that the students in Louisiana will not be able to keep up with the students in other states who are already doing better than them: “I think there’s too much disparity between regions for a national curriculum right now” (personal communication, July 19, 2006). Furthermore, he felt that establishing a national curriculum would lead to a national test. William was unsure how Louisiana’s iLEAP would compare with other states’ tests.

**William’s involvement in professional development.** William became involved in the PDM professional development project through Bayou HS which is a LINCS school. Ms. Shakleford who is the regional LINCS coordinator had told the teachers of that opportunity and encouraged them to participate just the way she told them about the CSI project that summer. William found PDM “really good, really helpful, enjoyed it” (personal communication, July 19, 2006), however he could not elaborate about what the specific aspects of the professional development program that made it so helpful and enjoyable. PDM was just one of numerous opportunities for professional development for LINCS schools: “When you’re a LINCS school, you, man, you just have all this information coming in so if you’re interested in going to workshops and interested in professional development, the opportunities are there” (personal communication, July 19, 2006).
William liked that the professional development projects were “real focused on one area.” For example the first year PDM was focused on geometry, the second the emphasis was algebra and measurement (he couldn’t remember the focus in the most recent year!). He enjoyed being able to spend two weeks on a focus area. He liked that there was not too much covered and “it wasn’t too spread out” (personal communication, July 19, 2006). In general, he likes professional development that is focused, in depth, and he can really spend time on one area, “wrap your mind around it.”

The third summer that he participated in a professional development project was at another university. The CSI project there focused on reading and comprehension across the curriculum. William was excited about this because he knew that on the standardized tests the students did poorly on reading every year and that has been their weakest area. In order for the students to begin to do better on that part the teachers would have to start teaching reading “on a certain level in all the classes” (personal communication, July 19, 2006). William was determined to “find ways to incorporate that [reading] into my class.” He has noticed over time that when he teaches the Pythagorean theorem his students can do all kinds of computational problems as long as it is not in the form of a word problem, in which case “they don’t have a clue.” William explains this observation with the students’ lack of reading comprehension. Another problem that he has noticed is that when he finishes several topics, say, Pythagorean theorem and two-step equations, and gives the students a test over the material where the problems are all mixed, “they have trouble with it” (personal communication, July 19, 2006). William does not have an explanation for the students’ inability to do problems they have previously been able to do but he knows that the students are seeing the problems like this, mixed up, on the LEAP test where “they throw it all together.” William is committed to making
this a focus for this year: “When we finish something to not just leave it” (personal communication, July 19, 2006). He hopes that he will see an improvement in his students’ performance by revisiting previously studies material.

William ties his professional development experiences to student performance levels. If students are weak in reading they are usually weak in mathematics. William knows that on the standardized tests there are plenty of problems that are “written in word problem form” (personal communication, July 19, 2006). Students have to read the problems, and those who are weak readers will be affected by that, they will likely have lower test scores. William is confident that with the many CC activities there will be opportunities to incorporate reading in them. For example, he is considering asking students questions in written form following an activity about what the activity was about and what they were trying to accomplish with it.

**Joanne**

The role of LINCS. Joanne credits the Learning-Intensive Networking Communities for Success (LINCS) program with many positive changes at Bayou High School and throughout the state. She feels that when teachers are given their students’ state test scores, the teachers tend to look at individual scores. LINCS, on the other hand, offers the teachers a chance to look at the big picture. They can figure out what the weakest overall scores are (for Bayou High School those were in the area of vocabulary) and notice that every subject works on vocabulary to some extent. In such cases LINCS helped the teachers and administrators to identify a focus in improving their students’ scores. This process took more than a year at Bayou High school to figure out exactly how things worked with LINCS and what the teachers were supposed to be doing but they have seen increased test scores every year since Bayou HS became associated with LINCS:
But as we studied and we realized where we were headed, we actually had a focus for where we were headed. We knew what LINCS was about and what we needed to do in here and then go back to the classrooms and do it. I feel that it’s that going back to the classroom and implementing, and then coming back and discussing how this worked or didn’t work, or what we can do to improve. And knowing where that’s leading based on the scores that has really helped” (personal communication, July 17, 2006).

After Joanne’s first year at Bayou HS, the school was no longer in corrective action (also known as “school improvement 1”). Joanne credits the schools’ association with LINCS in the past three years and the teachers’ hard work to a large extent for that success:

Just like anything else it takes hard work, you know, change is difficult but because they were so willing to do that and so hated that stigma of being in corrective action. The students too, you know, the students didn’t want that label. They didn’t want to be in corrective action and so they worked hard too. And the teachers said to them, ‘We’re doing this because we don’t want to be in corrective action anymore.’ And they were willing to put forth extra effort. (personal communication, July 17, 2006).

Bayou High School had also undergone a change in personnel during that time and “teachers realize how important the tests are now”, so they were probably working a little harder. Although the mathematics test scores have been going up every year, “they are nowhere near where we would like them to be” (personal communication, July 17, 2006). Joanne believed that her Bayou HS can be one of the top 5 school in state test scores, “but it takes a lot of hard work and you don’t do that overnight. You know, you have to look at reforms and things that you know work, or that had been proven to work, and use those ideas” (personal communication, July 17, 2006).

During her first year at Bayou High School the superintendent approached Joanne about LINCS. At the time she did not know anything about LINCS. They talked to some other people and conducted some initial research and found out that LINCS was a state grant and that they could chose their focus. Since they had already identified math as the school’s weakness, they decided to focus on math. After that Joanne began attending LINCS training sessions and
workshops where she was taught math lessons. Also as part of LINCS she attended LaSIP projects at two regional universities. Joanne particularly enjoyed the community spirit when all the teachers get together and discuss the problems that the students have with math and how to solve them. Even the teachers who do not teach math become involved for example in how to improve the students’ reading skills or vocabulary because they know that all of this will have an impact of the students’ math performance. Joanne also likes it when she goes back to the classroom after these brain storming sessions and observes how the teachers are implementing the suggestions, and she likes helping them. She especially like that the other teachers seek her advice and trust her to help them. Joanne credits the LINCS group meetings for inspiring the teachers to go back to their classrooms and trying new things.

Recognizing that what they had been doing was not working and that Bayou needed to get out of corrective action allowed the teachers there to be open to new ideas—they embraced LINCS, and sought and accepted Joanne’s help as a facilitator/coach:

Nobody knows everything about teaching. I don’t care how good a teacher you are, how good an educator you are, you do not know everything, and you can always learn something new. And I think it was that openness that they had, that willingness to try something different that has really helped to turn them around. (personal communication, July 17, 2006)

Joanne enjoys the camaraderie in the LINCS study groups and professional development projects like PDM where the teachers get to share ideas. [I did not notice much of a camaraderie in PDM except when the teachers would try to cheat together about when they got back from their extended lunch breaks so that they would get paid although they were not at the workshop on time.] She liked being able to talk with other teachers, generate and exchange ideas. Joanne finds these exchanges to be

An excellent way to grow professionally. Anything you do as far as learning, to me, is going to help you in the classroom. My philosophy’s always been that I love to learn no
matter what and I hope that all the other teachers are that way. (personal communication, July 17, 2006)

Joanne thinks that teachers who have had good experiences with previous professional development projects are excited about future such projects. Teachers like to enjoy the professional development projects and get something out of them—something different, some new information. Such professional development gives teachers the opportunity to work together and also allow the schools to work together with the university. Teachers would be asking themselves what they need to do to get their students ready for college classes and what they might be lacking. When teachers hear from the college instructors some of the areas in which college students are lacking, the teachers can try to fill in these gaps in high school.

Since PDM was only available for two years, instead of the projected three years in the initial proposal, Joanne had to attend a different professional development program in the summer of 2006. She planned to attend a week-long CSI project at LA Tech which would focus on reading across the curriculum. She was going to attend this professional development with a science teacher and the middle school math teacher, Mr. Allred, from Bayou HS. Although this professional development project is for LINCS schools and their teachers, teachers from any high-needs school are allowed to attend, especially since the whole Morehouse parish is considered a high-needs parish. Joanne is unsure how exactly a school is labeled as a “high-needs school,” but she thinks that probably district scores (test scores) and economic status are the main factors.

**NCLB.** Joanne finds LINCS and NCLB to go hand-in-hand. NCLB expects teachers to find where the students are and work from there. LINCS expects teachers to look at the test scores and identify the strengths, and capitalize on them, and also identify the weaknesses, and work on improving those. Joanne likes that the NCLB also places a focus on special education.
because many times these students are labeled as ones that cannot learn anything. Many times these students are neglected, expected to “just sit in a room color and cut out or whatever” (307), instead of being expected to learn like the rest of the students. Instead of giving up on these students, teachers need to find out where these students are and how they can reach them and teach them. As a result of NCLB, most of the special ed students are back in the regular classrooms, “where they really have to struggle” (personal communication, July 17, 2006). Joanne thinks that it will get easier for the special ed students as they go along, and especially if they start at regular classrooms from the earlier grades and get individual help in addition to what they learn in the regular classrooms. According to Joanne, both NCLB and LINCS focus on the students and learning, and do not give up on anybody. Teachers can no longer let the weak students just sit back and do nothing. They have to find ways to reach to these students and NCLB and LINCS are pushing them to do just that.

After the signing of NCLB into law, Bayou HS and other rural schools have seen many positive changes. Prior to NCLB, rural students “rural students were thought not to have the ability that other students had and so they were just kind of there to do whatever they could” (personal communication, July 17, 2006). There has been a shift in this thinking, and instead of thinking that the students and their SES and their geographic location are the deciding factors for their success in school, now it is the teacher who has the biggest influence on what happens in the classroom. The teachers need to have high expectations of their students, such as that the students will go on to college, if they expect the students to be successful, “we’re all here pulling, tugging, challenging, trying to get them to do better, to do more, to do better” (personal communication, July 17, 2006). The teachers need to believe that their students can be as successful as students anywhere else. Joanne thinks that most of the teachers know how
important it is to have high expectations of their students. Joanne cites some research that supports her beliefs that “they can learn just, they can, will, and do learn just the same as any other student” (341-342). NCLB has changed how educators look at students, because according to it all students are equally valuable and important.

Joanne thinks that NCTM helps to raise the standards, and in a way provides a bigger picture. Instead of looking at individual or local things, it sets the standard for the entire nation, “OK, this is what they need to know, and this is what we can do to help them get there” (personal communication, July 17, 2006).

*Professional development.* Providing professional development is one thing that administrators, school districts and the state department of education can do to improve rural education in Louisiana. Joanne feels that they are doing that already. Teachers feel that do not have a voice and that no one is coming in their classrooms to see what they are doing, “nobody really understand the situation” (personal communication, July 17, 2006). This leads to a disconnect between the teachers and the administrators. Teachers are saying, “it’s easy for them to sit in their Ivory Towers in Baton Rouge and tell us what to do. But they need to come and see what we’re doing and what’s going on.” Administrators need to show teachers that they care and they can do that by meeting and talking with teachers; “lending a listening year” (personal communication, July 17, 2006) would improve morale. It might be enough for teachers if administrators were to say, “OK, I can’t solve all your problems, but I’m here to listen, so if you have something to talk to me about, I’ll see if I can work on that, but I just want you to know that we’re here to hear what you have to say.” Rural teachers also have many after-school responsibilities, such as helping out with sports. These additional demands of their job as rural teachers would leave them almost no time to spend with their families.
Rural teachers would benefit from having extra planning periods to prepare for their many different classes. So rural schools may need to hire a few extra teachers to try to ensure additional planning periods. Unfortunately, the state department of education usually looks at the student to teacher ratios and not the teacher’s load in terms of preparations.

In order for teachers to benefit the most from professional development, it needs to be “practical, hands-on techniques that they can use in the classroom” and “has to show you how to do that [methods that anybody can use] and that you have a time to practice and internalize that before you go back to the classroom” (personal communication, July 17, 2006). Joanne also thinks that teachers need some help with classroom management and discipline problems. However, if the teachers “use the proper teaching techniques, teaching methods where the students are involved,” they will not have to worry much about discipline problems.

Professional development needs to focus on content. If the professional development focuses on teaching methods, they could be applicable to all subject areas and not be subject-specific.

The professional development sessions should be during the school day because teachers are already so busy that it is too much to expect them to stay after school or come on weekends. Summers are a good time for professional development, although teachers have less and less time during the summer, “teachers are giving up their summers now” (personal communication, July 17, 2006). “But most want to learn, they really do, they want, they’re hungry for that good professional development;” teachers are “just really hungry for good practical working ways to do things.” Joanne recently returned from a week-long professional development workshop at a regional university and she was glad to see that the other teachers there were excited to go back to their classrooms and try some of the things they learned there. She found this workshop especially helpful for social studies and science teachers who teach traditionally: they lecture and
expect their students to take notes. The teachers learned some techniques that would allow them to get away from this way of teaching. They tried the techniques during the workshop and found them to work, so now they hope that these techniques would work with their students. Sometimes teachers get turned off by professional development workshops because they are exposed to things that are very different from what they normally do and they may feel that they are being told how to teach their classes.

Joanne has noticed when she observed classes that some teachers do not have the needed content knowledge “in most of the major subjects” (personal communication, July 17, 2006). This lack of content knowledge could be due to the fact that especially the elementary and middle teachers have to “have a wide range of knowledge rather than just math.” Joanne felt like sometimes she picked up the new material much faster than the mathematics teachers at the professional development workshops that they attended together. Joanne’s suspicions were confirmed when she did better on the tests that the math teachers took as part of the professional development workshops. She wondered how she did so much better than teachers who teach that material and she has been out of high school for more than thirty years. Joanne does only arithmetic—addition, subtraction, multiplication, and division, and she feels that she does not use the more advanced subjects and topics, like geometry. She is puzzled by this discrepancy and wonders whether teacher education programs “need to maybe up their standards” (personal communication, July 17, 2006). Joanne is also disappointed that some of her colleagues speak incorrectly or poorly, for example using “might could”, “I seen”, and “ain’t.” She feels that teachers need to set the tone for the students and they fail to do so when they speak improperly, and do not try to correct and improve themselves.
In conclusion, Joanne found the social aspect of working with other teachers very important for her personal professional growth. She enjoyed participating in interdisciplinary study groups and the resulting openness and sharing of ideas. Joanne thrived in the LINCS-type activities and benefited from the practical nature of the professional development programs.

**Andrea**

Andrea is intrigued by the possibilities behind professional learning communities, especially “to really bring about some really good, lasting, deep change” (personal communication, July 10, 2006). According to her, NCLB has completely changed the definition of professional development. Just attending a conference is not good enough any more. The professional development needs to be “job-embedded and needs to really have an impact on your classroom; it needs to be sustained over time.” NCLB expects a greater collaboration among the people responsible for the professional development and the school districts, as far as aligning the professional development programs with the school goals and needs.

**LINCS and professional development.** The Learning-Intensive Networking Communities for Success (LINCS) Professional Development Process was a result of the NCLB legislation. “And it was an effort to try to bring professional collaboration into the schools and to do what is called sustained, deep professional development” (personal communication, July 10, 2006). The Louisiana Systemic Initiatives Program (LaSIP) was already in place prior to the formation of LINCS. LINCS schools always received first preference to participate in LaSIP projects. These include a sustained developmental course with academic year follow-up. There are also whole-faculty study groups.

The professional development for LINCS schools is at almost no cost to the schools, because even the substitutes are reimbursed through the grant. The faculty who conduct the
workshops are also paid through the grant and the teachers are reimbursed for their travel. The professional development is funded through several funding agencies: the state department of education, NCLB money, LINCS.

**Andrea’s involvement in professional development.** Andrea is familiar with recent research on professional development which suggests that it should be school- or district-based. Professional development should work in collaboration with the school improvement plans and overall goals. A professional development project should take into account the strengths and weaknesses of a school. Maybe each district will have an office that organizes the professional development for that district and contracts professional development programs like the one at ULM for school-specific workshops. The PDM project is an example of a professional development that is trying to serve teachers from six different districts that have different needs and thus offers “one-shot-in-the-dark workshops” (personal communication, July 17, 2006). The emphasis can be on increasing content knowledge, but the responsibility for that improvement can lie with the districts. The kind of workshops that are available now, like PDM, leave the site coordinators feeling like outsiders. This is especially true of Andrea’s interactions with the principals when she introduced herself and described the project to them. They were mostly courteous and listened to her, but left her feeling like an outsider because she wasn’t associated with the district in any way. So she did not feel that they were interested in cooperating in any meaningful way other than tolerating her presence on occasion. Andrea also referred to research that suggests that many traditionally minded administrators “don’t really see professional development as a means toward improvement” (personal communication, July 17, 2006). According to Andrea, what she reads in the research on professional development is true of the districts that we work with: “I was reading, and I think I mentioned before, about the fact that
leaders in our district don’t see professional development as a tool towards school improvement” (personal communication, July 10, 2006). Professional development is seen as a venue for teachers to get some new activities, but not really as a significant way to impact school improvement. So PDM was seen as a way for the teachers to make some money in the summer: “OK, the teachers went, they did what they were supposed to do this summer and they made their money for the summer, and this is part of the deal—these people will have to come into their classroom” (personal communication, July 10, 2006). That was the attitude shared by the majority of the school principals. Very few of the principals considered this professional development project to be of some significance.

The professional development program that Andrea works for offers several different types of workshops. There are projects like PDM, which are summer institutes with academic year follow-up. They also sign contracts with schools and offer workshops based on what the schools needs are (with no return visits). Then they also have contracted workshops that have return visits and the teachers get feedback from the site coordinator that is related to what they learned in the professional development project. Despite her limited involvement with the third kind of professional development project, Andrea felt that that was the most effective one.

**Andrea’s perceived potential.** According to Andrea, professional development is one of the best tools that rural districts and schools have at their disposal. She wishes that people would see the potential in professional development and put more effort into it. When they realize how important professional development is for their district, and how it can help with the school goals, they should be willing to spend money and time on it. Andrea thinks that we actually need a national curriculum, so that “we can get on one page” (personal communication, July 10, 2006). Currently “the curriculum has been criticized as being a mile wide and an inch deep.”
The teachers have to teach too much material and they do not “allow students extra time because often times re-teaching is a luxury.” There should be manageable expectations of teachers, because now they are expected to teach too much material and too quickly.

Another possible direction for future professional development projects that will not require a lot of resources is the forming of professional learning communities. School faculties need to sit down together and identify the general issues that they need to work on and consider possible solutions. This kind of interaction would give everyone a chance to get involved and contribute to the school-wide discussion. These group meetings could identify content-specific needs, like specific content workshops, but overall the solutions would be holistic in nature. Andrea feels that offices for professional development programs like Bayou Regional Educational Academy for Math and Science will still have a place in the professional development of teachers in the future, but their role in relation to the district needs to change.

Susan

*Meaningful professional development.* Susan has observed a great change in teachers’ attitudes toward professional development. NCLB forces teachers to participate in professional development, and they are no longer interested in professional development. In earlier years, teachers were competing for participation in professional development workshop. Now it seems like the incentives, usually in the form of stipends, supplies and college credits or credits toward the “highly qualified” status are never enough to entice the teachers to participate in such activities. Susan agrees that all children deserve to have highly qualified teachers. She finds the current emphasis on testing to “extinguish the love for teaching”, narrow the curriculum and stifle creativity. Susan sees a different form of professional development, one that teachers
actively have an input it, as more effective than the current one-size-fits-all model. Susan wants to see good teachers being encouraged, and administrators being better trained.

Professional development should be connected and related to the teachers’ classroom practices. Susan found reflecting on her own practices to be important for her growth as a teacher. She favors professional reading and study groups as ways to reflect. Teachers need to want to improve their practices and better themselves in the classroom, to be motivated themselves. Many teachers think incorrectly that once they graduate, get their certification, or achieve a “highly qualified” status, they are done. They don’t realize the need for lifelong learning and improving. By wanting to be better at their jobs, teachers show respect for themselves and the job, and will be treated as professionals by others. Teachers can begin by dressing in a presentable way when teaching.

**Importance of teachers’ content preparation.** Susan feels that prospective teachers need a better content understanding before they graduate and not require professional development training to make them *adequate* for the job. The professional development that she helps organize is always influenced or grounded in the national standards. Even if the emphasis is on the state standards, these standards are based on the national standards. Susan blames the standards to some extent for the mediocrity that she sees in classrooms, because the standards force the good teachers to come down to these standards while the bad teachers need to rise to them. Susan is skeptical about National Board Certification which is highly encouraged in Louisiana, because she is familiar with recent research that concluded that there is not a positive correlation between NBC and student achievement. Furthermore, there is not a positive correlation between professional development and student achievement.
Teachers need to be knowledgeable about both content and pedagogy. Susan finds teachers who don’t know the content to be “dangerous” because of the impact they can have on students. Keeping the students’ attention and being energetic and dynamic are not enough when a teacher lacks the content knowledge.

**The administrators’ role in teachers’ professional growth.** Supportive administrators are a key factor for teacher development and success. They would encourage teachers to grow professionally, for example become involved in professional development, and they would also respect the teachers’ decisions and initiatives in the classroom. Such administrators will have high expectations of the teachers, because they would be committed to student success and student learning, and they would desire the best for the students. Susan felt that when she had a supportive administrator, she was motivated to work harder. Her administrator listed to what needs she had as a teacher and tried to accommodate them, for example by giving her a planning period. She felt respected and appreciated, and wanted to do what is best for the students that taught. She liked being treated as a professional.

Susan claims that at the time of this study Louisiana had one of the most “extensive assessment systems” (personal communication, July 7, 2006) in the country. It was designed so that teachers can track their students in different subjects across time, and use this information to improve their instruction and hopefully reach out to more students, and identify their weaknesses and help them to learn better. Many principals are insecure and feel uneasy about the teachers having access to such information and prevent the teachers from accessing these databases by not giving them the information needed to log in.

Susan finds that teachers need to be knowledgeable about both content and pedagogy. Teachers who do not know the content are “dangerous” because of the impact they can have on
students. Keeping the students’ attention and being energetic and dynamic are not enough when a teacher lacks the content knowledge. Susan feels that rural teachers in Louisiana are among the lowest paid teachers in the country. If they were paid more, they might actually care about what they do more.

Overall, Susan fights to eliminate mediocrity in the classroom. She proved this by being very interested in science and teaching science well and for these efforts she received the award for best teacher in the state about twenty years prior to this study. As a professional development organized she can span out and be more effective by reaching many different mathematics and science teachers. Susan uses professional development as a tool to get good science teaching in the classroom.

**Themes**

*Teachers’ responses to standardized reform and enforced compliance to standards.* As I had expected, the teachers’ responses were quite mixed. What some perceived as promising and encouraging, others deemed as dooming and stifling. The teachers’ growing negative responses to the reforms fell in two broad categories: resignation and subterfuge. For the purposes of this study, resignation denotes accepting and unresisting attitudes. Subterfuge refers to an expedient strategy to evade a rule or escape consequences or hide something. While some of the teachers’ reactions to the reforms could belong to both categories, they are placed in the one that best describes them. Following are the accounts of the teachers’ negative and positive reactions. The teachers’ recommendations for future reform implementation conclude this section.
Unanticipated Responses.

Resignation. This study coincided with the first year of the state-wide implementation of the CC. By that time the teachers were becoming increasingly aware of the expectations and consequences of NCLB and therefore were doing what they could to become “highly qualified.” There was a growing confusion among teachers about what exactly they needed to do, especially for those in middle and high school, to gain this status. For example, a teacher may be certified but not highly qualified. Thus many of the teachers were working on a combination of prerequisites which consisted of university courses, continuing learning units (CLUs) and teaching experience, in addition to trying to initiate the implementation of the CC.

The teachers who participated in this study were used to being a part of professional development programs and frequently attended workshops and seminars. However, they were growing tired of the generic professional development activities that were not geared toward meeting their specific needs. As a result of this problem the professional development organizers and coordinators found it increasingly difficult to motivate the teachers to take part in professional development activities. The teachers were not openly resisting the increased expectations for participating in professional development activities, but the majority of them were not embracing them either. This showed in their lack of participation, expressed desire to do minimal work, and avoidance of challenges. Several teachers even admitted to just being there so they would make some money in the summer. The teachers were expected to participate in so many professional development activities as part of their departments, schools, and parishes that the incentives, which were usually in the form of financial compensation, credits/hours toward the “highly qualified” status and continuing learning units (CLUs), or classroom supplies,
were not enough to encourage them to participate, or become more actively involved and
genuinely interested in these programs.

As previously indicated in this chapter, the teachers’ responses to what they perceived as
top-down mandates varied widely, but overall all of the teachers expressed at least indirectly
some frustration with the recent changes and the lack of control they had in their own
classrooms. They expressed this frustration in resisting the changes they were supposed to make
to their teaching in implementing the CC. The forms of resistance varied widely. In extreme
cases, teachers decided to give up teaching or take an early retirement as opposed to changing
their ways of teaching. Some teachers considered relocating and looked for jobs in other states.
For the most part, the majority of the teachers exercised some resistance as they attempted to
implement the CC in a way that was meaningful for their teaching and their students. Some
teachers took advantage of the professional development opportunities that were offered and
learned new ways of teaching their students, for example, implementing hands-on activities and
incorporating reading with their mathematics instruction.

Subterfuge. The teachers acknowledged the existence of standards, reforms, and
authority. Many claimed to be familiar with the expectations of the new reforms. However, they
failed to truly incorporate the standards in their teaching, consistently act upon the reforms, and
obey authority. The teachers were becoming increasingly aware of the existence of national and
state standards for the teaching of mathematics, but they still struggled to fully comprehend what
these standards meant for their teaching and their students. This lack of internalization of many
of the changes and mandates was especially evident in the discrepancies between the teachers’
professed familiarity with the expectations placed upon them and their classroom teaching.
Overall, the reforms and changes that the teachers faced were causing them to feel that they were
not respected and that their work was not valued. Additionally, because of the students’ poor performance on the standardized tests due to their below-grade-level status, the teachers felt that they were failing to teach their students what they needed to know.

The implementation of the Comprehensive Curriculum proceeded with mixed success. Some of the teachers were open to the changes and welcomed the help they were offered while others wanted to figure things out on their own and refused help even when they were clueless. The teachers who sought some help were not willing to put aside everything that they normally did in their classrooms prior to the Comprehensive Curriculum.

Some teachers were uncomfortable with the changes and found the demands too overwhelming. They were unhappy and confounded because they could no longer cover the material in the order in which they were used to, they were denied the opportunity to use their tried-and-true lessons and activities, and they were forced to get used to new activities and implement them with their students. All of the new demands significantly increased the teachers’ planning time. In addition, the teachers had to keep up with professional development activities and the continuous changes to the implementation instructions and confounded expectations from their parishes and the Louisiana state department of education.

From the teachers’ perspective, the actual implementation of the CC revealed a multitude of shortcomings of the curriculum itself and the plans for its implementation. After working with the Comprehensive Curriculum for a year, teachers and educators were disappointed that the new curriculum was not really comprehensive and that there was no time built into the curriculum to review and re-teach concepts that the student missed. Some teachers did not find the Comprehensive Curriculum innovative because they had better and tried activities for their students that were not included in it. Others were upset because they were not allowed to make
decisions about the activities that would work best for their students. The teachers felt that their creativity and autonomy were taken away from them and they were being told what to do instead of being allowed to pursue what they knew would be best for their students. The teachers did not like the confusion caused by the implementation of the Comprehensive Curriculum and the fact that it did not come with ready-made problem sets and worksheets. Furthermore, some of the teachers felt pressured to give unit exams in a certain format and submit these to the district where they suspected that no one looked at them.

By January 2006, midway through the academic year, most teachers had abandoned the new curriculum. In part this was due to pressures to raise test scores for the upcoming administration of the Louisiana Educational Assessment Program (LEAP) and Graduation Exit Examination (GEE) state tests. Both middle and high school teachers were affected by these tests because LEAP was administered at the 4th and 8th grade level, and the GEE was for grades 10 and 11. In some sense, this abandonment of the implementation of the CC is the form of rebellion that these teachers chose as their response to the top-down mandates. From the very beginning of the academic year some of the teachers decided on their own, without consulting their superiors, how to use the Comprehensive Curriculum. For example, one of the teachers determined that it was not feasible to do every activity and he picked the ones that he felt would benefit his students and enhance his teaching.

One of the biggest concerns that the teachers expressed, which they also shared with the on-site coordinators, was their inability to grasp the “big picture” of what was going on in the schools at the state level. The teachers kept receiving mixed messages from the various districts about what they were supposed to do with the Comprehensive Curriculum. They could sense the confusion with the new curriculum even at the higher echelons and knew from previous
experiences that the state department and the districts would not be able to keep them closely accountable for using the *Comprehensive Curriculum* in their classrooms. Many of the teachers were not even aware that different districts interpreted the implementation of the *Comprehensive Curriculum*. They became aware of the varying expectations and mandates only when they had a chance to talk to other teachers at the professional development meetings and with the on-site coordinators during their classroom visits.

The teachers felt disconnected from the administrators and decision makers. They felt that they did not have a voice and that no one was coming to their classrooms to see how things were going. Although there were monitors who came to check on the implementation of the *Comprehensive Curriculum*, they were usually fellow teachers. The teachers felt like they were being told what to do and they were bombarded with demands, yet only teachers could truly understand what their fellow teachers were going through. The administrators needed to show teachers that they cared at least by listening to the teachers’ experiences and concerns, and thus boost the morale. This disconnect between the teachers and the administrators were voiced by both teachers and teacher educators.

Teacher worries were affected by lack of experience with reforms and in the classroom. The teachers who had a strong mathematics background were less worried about using the new activities. The situation was similar for those teachers who planned ahead for the implementation. They were better prepared to see the big picture as well as modify the activities that were unclear or contained incorrect information. Many of the veteran teachers, who had taught more than 20 years, were happy and content with their students’ test scores and the CC was too much of a disruption for their lives and jobs.
Anticipated Responses. Despite the negative comments and criticisms of the CC and the way it was implemented, teachers found some positive aspects of the reforms. In that sense the NCLB Act had the potential to bring positive change for teachers who were interested in their students’ learning and dedicated to their teaching. Its main focus was on improving student learning, although the teachers may find implementing the NCLB challenging. This legislation increased the workload for teachers but this was done in the name of helping and benefiting the students. This meant more training and professional development for teachers so they could cater to the students’ various learning styles. As teachers prepared to meet the expectation of NCLB they welcomed the promise of more funding for their schools to buy necessary equipment and manipulatives.

Teachers who had a positive disposition about mandated changes and believed that the reforms would lead to improvements benefited from the offers for professional development and realized personal growth as teachers. For example, one of the on-site coordinators reported that overall the teachers were more willing to seek and receive help the year the Comprehensive Curriculum was implemented compared to the previous year. The teachers welcomed any chance for feedback in the form of classroom observations and monitoring. These included taking a closer look at students’ test scores and analyzing the areas in which the students performed adequately as well as the weaker areas that needed improvement. Teachers who remained positive about the changes used the suggested materials, lessons, and activities, and found them helpful and useful in teaching their students at least for a short period of time. These positively minded teachers also took advantage of the available professional development opportunities. Such teachers recognized the efforts made by their schools and parishes to ease the transition to the new curriculum and the increased assessments.
Some teachers liked the increased accountability and welcomed the changes it brought to increased student learning. Overall, the new assessment practices brought about changes in some students’ and teachers lives. Students who would have graduated based on passing course grades alone, (i.e. before statewide standardized testing became the norm), might not graduate on time. Some of the students had to stay in school longer until they learned the content well enough to pass the standardized tests. Although such mandates for increased accountability led to added pressures and increased workload for the teachers, some of the teachers were happy that the students would actually be encouraged to truly learn.

On the positive side, teachers liked that the Comprehensive Curriculum provided them the opportunity to try new activities for which their schools and districts provided money for supplies and materials. They also liked having professional activities made abundantly available. Additionally, there was the added focus on ensuring that the students are learning what is being tested. The teachers could no longer ignore students or groups of students, and they needed to ensure that every single student was learning.

**Teacher recommendations for future reform implementations**

In their past experiences with reforms and mandates, the rural teachers became used to having exceptions made for them and their schools, so in some ways they were not very concerned about the mandates of state and national reforms. They knew that exceptions were made because mathematics teachers were hard to recruit and retain in general, and this was especially difficult in rural schools. However, the new reforms prompted increased accountability and further encouraged teachers to take their responsibilities for each of their students’ learning seriously.
My classroom observations and interactions with teachers suggested a relationship between the teachers’ attitudes about reforms and their implementation of the changes. Teachers who approached the reform efforts and mandates with a negative attitude gained little from the reforms. However, teachers who stayed positively focused learned new activities and new ways of introducing material to their students. Yet even teachers who were open to the idea of the Comprehensive Curriculum and were able to see its importance felt that the curriculum was introduced too abruptly. To them the implementation of the CC felt like a top-down decision that came down as a surprise and a shock.

Overall, the teachers had numerous suggestions on improving the Comprehensive Curriculum itself as well as its implementation. Some questioned why the new curriculum was not initially piloted on a much smaller scale in order to get teacher, student and parent reactions. Some of the teachers talked about the idea of introducing the Comprehensive Curriculum gradually by either adding one grade per year, starting from the early elementary grades or starting with 1st, 4th, and 8th grades all at once and adding a grade each year to the initial grades. Others favored an initial introduction to a framework or general syllabus prior to the implementation of the Comprehensive Curriculum. This framework could then have been followed by activities that illustrated the goals of the framework. And at the last stage the framework and the activities could be merged to generate some final product like the Comprehensive Curriculum. In general, most teachers reached a consensus that some form of a gradual change would have been an easier adjustment than the sudden state-wide implementation in the four main content areas at all grade levels.
Chapter 7

Conclusions

In this chapter I provide summaries of the aims and findings of the study. I outline the implications of the findings and the limitations of the study of rural mathematics teachers in a time of statewide curriculum reforms. I conclude with a set of recommendations based on the insights gained from my work with teachers in the course of a professional development program and other relevant research.

Summary

The study reported in this dissertation is of the implications of mathematics education reforms for rural secondary mathematics teachers. I examined the teachers’ understanding of recent mathematics reforms and the state-wide implementation of the new Comprehensive Curriculum. I sought to understand the teachers’ responses to these reforms and the professional development activities associated with them. I further investigated some of the discrepancies between the teachers’ professed beliefs about mathematics and their classroom practices.

I conducted a qualitative study of teachers’ responses to the initial implementation of the Comprehensive Curriculum during their second year of involvement in a professional development program. The study was framed in symbolic interactionism and grounded theory. This research took place over a period of two years. The focus during the first year was on building relationships through active participation in professional development meetings, classroom observations and follow-up discussions. Meticulous note-taking during the first year contributed to the informal data collection and formulation of the research questions. The second year began with formal data collection in the form of surveys and pre- and post-tests that
led to the selection of interview participants. During this year formal data collection methods accompanied involvement in the professional development activities and classroom observations and conferences.

Initially, I became acquainted with the teachers involved in the two-year professional development program. With plans to become involved with the teachers who participated in the two–year professional development program, I engaged them in informal conversations during the on-campus component of the program. During the second year of the professional development program I volunteered to be one of the high school instructors during the two-week summer 2005 on-campus session. At that time I collected some preliminary data such a pre- and post-surveys of the teachers’ beliefs and dispositions regarding mathematics, teaching, technology and standards.

Primarily qualitative methods were employed in this study. Formal data were collected for an academic year and included the focus survey; teachers’ journals; instruction materials from the professional development program; field notes and observation protocols from classroom observations and demonstrations; interviews with target high school rural teachers, professional development coordinators and mathematics content area coach; and Comprehensive Curriculum materials. Data analysis included common qualitative analytical methods such as constant comparison methods, triangulation of data, and a search for disconfirming evidence. Throughout the study, the ongoing use of these three methods took on quite a complex nature as I coded and recoded, embellished codes and merged codes as I transcribed interviews, analyzed data and designed subsequent interview foci. The process of constantly refocusing and refining my search of the participants’ meanings and understandings of teaching, mathematics,
professional development and reforms enabled me to identify the categories: expectations, big picture and alignment which I discussed in the findings section.

The state of Louisiana decided to begin the 2005-2006 implementation of the Comprehensive Curriculum for all grades, K-12, in the four main content areas: mathematics, language arts, science and social science. The teachers who were to implement these new materials had already been through some changes in the past two years, none of which of this magnitude. The state introduced the Grade Level Expectations (GLEs) during the 2003-2004 academic year. The following year the teachers were exposed to the Model Curriculum Framework. So for a third consecutive academic year the teachers faced dramatic changes in their curriculum which invariably affected their classroom practice. In addition to their involvement with the GLEs and the Model Curriculum Framework, the teachers were mandated to begin using the Comprehensive Curriculum during the second year of the study. The implementation of the new curriculum coupled with the professional development program and the pressures for increasing test scores offered me an opportunity to study teachers during a challenging and uncertain time.

The new curriculum presented additional challenges especially for the rural teachers. They were already feeling geographically isolated, overworked, and busy trying to raise their students state assessment scores. Additionally, they found the implementation of the new curriculum complicated and confusing especially since they received mixed messages from their superiors about expectations concerning the implementation. Most of the teachers attempted to go along with the implementation as planned until they realized how difficult it was to fit the new curriculum in the plans they already had made for the new school year. Most of the teachers completely abandoned the Comprehensive Curriculum several months into the 2005-2006
academic year. Their primary reasons were fear of failing to improve the students’ state assessment scores and the realization of the low accountability expectations for the implementation. The teachers felt that they had to prioritize and they were more concerned with the state assessments than the confusing and unfamiliar curriculum.

The teachers felt more committed to their schools and students than to a quite differently organized curriculum that was supposed to be used with but did not fit into the existing curriculum. They chose to pursue their original plans, use successful teaching practices learned through their own experiences, and improve test scores. Although many of the teachers believed that mathematics instruction should involve non-traditional methods such as multiple representations, activities and manipulatives, they chose to resort to traditional teacher-centered instruction. The teachers’ resistance to the radically new, activity-based, student-centered curriculum was a response to feeling powerless with the changes they encountered year after year. The teachers felt that their voices were not being heard and that their work was not appreciated.

Even the professional development programs aimed at helping teachers with content and/or pedagogy could not soothe the teachers’ discomfort with the changes they faced. Although the teachers acknowledged that they were exposed to an abundance of professional development programs, not one ever solicited their input for the focus topics. For example, second year focus of the professional development program that was supposed to introduce them to the *Comprehensive Curriculum* failed to embody the very spirit of the curriculum itself. Although the new curriculum was student-centered and activity-based, the associated workshops were mostly lecture/discussion-based and teacher-centered.
The teachers’ main priority was improving their students’ test scores and making their schools proud. Since the signing of the No Child Left Behind (NCLB) Act into law three years prior to the implementation of the Comprehensive Curriculum, the Louisiana schools had seen change after change. The teachers’ and their schools’ performances were evaluated often and this evaluation was based on their students’ performance on the LEAP and GEE tests. No wonder the teachers rarely spoke about learning and understanding. They focused on memorization, drill and testing.

Although the teachers were told to implement the Comprehensive Curriculum they quickly realized that the new curriculum was not as important to those in power as was the improvement of student test scores. Since the actual accountability for the implementation was low or non-existent, the teachers interpreted the new curriculum as low priority and its implementation as elective at least until someone told them otherwise. Very early in the year some teachers resorted to only choose activities that fit with their regularly planned lessons, and later others did the same or stopped using the new curriculum altogether.

The analysis of the findings in this study was guided by the rural mathematics teachers’ responses to the three research questions. The questions pertained to standardized reforms, enforced compliance to standards, the impact of the professional development program, and the nature of mathematics. The implementation of the Comprehensive Curriculum was accompanied by an attempt to align the new curriculum with previously established state standards, grade-level expectations and the Model Curriculum Framework. This alignment between standards, curriculum, assessments and instruction was an example of the shift to standards-based accountability and high-stakes testing characteristic of post-NCLB systemic reform movements (Anderson et al, 2003).
Overall, the teachers were disappointed that amidst all the changes they failed to catch a glimpse of the “big picture.” They tried to make sense of the standards, the Grade-Level Expectations, the Model Curriculum Framework, and the Comprehensive Curriculum. However, these changes made little sense to them. Furthermore, the teachers realized that if they waited long enough many of these changes would just go away. After all, this is what happened to the Model Curriculum Framework that disappeared shortly after it was introduced. Many teachers secretly hoped that the Comprehensive Curriculum will either disappear in a similar manner or be re-invented in a more teacher-friendly form.

Implications

In this study I examined the responses of rural mathematics teachers to the implementation of a new curriculum. Although generalizability was not and could not be a goal of a qualitative study, insights that I gained from the teachers’ experiences are valuable, and I discuss them in this section. Because I believe they are valuable to the field of mathematics education and especially to mathematics educators who are seeking ways of improving professional development and connecting it more directly with teachers’ everyday practices. The implications made in this section may inform both to research and practice.

Many rural schools undoubtedly share the challenges faced by Delta High School and the other rural schools that I visited during this study. The findings from this study highlight some of the issues that other rural schools might face if and when they become part of a state-wide implementation of a new curriculum.
Limitations

This study offered valuable insights for the implementation of a new curriculum at a time of systemic reforms. I examined rural mathematics teachers’ responses to the changes they were undergoing while they participated in a professional development program. I limited the study to one academic year which coincided with the first year of the state-wide implementation of the Comprehensive Curriculum. A longitudinal exploration of the state-wide curriculum implementation may render an entirely different picture. As Fullan (2001) notes, such an implementation would typically go through several stages and take more than five years. Therefore, it would be beneficial to examine the teachers’ experiences with the new curriculum longitudinally during the duration of the entire implementation.

Additionally, the limited resource of time did not permit me to examine the students’ reactions to the new curriculum and to assess what the student learned from it. Furthermore, more time would have offered me an opportunity to learn whether or not the use of the new curriculum affected the students’ state test scores. These issues serve as a natural extension for future work in the area of systemic reform and will be a part of my future research agenda.

Recognizing the complexity of a thorough study of teacher responses in this situation of systemic reforms would include more research into similar situations. Researchers committed to studying systemic reforms may benefit from studies of rural schools and consider applying insights gained from these studies to rural schools environments. Additional topics that may shed additional insights on the findings include communities of practice, teachers’ beliefs and teachers’ actions. The research on teacher beliefs and classroom actions as separate entities may help explain some of the discrepancies that I observed between teachers’ professed beliefs and their day-to-day classroom practices.
Recommendations

The recommendations focus on the areas of mathematics teacher education and professional development, reforms in mathematics education, and rural schools.

Further research into the beliefs, attitudes and dispositions of rural mathematics teachers would enhance our understanding of their practices. Knowing more about how they view, practice and teach students mathematics would inform studies of their responses to change whether it be curricular or other changes that we might not even imagine at the time.

The professional development overload with content and pedagogy may often be perceived useless by teachers. While the professional development may be well intended, planned, and executed, if the teachers’ do not feel truly involved and a vital part of it they would become disengaged.

Rural schools continue to be under-represented category in educational research. Despite the fact that at least 40 percent of American students attend rural schools and that at least fifty-six percent of school districts in 2005-2006 were rural (NCES, 2006), the voices of these students and teachers are rarely heard. Education stake holders need to be especially vigilant when the challenging factors associated with rural schools, such as geographic isolation, recruitment of quality teachers and teacher retention, relationships between teachers and the community their serve, are coupled with systemic reform, such as the implementation of the new curriculum. Rural teachers’ time and resources are already stretched thin by the everyday demands of their job. So when faced with a new, top-down imposed challenge, they will have to make some decisions about how to handle the new demands. Unless they receive some relief in a different area, they will likely have to make the new demands more manageable or abandon them altogether. Since rural teachers already feel overextended and their voices under
represented they will continue to fight back silently. In this process of quiet rebellion neither the teachers nor their student will benefit.
References


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Appendix A
Teacher Survey 2005

Teacher Survey

Name:__________________  School: ____________________

1. **Which of the following degrees do you have?** (Circle your answers.)

   Bachelors  Yes  No

   Masters  Yes  No

   Doctorate  Yes  No

2. **Please indicate the subjects for each of your degrees.**

   Bachelors: ____________  Masters: _______________  Doctorate: _______________

3. **How many years have you taught mathematics prior to the 2005-6 academic year?**
4. What type(s) of state certification do you currently have?

5. Are students in your classes permitted to use calculators during mathematics lessons?

   ____ Yes, with unrestricted use.       ____ Yes, with restricted use.

   ____ No, calculators are not permitted.

6. How many students in your classes have calculators available to use during mathematics lessons? (Circle your answer)

   All   Most   About half   Some   None

7. How many students in your classes have graphing calculators to use during mathematics lessons? (Circle your answer)

   All   Most   About half   Some   None
8. How often are students in your math classes permitted to use calculators during tests or examinations? (Circle your answer.)

Always  Sometimes  Never

9. How often do students in your classes use calculators in their mathematics classes for the following activities?

Write the corresponding letter: Almost always (A), About half the lessons (H), Sometimes (S), Never (N)

Check answers  _________  Do routine computations  _________

Solve complex problems  _________  Explore algebra concepts  _________

10. Do students in your math classes have computers available to use during their mathematics lessons? (Circle your answer.)

Yes  No

11. Do any of the computers have access to the Internet? (Circle your answer.)

Yes  No
12. In teaching mathematics to your math classes, how often do you have students use a computer to do the following activities?

   Write the corresponding letter: Almost always (A), About half the lessons (H), Sometimes (S), Never (N)

   Discover mathematics principles and concepts ______

   Practice skills and procedures ______

   Look up ideas and information ______

   Process and analyze data ______

13. How familiar are you with the following:

   NCTM Standards? ________________________________

   Louisiana Mathematics Content Standards? ____________________________

   Louisiana Grade-Level Expectations? ________________________________

   No Child Left Behind (NCLB) ________________________________
14. To what extent do you agree with the overall vision of mathematics education described in the NCTM Standards?

15. To what extent have you implemented recommendations from the NCTM Standards in your mathematics teaching?

16. Think about your plans for your mathematics classes for the next academic year. How much emphasis will each of the following student objectives receive? Write the corresponding letter(s): None (N), Minimal emphasis (m), Moderate Emphasis (M), Heavy emphasis (H).

   Increase students’ interest in mathematics _______

   Learn mathematical concepts _______

   Learn mathematical algorithms/procedures _______

   Develop students’ computational skills _______
Learn how to solve problems

Prepare for standardized tests

Learn to reason mathematically

Learn to perform computations with speed and accuracy

Learn how mathematics ideas connect with one another

Prepare for further study in mathematics

Review material from previous years

Understand the logical structure of mathematics

Learn about the history and nature of mathematics

Learn to explain ideas in mathematics effectively

Learn how to apply mathematics in real-life situations
17. **About how often do you do each of the following in your mathematics instruction?**

   Write the corresponding letter(s): Never (N), Rarely (R), Sometimes (S), Often (O), All or almost all mathematics lessons (A)

   a) Introduce content through formal presentations

   b) Pose open-ended questions

   c) Engage the whole class in discussions

   d) Require students to explain their reasoning when giving an answer

   e) Ask students to explain concepts to one another

   f) Ask students to consider alternative methods for solutions

   g) Ask students to use multiple representations

   h) Allow students to work at their own pace

   i) Help students see connections between mathematics and other disciplines

   j) Assign mathematics homework to be done at home

18. **How often do you assess student progress in mathematics in each of the following ways?** Write the corresponding letter(s): Never (N), Rarely (R), Sometimes (S), Often (O), All or almost all mathematics lessons (A)
a) Conduct a pre-assessment to determine what students already know

b) Observe students and ask questions as they work individually

c) Observe students and ask questions as they work in small groups

d) Ask students questions during large group discussions

e) Use assessments embedded in class activities to see if students are “getting it”

f) Review student homework

18. (cont’d) **How often do you assess student progress in mathematics in each of the following ways?** Write the corresponding letter(s): Never (N), Rarely (R), Sometimes (S), Often (O), All or almost all mathematics lessons (A)

g) Review student notebooks/journals

h) Review student portfolios

i) Have students do long-term mathematics projects

j) Have students present their work to the class

k) Give predominantly short-answer test (e.g. multiple choice, tru/false, fill in the blank)
1) Give tests requiring open-ended responses  
   (e.g. descriptions, explanations)  

m) Grade student work on open-ended tasks using  
   defined criteria (e.g. a scoring rubric)  

n) Have students assess each other (peer evaluation)  

19. Considering your training and experience in both mathematics content and instruction, how ready do you feel to teach these topics at the middle/junior high level?  
   Write the corresponding letter: Very Ready (V), Ready (R), Not Ready (N)  

a) Numeric, algebraic, and geometric patterns or sequences  
   (extension, missing terms, generalization of patterns)  

b) Simple linear equations and inequalities  

c) Estimation of length, circumference, area, volume, weight, time, angle, and speed in problem situations  

d) Computations with measurement in problem situations  
   (e.g., add measures, find average speed on a trip, find population density)  

e) Equivalent representations of functions as ordered pairs, tables, graphs, words or equations  

f) Attributes of graphs such as intercepts on axes, and intervals where the function increases, decreases, or is constant

19. (cont’d) **Considering your training and experience in both mathematics content and instruction, how ready do you feel to teach these topics at the middle/junior high level?**

**Write the corresponding letter: Very Ready (V), Ready (R), Not Ready (N)**

  g) Measures of irregular or compound areas (e.g., by using grids or dissecting and rearranging pieces)

  h) Precision of measurements (e.g., upper and lower bounds of a length reported as 8 cm to the nearest cm)

  i) Proportional, linear, and nonlinear relationships (travel graphs and simple piecewise functions included)

  j) Standard units for measures of length, area, volume, perimeter, circumference, time, speed, density, angle, mass/weight

  k) Relationships among units for conversions within systems of units, and of rates

20. **Please indicate how well prepared you currently feel to do each of the following in your mathematics instruction.**

**Write the corresponding letter: Inadequately prepared (I), Somewhat prepared (S), Fairly well prepared (F), Very well prepared (V)**
a) Take students’ prior understanding into account when planning curriculum and instruction

b) Make connections between mathematics and other disciplines

c) Use calculators/computers to demonstrate mathematics principles

d) Use the Internet in your mathematics teaching for general reference

e) Lead a class of students using investigative strategies

f) Use calculators/computers for drill and practice

g) Use the Internet in your mathematics classes for collaborative Projects with classes/individuals in other schools

h) Manage a class of students engaged in hands-on/project-based work

i) Have students work in cooperative learning groups

j) Teach mathematics with manipulatives, such as counting blocks or geometric shapes

20. (cont’d) Please indicate how well prepared you currently feel to do each of the following in your mathematics instruction.

Write the corresponding letter: Inadequately prepared (I), Somewhat prepared (S), Fairly well prepared (F), Very well prepared (V)
k) Use calculators/computers for simulations and applications

l) Use the Internet in your mathematics teaching for data acquisition

m) Use calculators/computers for mathematics learning games

n) Recognize and respond to student cultural diversity

o) Encourage students’ interest in mathematics

p) Use calculators/computers to collect and/or analyze data

q) Encourage participation of females and minorities in mathematics

r) Integrate mathematics with other subjects

s) Provide mathematics instruction that meets mathematics content standards ______
   (district, state, or national)

t) Teach problem-solving strategies

21. To what extent do you agree or disagree with each of the following statements?

Write the corresponding letter(s): Agree a lot (AL), Agree (A), Disagree (D),
Disagree a lot (DL)

a) More than one representation (picture, concrete material, symbols, etc.) should be used in teaching a mathematics topic
b) Mathematics should be learned as sets of algorithms or rules that _______
cover all possibilities

c) Solving mathematics problems often involves hypothesizing, _______
estimating, testing, and modifying findings

d) Learning mathematics mainly involves memorizing _______

e) There are different ways to solve most mathematical problems _______

f) Few new discoveries in mathematics are being made _______

   g) Modeling real-world problems is essential to teaching mathematics _______

   h) Students learn mathematics best when they ask a lot of questions _______
Appendix B

Andrea Interview Questions

Andrea Second Interview Questions July 16, 2006

Could you please tell me briefly about DAMSELS.

Could you talk a little bit about LINCS schools.

What do you know about the Model Curriculum?

RQ #1:

What are some challenges that rural teachers face?

What are your thoughts on improving rural education in LA?

What can administrators and school districts do to improve rural education in LA?

What kind of professional development projects do you envision in the future? Should there be an emphasis on content, pedagogy, technology, etc.?

What have your changed about the way you help R math teachers in the classroom with the implementation of the CC?

RQ #2:

How important was the 3M Professional Development for the teachers involved?

What feedback have you received from the teachers?

How do you determine the impact of a professional development program such as 3M on teachers’ classroom practices?

How specifically did this professional development address the CC?
What do you think is the impact of 3M on the teachers’ classroom practices and especially on implementing the CC?

What could have been done differently to have a greater impact on the teachers’ practices?

During the second year of 3M we placed an importance on the CC. How does that go along with your understanding of professional development? Were you pressured into considering doing some work with the CC?

RQ #3:

What do you perceive as being so different about the CC that some teachers may be resistant to implement it in their classrooms?

What are some of the other curricula or textbooks that LA teachers usually use in their classrooms?

How does the CC compare to the textbooks you remember using as a student? How does the CC compare to the textbooks that are already adopted by Delta HS?

Compare and contrast the usual curricula and the CC.

What are some adjectives that you would use to describe the CC? Would you say it is innovative? How can teachers be encouraged to be innovative? Could you give me an example of a specific innovation that you have implemented in your classroom or have seen another teacher implement?
Appendix C

Joanne Interview Questions

Second Interview Questions July 16, 2006

RQ #1:
Is math still the focus area for improvement at Delta HS? How often is the focus re-evaluated?

What are some challenges that rural teachers face?

What are your thoughts on improving rural education in LA?

What can administrators and school districts do to improve rural education in LA?

What kind of professional development projects do you envision in the future?

What have your changed about the way you help R math teachers in the classroom with the implementation of the CC?

How much access do the teachers have to the test scores?

Did all schools have school monitors? What kind of work did they do? What were the consequences of their observations?

RQ #2:
How important are the tests that students take every year? What is their impact on teachers?

What do these tests say about teaching and learning?

What do you perceive as the greatest areas for improvement of the rural teachers that you work with? Do they lack in content, pedagogy, or some other area? How do they receive help in this area?

What could have been done differently this past year to have a greater impact on the teachers’ practices in implementing the CC?
There are three people in the parish with your title of coach. Are there more than three rural schools? What are other rural schools doing to implement successfully the CC?

RQ #3:

There is an emphasis on improving test scores. What are some positive aspects in Delta that you would attribute to this emphasis? What are some negative consequences?

With the emphasis on testing, some teachers and schools feel tempted to “teach to the test.” How did you address this at Delta HS?

Describe how the CC relates to students from varied ethnic groups. What about how it relates to rural students? Any specific examples?

What do you know about a so-called Model Curriculum?

How does the CC compare to the textbooks you remember using as a student? How does the CC compare to the textbooks that are already adopted by Delta HS?

What are some adjectives that you would use to describe the CC? Would you say it is innovative? How can teachers be encouraged to be innovative? Could you give me an example of a specific innovation that you have implemented in your classroom or have seen another teacher implement?
Appendix D

General Interview Questions

Semi-Structured Interview Questions:

Describe your teaching experiences.

How long have you been teaching?

Describe your mathematics background.

What math classes have you taught recently?

What math classes are you currently teaching?

What do you know about the No Child Left Behind Act?

How does that legislature influence your work?

What is your experience with the National Council of Teachers of Mathematics (NCTM) Standards?

Are you “well-qualified”? If yes, how did you accomplish this status? If no, what steps are you taking in achieving this status?

Why did you enroll in the 3M professional development project?

What are your impressions of this project?

To what extent did you use materials and content from 3M in your own classroom?

How did you implement the Comprehensive Curriculum (CC) in your classroom?

What are some positive and negative aspects of the CC that you identified?

How do you find this curriculum different from the one you usually use?

What would you do differently next time you teach the same classes?

How did your students respond to the new curriculum? Describe any changes you observed in your classroom as a result of implementing some of the activities.
Describe for me in detail an activity that went really well.

Describe an activity that did not go well in your classroom.

What suggestions or recommendations do you have for teachers who have not used this curriculum yet?
Appendix E

Additional Interview Questions

Opening Questions:

1) Describe your teaching experiences.
2) How long have you been teaching? What subjects and grades? Where? How long have you been at your current school?
3) Describe your mathematics background.
4) What degrees do you hold? What certification do you have?
5) What kind of schools did you attend—rural, urban, suburban? Describe for me your experiences there as a student, and in particular your mathematics learning.
6) How did you decide to become a mathematics teacher? What contributed to your decision?

What do you know about the No Child Left Behind Act?

How does that legislature influence your work?

What is your experience with the National Council of Teachers of Mathematics (NCTM) Standards?

Are you “well-qualified”? If yes, how did you accomplish this status? If no, what steps are you taking in achieving this status?

Why did you enroll in the 3M professional development project?

What are your impressions of this project?

To what extent did you use materials and content from 3M in your own classroom?

How did you implement the Comprehensive Curriculum (CC) in your classroom?

What are some positive and negative aspects of the CC that you identified?

How do you find this curriculum different from the one you usually use?

What would you do differently next time you teach the same classes?

How did your students respond to the new curriculum? Describe any changes you observed in your classroom as a result of implementing some of the activities.
Describe for me in detail an activity that went really well.

Describe an activity that did not go well in your classroom.

What suggestions or recommendations do you have for teachers who have not used this curriculum yet?

Research Question # 1:

1) What do you know about the No Child Left Behind Act? Describe what this means for your mathematics teaching? How does this legislation influence your work?
2) What is your experience with the NCTM Standards? Describe your familiarity with them and their impact for your mathematics teaching.
3) Are you “highly qualified”? If yes, how did you accomplish this status? If no, what steps are you taking in achieving this status?
4) Do/did you feel pressured to become “highly qualified”? What is the sense you get from your colleagues and administration about being “highly qualified”?
5) When did you first hear about the Comprehensive Curriculum (CC)? Who told you about it? Describe your feelings, thoughts, and expectations at that time. How, if at all, have your views changed since you used the CC in your classroom?
6) Discuss what you thought you were expected to do with the CC. Do you feel that you met these expectations?
7) What happened after you found out about the CC?
8) How did you prepare to use the curriculum? Did you use some other resources or people in the preparation, or did you prepare by yourself?
9) Describe any positive changes that occurred in your life/teaching/work with the implementation of the CC?
10) What negative changes, if any, have occurred in your life/teaching/work due to the implementation of the CC?
11) What changes have you done in your classroom with the implementation of the CC?
12) Describe the positive and negative aspects of the CC.
13) How do other math teachers you know feel about the CC? What about teachers in the other content areas?
14) Describe the support you have received in implementing the CC.
15) What do you think are some of the benefits of this state-wide curriculum? What drawbacks do you see?
16) Could you share some suggestions or recommendations that you have for teachers who have not yet used this curriculum?

Research Question # 2:
1) How did you become involved in the Making Mathematics Meaningful (3M) professional development project?
2) What are your impressions of the project?
3) Could you describe the most important things that you learned as part of this project?
4) Tell me how you used materials and content from 3M in your classroom.
5) Describe the impact that 3M has on what you do in the classroom.

Research Question # 3:

1) What is the usual curriculum that you use in your classroom, other than CC?
2) Compare and contrast the two curricula. Describe a typical lesson using each curriculum.
3) Thinking back, describe the best curriculum you have used in your classroom.
4) What kind of curriculum changes would you recommend?
5) When you think of mathematics, what are some of the first things that come to your mind?