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A Mixed-Methods Inquiry into Science Teachers' Perceptions of the Effects of Professional Development Experiences on Implementation of Research-Based Instructional Practices

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A Mixed-Methods Inquiry into Science Teachers' Perceptions of the Effects of Professional Development Experiences on Implementation of Research-Based Instructional Practices

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Dedication

This work is dedicated to my husband of 52 years, Mack, my daughters, Carolyn and Marilyn, my sons, Michael and Mack Anthony, daughter-in laws, Maria and Tasha, and three grandchildren, Rachel, Jasmine, and Ariana. You were always there to encourage and inspire me.

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Through it all, I have kept the faith. I am reminded that I can do all things through Jesus Christ, who strengthens me. (Philippians 4:13)

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Abstract

This was a modified integrated mixed methods study of teachers' perceptions of factors that influence transfer of research-based teaching strategies into classroom practice. Participants were made up of 66 respondents to a researcher made survey, "*Survey of Teacher Attitudes toward Change and Classroom Implementation of Research–Based Strategies*". Respondents were divided into two groups based on participation in Louisiana Systemic Initiatives Programs (LaSIP): LaSIP, N= 39 and Non-LaSIP, N= 27.

Answers to five research questions were based on analysis of quantitative data from a survey, recorded on a five-point Likert scale and qualitative data from analyses of transcripts of three personal interviews, two focus group discussions and five short-answer questions on the survey. SPSS software version 9 and Atlas.ti version 7 were used in quantitative and qualitative analyses, respectively.

Concurrent quantitative and qualitative strands of data were integrated throughout the study. Findings from quantitative data included the following: (1) Teacher perceptions of features of the LaSIP were predictive of reported frequency of use of research-based teaching strategies (RBTS); (2) Reported frequency of use of RBTS was not significantly different in LaSIP versus Non-LaSIP teachers, except in reported use of alternative assessments. (3) Both LaSIP and Non-LaSIP teachers indicated that implementation of RBTS increased student achievement (4) LaSIP teachers identified factors such as opportunity to collaborate with colleagues, time to acquire content knowledge, practice with material and supplies and modeling of RBTS as features of the LaSIP that positively influenced classroom implementation. (5) Perceived barriers to implementation of RBTS included lack of equipment and lack of teacher input into planning of professional development.

Analyses of qualitative data supported many of the findings due to quantitative analyses. Additionally, qualitative data provided more in-depth information concerning teacher perceptions of barriers to implementation such as lack of teacher input into planning and implementation of professional development, and lack of time for in-depth learning during professional development activities.

Key Words: Teacher Professional Development, Research-based Teaching Strategies, Classroom Implementation, Science Pedagogy, Mixed-Methods, Student Achievement

Chapter One

Introduction

"Education is life--not a mere preparation for an unknown kind of future living…The whole of life is learning; therefore, education can have no ending. This new venture is called adult education--not because it is confined to adults, but because adulthood, maturity defines its limits." from Lindeman, E. (1926). *The Meaning of Adult Education*. New York: New Republic, p. 6.

Purposes of the Study

The purpose of this study is to examine teachers' perceptions of factors that influence levels of classroom implementation of research-based teaching strategies following participation in a long-term, State Systemic Initiatives (SSI) program. Decades of teacher research studies have been dedicated to explaining and understanding how teachers' professional development learning experiences impact the teaching process and the strategies teachers employ in the classroom. Much of the inquiry has revolved around efforts to gain insight into "the formerly hidden world" of teaching (Clark, 1995, p. 256). Many of these studies give recognition to the idea that teacher' perceptions and personal knowledge of learning, teaching strategies, students, curriculum development and school culture influence what they teach and how they teach in response to an innovation in education (Borko & Putnam, 1995; Fullan, 2001).

Teachers, like students, must be able to connect new learning experiences to existing knowledge and beliefs in order to implement experiences encountered in professional development programs (Loucks-Horsley *et al.*, 1987; Keeley, 2005). It is also important that providers of such programs be able to understand and appreciate the personal knowledge and beliefs of teachers and use the knowledge to enhance and expand teachers' professional capabilities (Yore, 2001).

There is general agreement amongst researchers that what teachers do in the classroom can have profound effects on what students learn. Furthermore, effective teachers can have a profound influence on student learning even in relatively ineffective schools (Haycock, 1998; Blair, 2000; Beasley and Apthorp, 2010). The idea that teachers control most of what goes on in today's classroom is indisputable. Teachers are also in unique positions to supply meaningful insights into the teaching and learning process at the classroom level and can inform providers of their own professional development needs (Smith *et al.*, 2007). Therefore, it was reasonable to explore the features of professional development programs that affect implementation of research-based teaching strategies from the unique perspective of the classroom teacher.

This study also included inquiry into teachers' perceptions of the importance of research-based teaching strategies in improving student achievement. In a study of 900 school districts, Ferguson (1991), found that teacher expertise accounted for 40% of the variance in student achievement in reading and mathematics. In a later study, Sparks and Hirsh (2000) noted that a growing body of research has shown that improving teachers' knowledge and teaching skills is essential to improving student performance. The idea that professional development is often the key to student achievement has also been confirmed in other studies (Guskey & Sparks, 1996; Reitzug, 2005; Lumpe, 2010).

Understandably, state and local school districts devote portions of their budgets to professional development each year in efforts to improve schools and student achievement. Both state and federal funds were invested in the LaSIP professional development efforts. It is important to know if teachers' perceptions of such efforts indicate that the programs make a difference in the classroom. Therefore, another focus of the study is to determine if there are differences in reported levels of implementation of research-based teaching strategies between teachers who participated in the Louisiana Systemic Initiatives Program (LaSIP), and those who did not.

Many of the teachers who volunteered to participate in this study are former or current participants in the LaSIP, a long-term, professional development model that had its inception in 1992. LaSIP is an integral and ongoing part of the Louisiana education reform efforts that advocate for research-based, content-rich training for teachers in mathematics and science. Projects of the LaSIP have influenced professional development in the state of Louisiana for over two decades. Therefore, teachers' perceptions of its effectiveness in improving teacher learning and increasing levels of implementation of research-based teaching strategies in the classroom are important.

In spite of extensive efforts to improve schools, there is deep concern, locally, state and nationwide, about the quality of teaching and learning in today's classrooms. The concerns deepen when the discussions turn to teaching and learning in mathematics and the sciences (Shymansky, 1992; Keys and Bryan, 2001; Keeley, 2005; Loucks-Horsley, Hewson, Love and Stiles, 2010). Although this study was limited in scope, it is hoped that the findings contributed to the overall data base on teaching and learning and furnished useful insights to professional development providers that help teachers and students move closer to meeting national goals.

This was a mixed methods study. A concise definition of mixed methods research is still evolving. However, Johnson, Onwuegbuzie and Turner (2007) used the definitions proposed by 19 other researchers to propose a composite definition as follows:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (for example, the use of qualitative and quantitative viewpoints, data collection, analysis, inferences, and techniques) for the purposes of breadth and depth of understanding and corroboration (p. 123).

A diagram of the study design is included in the methods section. Based on this design, findings from quantitative data collected via a survey was integrated with the findings from qualitative data collected through personal interviews, five open-ended questions in the survey and from focus group discussions.

National Significance of the Problem

For more than two decades, there have been intense efforts to improve teaching and learning in science. The National Science Education Standards (NSES) were developed by the National Research Council (NRC) in 1996 and were quickly embraced by leaders at the LASIP as being vital to reforming science education in Louisiana. The national benchmarks in science were developed by the American Association for the Advancement of Science (AAAS), in the period between 1989 -1998. Both of these publications have had a significant impact on the speed and direction of reform in science education in Louisiana, yet students in Louisiana still lag behind other states in overall student achievement as reported in the National Assessment of Educational Progress (NAEP) in 2009.

National reform efforts continue on other fronts as well. Teachers, students and even parents are being held to higher standards of performance. The “No Child Left Behind” (NCLB) Act, a federal mandate enacted in 2001 by President Bush, had a core demand for “highly qualified” teachers in every classroom. The provisions in the legislation were far reaching, touching on every facet of school policy and operation. NCLB required states to develop and put into place standards in science by the 2005-2006 school year. Accordingly, states were required to begin testing science at least once a year in grades 3-5, 6-9 and 10-12 beginning in 2007-2008 (Smith et al, 2007). More recently, Congress enacted the American Recovery and Reinvestment Act of 2009 (ARRA). The ARRA legislation has set goals of "achieving significant improvement in student outcomes, including making substantial gains in student achievement, closing achievement gaps, improving high school graduation rates, and ensuring that students are prepared for success in college and careers." (Race to the Top: Executive Summary, p. 2) Both NCLB and ARRA envision classrooms that include teachers who are highly qualified.

These requirements have serious implications for both in-service teachers and professional development providers. In order to meet the highly qualified requirements in-service teachers must re-train in many instances and professional development providers must offer professional development that meets the requirement of being research-based. Hence, not only are providers required to supply teachers with high quality professional development, they are also required to support their claims concerning program effectiveness with scientific research. The NCLB Act (2001) defines scientifically based research as "research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs,"(Beghetto, 2003, p. 1)

Accountability for results in student achievement is being demanded at all levels. In response to this demand, many states (Texas, Tennessee, Virginia, North Carolina), have enacted high-stakes testing. Likewise, in Louisiana, the Louisiana Educational Assessment Program (LEAP 21) and End of Course Exams (ECE) are system-wide accountability programs focused on assessment of student achievement. Modifications have also been made in the science frameworks of the National Assessment of Educational Progress (NAEP). In the 1996-2005 science frameworks, the dimension of knowing and doing was organized into three practices, conceptual understanding, science investigation and practical investigation. In the 2009 framework, there are four practices assessed: (1) identifying science principles (2) using science principles (3) using scientific inquiry and (4) using technological design (U. S. Department of Education, 2007).

A review of the National Science Education Standards (NSES) the national benchmarks in science and policy implications in NCLB and ARRA indicate that student achievement and teacher effectiveness are intricately linked. The correlation between teacher effectiveness and student achievement has also been explored by educational researchers, (Guskey & Sparks, 1996; Von Secker & Lissitz, 1999; Von Secker, 2002; Joyce & Showers, 2002;, Yore, Anderson & Shymansky, 2005; Smith, *et al.*, 2007). Thus, it is understandable that considerable funds have been devoted to teacher enhancement programs at the national, state and district levels. This study was devoted to investigating teacher perceptions of one such program. The aim was to provide data that increases insight into factors that influence teacher implementation of research-based instructional practices following participation in professional development, Exploring ways to facilitate implementation of these practices in the classroom is a step toward improving student achievement (Smith, *et al.*, 2007).

The framework for the Next Generation Science Standards (NGSS) was released during the latter part of 2012. Included in the framework are recommendations that professional development be an integral part of the school-wide improvement process. New teaching and learning standards in science were released in 2013. The NGSS focuses on *science, technology, engineering* and *mathematics* (STEM) to set guidelines for preparing a scientifically literate workforce that is capable of competing in a global economy. The new science standards, like previously released science education standards (NRC, 1996) include recommendations for innovative ways to implement research-based curricula, and instruction and assessment aimed at improving teaching and learning.

Although the NGSS will include greater emphasis on technology and engineering, they are not totally new recommendations. For years reform efforts have centered on school-wide improvement that is research-based (Rosenholtz, 1989; Darling-Hammond, 1990; Darling-Hammond & McLaughlin, 1995; Sparks & Hirsh, 2000). School administrators and teachers are required to document research studies that support the activities proposed in school improvement plans. Louisiana's School Improvement Plan (SIP) template requires that each school's goals and objectives be aligned with the National Staff Development Council (NSDC) professional development standards that call for a comprehensive approach to professional development. Training and hiring *highly qualified teachers* are important objectives of many of the school improvement plans and also the focus of national science reform efforts (NCLB, 2002). Yet, studies indicate that problems persist of too few teachers entering the profession and too many current teachers that are under-qualified (National Commission on Teaching and America Future, 1997).

The problems of having too few teachers entering the profession and too many teachers who are under-qualified within the profession, were highlighted in the findings that were released from the study by The National Commission on Teaching and America's Future (NCTAF), created in 1994. The primary mission of the NCTAF was to identify the implications for teaching in light of school reform efforts as well as recommend steps to ensure that all children have teachers who have the requisite skills and knowledge in the subjects they teach.

Moreover, the Commission sought to address the need for developing a comprehensive plan for recruiting, preparing, and supporting a national teaching force that can meet 21st-century standards of high educational performance. The Commission issued its major report, *What Matters Most: Teaching and America's Future,* in September of 1996. One year later, the Commission released a follow-up report, *Doing What Matters Most: Investing in Quality Teaching,* which described progress toward its recommendations. In its initial report, the National Commission on Teaching and America's Future (NCTAF) reported that more than

1. 50,000 people who lack the training required for their jobs enter teaching annually on emergency or substandard licenses." [Further, in the same study, it was reported that]
2. nearly one-fourth (23%) of all secondary teachers do not have even a college minor in their main teaching field. This is true for more than 30% of mathematics teachers.
3. Among teachers who teach a second subject, 36% are unlicensed in the field and 50% lack a minor. (NCTAF, 1996, p 15)

In light of the findings that nearly 25% of the teaching workforce may be under-qualified, there is clearly a need for reform efforts aimed at recruiting and retaining qualified teachers. Educators now have a substantial base of knowledge on which to build. Research on how to teach and what to teach is being rapidly added to the data base and made accessible to recruits and to teachers already in the workforce. Taking advantage of these advances, implementing research-based teacher training and facilitating intense implementation of this training at the classroom level, can be the engine that drives school reform efforts.

Supovitz and Turner (2000) described professional development efforts as "limited, fragmented and marginalized" (p. 1). Though inadequacies in teacher professional development still exist, the picture of professional development as described by Supovitz is improving.

Spurred on by increased research, the nation's focus on teaching, and learning and government mandates such as NCLB and ARRA, our knowledge of what works in professional development has evolved into an expanded core of research-based information. Yet, professional development is often planned and executed without meaningful input from teachers. One of the core beliefs that framed this study is that teachers' clinical experience, realistic wisdom, their beliefs about education, and assessment of what they need as learners are important factors in their professional growth, (Darling-Hammond, 1990; 1997).

Unfortunately, much of what is taught in professional development programs for in-service teachers is never transferred to the classroom. In fact, studies by Hirsh and Ponder (1991) found that as little as ten percent of what is taught is actually implemented in the classroom. Similar findings are described in Joyce & Showers (1995) as follows:

> "In the 1970's, evaluations of staff development that focused on teaching strategies and curriculum revealed that as few as 10 percent of the participants implemented what they had learned. Rates of transfer were low even for those who had volunteered for the training. Well-researched curriculum and teaching models did not find their way into general practice and thus could not influence students' learning environments." (p. 12).

Although more enlightened research concerning how teachers learn has been gathered over the years, problems concerning levels of classroom implementation following professional development experiences persist and are reported in other studies (Killion, 2002; Broad and Evans, 2006). For example, the NSDC in its 2010 report on improving teacher learning writes that "the nation is moving backwards in providing the vast majority of teachers with the kind of ongoing, intensive professional learning that research shows has a substantial impact on student learning". (NSDC, 2010, p. 1) Other researchers have also sought to explain why so little of professional development experiences are implemented in the classroom. Fullan (2001) describes what he calls the "*implementation dip*":

> "the implementation dip is a natural dip in performance and confidence as one encounters an innovation that requires new skills and new understandings. All innovations should call upon people to question and in some respects to change their behavior and their beliefs — even in cases where innovations are pursued voluntarily." (Fullan, p. 49).

According to Fullan, this is a natural occurrence following an innovation. How can providers compensate for the "implementation dip" that occurs in teaching behaviors following professional development activities? More importantly, how is the discrepancy explained or understood by teachers in the field?

The gap between teacher training experiences and actual classroom implementation remains in spite of efforts to bring to bear the latest findings of researchers about what works in professional development (Supovitz & Turner, 2000). Can lack of meaningful input from teachers in addition to weak follow-up activities be contributing factors? Perhaps the examination of teachers' perceptions of the quality of the training they receive and their perceptions of the factors that enhance or impede their ability to transfer professional development experiences into classroom practice shed some light on these questions.

Even as many providers strive to increase teacher input into the planning and implementation of professional development, some providers concede that there is no universal model of professional development that fits the needs of all teachers (Killion, 2002). Therefore, in spite of recognizable gains in the study of professional development for teachers, questions concerning levels of classroom implementation of teachers' learning experiences still remain. Based on these and other findings this study examined teachers' perceptions of their professional development experiences from several perspectives as outlined in the descriptions of the conceptual framework.

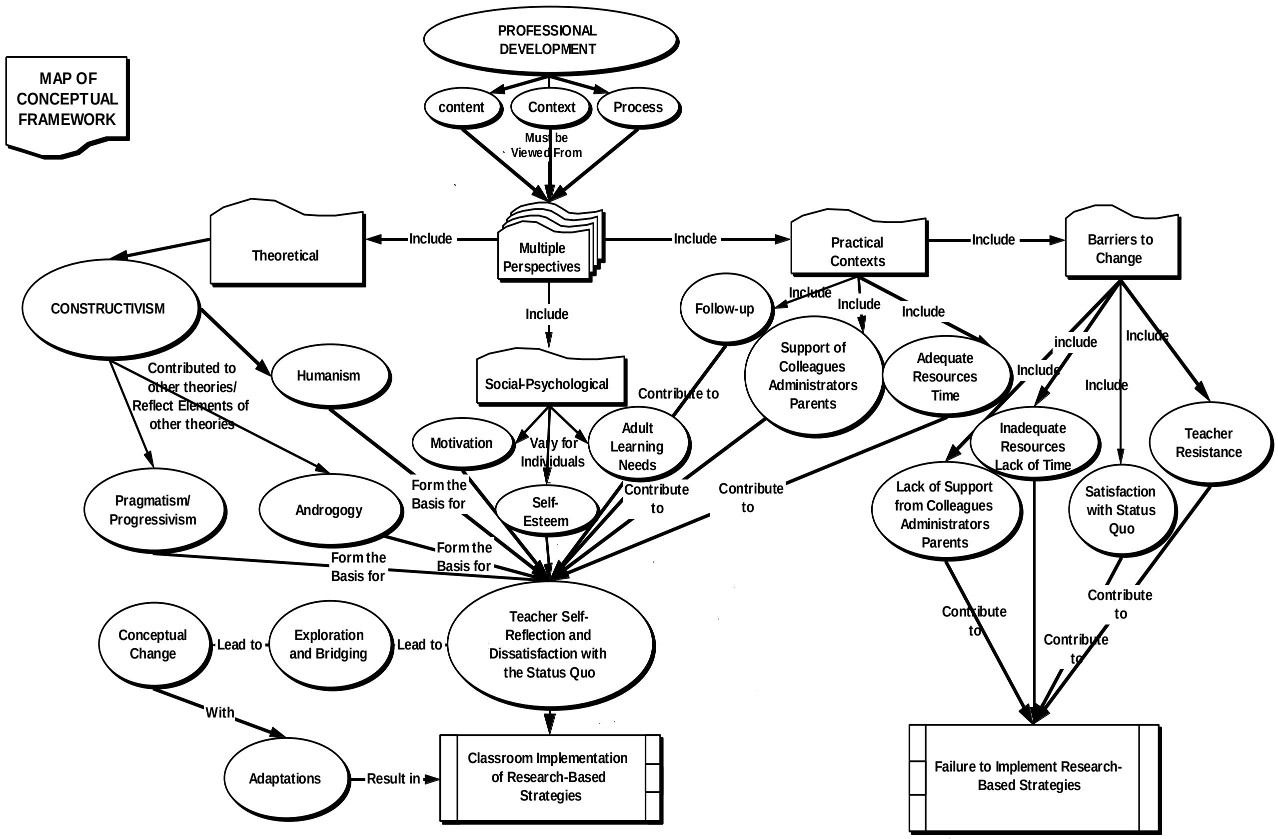

Figure 1. *Map of Conceptual Framework*

Conceptual Framework

Synopsis. The conceptual framework for this study provided lenses through which to examine science teachers' perceptions of the various features of the LaSIP and their perceptions of the impact of the program on transfer of training to the classroom. Conceptually, teachers are viewed as adult learners whose professional development needs vary. Therefore, professional development was viewed from several perspectives. The conceptual framework included constructivism as the major theoretical perspective.

Equally important to the study were the psycho-social factors such as teachers' motivation and learning needs and practical contexts such as follow-up and supportive working environments. The interrelationships among these factors are shown in Figure 1.

The belief underlying the conceptual framework was, that factors addressed teachers' learning needs properly during professional development could have a positive impact on teachers' ability to implement research-based strategies in the classroom.

As seen in Figure 1, classroom implementation of professional development experiences is not without inherent barriers. Barriers to implementation include factors such as teacher resistance to change, satisfaction with the status quo and lack of support from administrators and parents. In order for professional development to have its desired impact on teaching and learning, it must be based on an understanding of how all of these factors are interrelated. Explanations of the various perspectives are included in the discussions that follow.

Theoretical Perspectives: Teachers as Adult Learners. Understandings and beliefs concerning adult education form the basis for the theoretical framework for this study.

Among the definitions of adult education are those offered by Lindeman (1926) as seen in the opening quote and in Merriam and Brockett (1997, p.8), which states that adult education can be defined as "activities intentionally designed for the purpose of bringing about learning among those whose age, social roles, or self-perception define them as adults."

Professional development for teachers by its very nature can be considered adult education. Therefore**,** providers of professional development should have a thorough understanding of the adult learner and use that understanding in every aspect of program planning. In this study, adult education was viewed in the context of life-long learning prompted in part by dissatisfaction with the status quo. Considerable research on adult learners was reported by Butler (1992) in the

School Improvement Series at the North West Regional Educational Laboratory (NWREL). Some of the research findings are summarized in the paragraphs below.

First and foremost is the premise that adults learn throughout their lives, Lindeman (1926). Butler (1992) goes on to explain that age does not reduce a person's capacity to learn, although they may learn at a slower rate. Further Butler posits, adults learn in different ways that include learning from experience and as a result of self-direction. Additionally, learning for adults takes place at different times in their lives, for example middle age or old age. Adults also pursue learning opportunities for varying reasons such as career advancement or following the death of a spouse. As pointed out in these examples, optimal learning for adults takes place when new learning is clearly tied to or built upon past experiences, which clearly connects to constructivist learning theory. Both the psycho-social perspectives and the theoretical perspectives noted in the conceptual map in Figure 1 embrace the notion that adult learners' stages of development, whether personal, chronological, or professional, can have a profound effect on learning (Cameron and Pierce, 1994; Candy, 1991; Bruner, 1996).

Practical contexts also play a prominent role in adult learning. It has been reported by some researchers that adult learning tends to be problem-centered and require practical application of what is learned (Knowles, 1980). Additionally, the adult learner establishes ownership of what is learned by selecting new information and deciding how to use it (Merriam and Brockett, 1997). Finally, new learning (See Figure 1) is followed by a period of reflection to facilitate integration, adaptation and application of new knowledge and skills.

In order to offer effective professional development, providers must make decisions concerning the content, context and process of professional development activities (Loucks-Horsley *et al.*, 1987; 1990; Hargreaves, 1997). They should take into account teachers' prior knowledge concerning their current conceptions of science content and their views on what works in teaching, and learning science.

The extent to which providers acknowledge the characteristics and needs of adult learners can determine the success of implementing innovations at the classroom level (Lieberman, 1995; Loucks-Horsley, Hewson, Love, and Stiles, 1998). Giving teachers some control over the what, why, how, when and where of their learning can remove many of the barriers to implementation of research-based teaching strategies in the classroom and improve attitudes of teachers toward change (Borko, 2004; Caffarella**,** 2002; Guskey & Yoon, 2009; Hargreaves & Shirley, 2009).

Many teachers are effective practitioners with numerous years of experience. Yet, studies have shown, that teachers spend very little time thinking about the reasons behind what they do in the classroom (Yore, 2001). Moreover, teachers are afforded little time for true reflection on practices during their participation in professional development activities. (Brookfield, 1986; Candy, 1991; Loucks *et al.*, 1990). Therefore, it is often left to professional development providers to examine the conceptual framework that provides the foundation for the content and teaching practices that are offered to teachers. This relegates the role of the teacher to that of a voiceless recipient. Teachers are often ignored in planning and are therefore left to implement programs that are poorly planned without question (Caffarella, 2002). More often than not, these programs do very little to improve teaching and learning (Guskey & Sparks 1996; Smylie, 1992 and Little, 1993). Understandably, very little of what is experienced in this manner is transferred to the classroom (Guskey & Yoon, 2009).

It is important that teachers are made aware of the values and guidelines used to make decisions and set policy concerning the professional development activities they undertake or (in some cases) have foisted upon them. What teachers value about professional development and the assumptions they make about how students learn directly impacts what and how they deliver instruction in the classroom (Wenglinsky, 2000; Caffarella, 2002; Borko, 2004). Therefore, we should view teachers as adult learners whose perceptions of professional development vary based on their life experiences and self-identified learning needs. Professional development that aims to bring about changes in teachers' practices should be planned and implemented with these things in mind (Hargreaves, 1997). Teachers hold a philosophy of teaching that influences how they teach and what they teach. Effective professional development programs invest time in developing an understanding of teachers' philosophical beliefs. Therefore, the conceptual framework includes a focus on the theoretical perspectives of the study described in the passages which follow.

Theoretical Perspectives: Constructivism, Andragogy and, Humanism. In the National Science Education Standards (NSES), constructivism serves as a theoretical basis of teaching and learning. Jerome Bruner (1986; 1990; 1996), was one of the founding fathers of constructivist theory. Bruner's writings echo themes espoused in the writings of Jean Piaget (1972) and Lev Vygotsky (1978). Bruner, Piaget and Vygotsky espoused views that learners construct new ideas or concepts based upon existing knowledge. They considered learning to be an active process. Therefore, the learner should be able to select and transform information, engage in problem-solving, make decisions, generate hypotheses in order to make sense of the world.

Constructivism was the main theoretical perspective used in the conceptual framework for this study. Constructivism is defined by Candy (1991, p.254) as a "cluster of related perspectives… united in their view of the world.'' Being able to articulate a philosophical view of learning professionalizes teaching by connecting theory to practice. Helping teachers connect theory to practice is perhaps the most obvious reason providers in the Louisiana Systemic Initiatives Program (LaSIP) placed such emphasis on constructivism as a philosophy of teaching and learning in science.

As pointed out earlier, constructivists believe that the learner actively constructs knowledge and is not just a passive recipient of knowledge. The constructivist approach to teaching and learning in science gained prominence in the mid-1980s and generated considerable excitement in efforts to reform science education. Constructivism did not emerge within the field of adult education, but the basic tenets of constructivism have implications that are important in adult education and hence, professional development. Constructivism forms the basis of the following principles for designing effective learning environments:

Adult learners come to class with prior knowledge and experiences. Teachers are not presented with empty vessels in which to pour knowledge or bank slates upon which to write. Instead, teachers should structure learning situations in which the learner interacts with new knowledge in ways appropriate for making connections to their own experiences (Knowles, 1980; Merriam & Brockett, 1997).

> According to Brooks & Brooks, (1983) constructivist classrooms should be "organized so that student -to-student interaction is encouraged, cooperation is valued … and students' freedom to chase their own ideas is abundant." [In such an environment:] "Students are more likely to take risks and approach [tasks] with a willingness to accept challenges to their current understanding." (Brooks & Brooks, 1983, p. 10)

Meaningful learning does not take place by simply accumulating unrelated facts or bits of information. Lasting knowledge is acquired from experiencing multifaceted problems and engaging in complex problem solving situations. Accordingly, constructivist theorists (Fosnot, 1989; 2005) picture learning as an:

> interpretive, recursive, building process by active learners interacting with the physical and social world. [Fosnot explained that] "while constructivism is a theory of learning, not a description of teaching, it does have applications for instruction." Instruction can be put into context and used to activate the learner's ability to assimilate input from a variety of sources (Fosnot, 1996, p. 29-30).

The establishment of successful learning environments for participants should be based on constructivist philosophy and include opportunities for them to make associations between new learning and previous experiences. Experiential learning is meaningful to adult learners. Professional development providers can assist in the learning process by asking open-ended questions that cause participants to think about how new information relates to their own classroom experiences. These types of questions are most effective when focused on content that is most useful to participants. Using constructivist-based strategies with participants contributes to what Bain (2004) referred to as:

> critical learning environments, where instructors 'embed' the skills they are teaching in authentic tasks that arouse curiosity, challenge students to rethink assumptions and examine their mental modes of reality. (Bain, 2004, p. 4)

Constructivism borrows philosophically from several major perspectives for understanding the adult learner. One of the most familiar perspectives is the approach proposed by Dewey (1916). Dewey's approach to adult education, often referred to as progressivism, was based on a philosophy of ***pragmatism*.** The pragmatists like constructivists, valued knowledge derived from observation and experience rather than relying on tradition and authority. In other words Dewey's was a common sense approach to learning.

Dewey was one of the best known advocates for *progressivism* in education. He was able to propose educational goals and programs that formed the foundation for a philosophy of education that embodies the major principles of modern day adult education. The progressive movement in education engineered by Dewey and others had profound influence on the works of writers like Lindeman (1926) and Knowles (1980) who were prominent in the field of adult education.

Lindeman was one of the more prominent proponents of progressive adult education. His book is viewed as a standard resource for setting forth the philosophy of contemporary adult education. He espoused the belief that the aim of education was to improve both the individual and society. Accordingly, his concept of adult education leaned heavily on life experiences as pivotal in the learning process. Lindeman explained that as adults work, engage in recreation, shoulder responsibilities of family life or find themselves in situations which demand adjustments, they will seek education as a means to make those adjustments. Lindeman and Dewey crafted a vision of education in which the teacher is a facilitator of learning… "a guide on the side, rather than a sage on the stage." Although the phrase is not attributed to either Dewey or Lindeman, it is repeated often by reform-minded providers in describing what is expected in experienced-based science classrooms.

Another school of educational thought that influences the study of adult education and hence, professional development of teachers, is *humanism***.** Humanism is a philosophical world view based on the following assumptions:

(1) Human nature is intrinsically good.

(2) Human beings are free and autonomous creatures who exercise choice in determining their behavior.

(3) There exists a notion of self that has the potential for growth and development and self-actualization and

(4) A person has the responsibility to develop fully and contribute to the good of humanity. (Merriam and Brockett, 1997, p. 40)

Rogers (1969; 1983), translated the humanistic assumptions listed above into educational ideas that shaped contemporary education into a humanistic practice. According to research in the area of adult education,, when humanistic assumptions are applied to adult education, the result is a learner-centered enterprise, based on the belief that adult learners are intrinsically motivated, know their learning needs and are able to make decisions about content, instructional methods, measurement and evaluation of their progress (Merriam and Brockett, 1997, p. 8). It follows that, in such a system, learning is experiential and will not only impact behavior, but attitude and personality as well.

Humanistic thought was also espoused by reform-minded educators like Malcolm Knowles (1980), who advocated the use of teaching techniques that are experiential, risk free and supportive of cooperative learning. Knowles stressed self-directed learning and proposed the humanistic theory of *Andragogy* to explain how adults learn. His humanistic views support American democratic values of individual freedom and self-directed learning. Knowles' theory of Andragogy included self-direction in learning as a unique feature of adult education and the key to how adults learn (Knowles, 1980, pp. 55-58). Teacher self-direction is a necessary component of effective professional development and a reason for including Andragogy as a key theoretical perspective in the conceptual framework for this study.

In summary, for decades, constructivism has formed the theoretical framework for teaching and learning in science. Today, it remains viable in educational thought and practice as pointed out by the former president of the National Association for Research in Science Teaching (NARST). “A unification of thinking, research, and curriculum development and teacher education appears now to be occurring under the theme of constructivism.” (Yeany, 1991, p.1)

Other researchers agree. As Fensham (1992) asserts, “the most conspicuous psychological influence on curriculum thinking in the sciences since 1980, has been the constructivist view of learning.” [He speaks to the core of constructivism when he notes that it represents certain] “view of learning and embodies psychological theory of how educational beliefs are developed.” (Fensham, p. 801).

Constructivism describes a view of learning with implications for teaching. In this study constructivism connects theory to practice. Philosophical consideration is important in understanding teachers’ perceptions of what research-based practices will lead to effective teaching and meaningful student learning. This type of teaching and learning is student-centered, engages students in problem-solving and encourages questioning behaviors that lead to a deeper understanding of science. Teachers tend to teach the way they are taught. Therefore, it is important that teachers possess philosophical understanding and personal experiences with science that is taught in a constructivist manner in both pre-service and in-service programs. It is reasonable to assume that teachers’ perceptions of levels of implementation of research-based strategies are influenced by the extent to which professional development providers ensure that teachers’ philosophical beliefs and perceptions of learning are compatible with the learning activities offered in professional development programs.

Psychological, Physiological and Social Perspectives. The study of what influences teachers' perceptions of professional development include psycho-social perspectives in addition to theoretical perspectives. Psychological, physiological and social factors have an impact on teachers' selection of professional development activities and influence implementation of innovations in the classroom (Merriam & Brockett, 1997). For example, life changing events such as promotions, reductions in force, marriage, and divorce are cited as psycho-social factors that may impact adult learners. The ways in which teachers respond to these factors often lead to changes in the status quo and hence, motivate teachers to seek educational training. Effective professional providers devote attention to the physical, social and psychological learning environment when addressing the learning needs of teachers. Comfortable settings, low risks to self-esteem, clear articulation of expectations, balance in presentation of relevant content, and modeling of new and innovative pedagogies are but a few of the factors to be considered when teachers and providers make decisions about professional development (Merriam and Brockett, 1997).

Practical Contexts. Another factor that influences classroom implementation of professional development experiences is context (Lieberman & Miller, 1990). Does it matter where teachers receive and implement professional development? Researchers line up on both sides of the context issue. While some think that all professional development should be job-embedded (Learning Forward, 2011). Others like (Bybee, 2010), lean toward obtaining a balance between job-embedded study and activities such as workshops, college courses, and long-term professional development activities like summer institutes that extend for a year or more. Other researchers tend to agree that the context of professional development can affect levels of implementation (Lieberman, 1995; Wenglinsky, 2000). Mistakes in improving practice often emanate from an either or philosophy. Experience has taught that the broad approach recommended by Bybee is what is needed.

One of the most important factors in effective professional development is deliverance of relevant and meaningful content (Desimone, et al, 2002; Garet, et al, 2001; Yoon et al, 2007). Both quality and quantity of content is important to retention. In order for teachers to interpret and apply the content that is learned in professional development, they must be afforded ample time to practice what is learned. Hence, both the relevance of the content and the amount of time devoted to practice impact teachers' understanding and determine why and how much of professional development experiences are transferred to the classroom.

Whatever is learned during professional development can be quickly set aside if not reinforced (Cameron and Pierce, 1994). Reinforcement is of particular importance when instructors or providers are attempting to convince participants to change old practices and adopt new, reform-based approaches to teaching and learning. Modeling and frequent use of the new behavior is necessary to producing lasting change in the classroom.

Transfer of learning is not easy. Whether it is from school to real life or from real life to the classroom, educational experiences of teachers must be designed to foster the transfer of skills, and knowledge to new situations. However, before teachers adopt new teaching strategies, they must first be able to connect past experiences to the new learning. Additionally, they need time to reflect on what they have learned. Professional development experiences can be deepened through metacognition or "thinking about thinking.'' Content and pedagogy must be connected to problems or situations encountered in the classroom. Enabling teachers to make these connections result in what Shulman (1987) referred to as "pedagogical content knowledge.'' In Shulman's own words, pedagogical content knowledge is:

> "the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations-in a word, the ways of representing and formulating the subject that make it comprehensible to others" (Shulman, 1987, p. 9).

These components, time for reflection, relevant content, and models of pedagogy that are easily transferred to the classroom, are often missing in professional development activities for teachers (Reitzug, 2005).

As pointed out earlier, professional development will be viewed from a constructivist point of view. Transfer of learning is most likely when there is association between the new information and what the participant already knows. The participant's ability to make quick use of information taught in a course or activity in a new setting is critical to the transfer process. Therefore, the extent to which professional development experiences are of immediate use in the classroom can have a determinative effect on classroom implementation.

Teachers need continued support as they integrate new "pedagogical content knowledge" into their existing repertoire of skills (Shulman, 1987). Thus, follow-up is critical to successful implementation of professional development. The success of most programs for professional development of teachers rise and fall on the amount and quality of follow-up that is provided, therefore it was included as a critical aspect in the conceptual framework of this study (Hargreaves, 1994; Lieberman and Miller, 1979; McLaughlin, 1990; Little, 1993).

Innovations in science require teachers to change ineffective behaviors and master new ways of teaching. One of the most difficult barriers to overcome is teacher resistance to change which can stymie the most ardent provider or stall or overshadow reform efforts. Therefore, even when teachers receive sufficient follow-up, they may face other implementation barriers upon returning to the classroom. Barriers to classroom implementation of professional development experiences may be as simple as teachers' satisfaction with the status quo or poor past experiences. Other barriers may include lack of support from peers, administrators and parents. Hence, a study of teachers' perceptions of factors that influence implementation of professional development experience would not have been complete without examining barriers to implementation as well (McLaughlin, Talbert & Bascia, 1990; Killion & Kaylor, 1991; Lieberman,1995).

Many of the teachers who volunteered to participate in this study were involved in two to four week summer institutes sponsored by the Louisiana Systemic Initiatives Program (LaSIP), and the National Science Foundation (NSF). The institutes partnered with universities in an attempt to offer content-rich course work in combinations with components of job-embedded professional development and follow-up. Course design and instruction were intended to affect changes in the way science is taught by offering in-service teachers relevant, research-based content and teaching strategies. The purposes of this study are to determine science teachers' perspectives concerning the effectiveness of these efforts in increasing levels of classroom implementation and the teachers' perceived impact of research-based teaching strategies on student achievement.

The conceptual framework for this study allowed for a view of professional development that is multi-dimensional. Rather than a singular perspective and myopic approach to understanding the factors that enhance transfer of professional development experiences to the classroom, professional development was viewed from multiple perspectives that include theoretical, psycho-social and practical contexts as aspects of teacher learning. Findings concerning teachers' perceptions of professional development learning experiences were based on collection and analyses of both quantitative and qualitative data. Research findings and conclusions drawn can become part of a larger database on professional development to aid providers in making teachers' learning experiences more meaningful and easier to implement in the classroom.

Research Questions, Underlying Assumptions and Hypotheses

Research Questions:

1. Which reform-based program features are perceived by LaSIP science teachers as being important in improving professional growth and are most likely to influence selection and frequency of implementation of research-based teaching strategies in the classroom?
2. What are the differences, if any, in the levels of classroom implementation of research - based teaching strategies by LaSIP versus Non- LaSIP science teachers?
3. Which research-based teaching strategies/classroom practices do LaSIP science teachers perceive as being most important in improving student achievement?
4. In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues knowledge and skills gained from professional development?
5. What do teachers perceive as barriers to implementing research-based changes in curriculum, assessment and instruction in the classroom?

Underlying Assumptions:

1. In-service teachers can provide unique insights and perspectives about what is considered effective professional development and the factors that influence levels of implementation of research- based teaching strategies in the classroom.

2. Teachers' perceptions of levels of classroom implementation of research-based teaching strategies are positively correlated with their perceptions of factors described in Sections A-D and G of the survey.

3. Teachers who participated in the Louisiana Systemic Initiatives Programs (LaSIP) are more likely to implement research-based teaching practices in the classroom than teachers who do not participate in such programs.

The null hypothesis tested whether there was a significant difference in implementation rates between the two groups:

Null hypothesis: The difference between the mean summative scale scores of LaSIP trained science teachers and the mean summative scale scores of non-LaSIP teachers is zero.

Alternative hypothesis: The difference between the mean summative scale scores of LaSIP trained science teachers and the mean summative scale scores of Non-LaSIP trained science teachers is not zero.

Organization of the Study

This dissertation consists of five chapters. Chapter One serves as an introduction and is used to set forth the purposes of the study and explain the national significance of the problem. Additionally, the introduction provides an in-depth look at the conceptual framework for the study, sets forth the research questions, hypotheses and assumptions that will guide the study, lists important definitions and describes the limitations of the study.

The review of the literature in Chapter Two provides the reader with a historical context for professional development, emphasizes the various cycles of reform and the various social and political events surrounding them. The historical section of the review is followed by a review of current issues in professional development that include a discussion of research needs and an exploration of future directions of professional development related to classroom implementation of research-based teaching strategies..

Research methods used in the study are described in Chapter Three. The study is a mixed-methods inquiry into teachers' perceptions of factors that influence levels of implementation of research-based practices following participation in professional development. The design of the study includes both quantitative and qualitative measures of data gathering, data analysis and data interpretation. This chapter also includes a description of the techniques used in selecting participants used in the study. Instrumentation development, validation and reliability procedures are also described. The methodology section also includes descriptions of proposed statistical tests for validation of hypotheses and answering research questions. The rationale for using a mixed model design and an outline of procedures for conducting individual interviews and focus group discussions are also included.

Results and analysis of data are presented in Chapter Four. This chapter includes comparisons of self-reported implementation levels among LaSIP and Non-LaSIP teacher groups and correlations of results to program factors supported in the literature such as support and follow-up. Results will also be analyzed to determine teachers' perceptions of the impact of research-based teaching practices on student achievement. Analysis of findings from focus group discussions and individual interviews are merged with findings from statistical analysis of survey data to support conclusions drawn in the study.

Chapter Five is a discussion of teacher perceptions of the effects of various program components and external factors on levels of implementation of research-based teaching strategies. Final Conclusions drawn and recommendations for further study complete this chapter.

Definitions

Adult education. The literature has several definitions for adult education (Knowles, 1980; Houle, 1996). Merriam & Brockett (1997) proposes a succinct definition that captures the sense of meaning needed in this study. They define adult education as: “activities intentionally designed for the purpose of bringing about learning among those whose age, social rules or self-perception define them as adults,” (p. 8). More broadly, in this study adult education can be viewed in the context of life-long learning prompted by dissatisfaction with the status quo.

Constructivism is a philosophy of learning that focuses on using content that is connected to students’ prior knowledge to allow them to construct their own understanding of the world they live in as they engage in hands-on, active learning experiences. Meaningful learning takes place as the learner develops rules and mental models to accommodate new experiences. The model for instruction that is emphasized and modeled in LASIP projects requires teachers to encourage students to hypothesize, analyze data, make predictions and engage in collaborative problem solving to answer open-ended questions. Teachers are encouraged to engage in reflective self- assessment of their own progress in acquiring and practicing new skills and to engage in life-long learning (Bruner, 1986, 1990, and 1996).

Follow-up will be used to characterize support and assistance to teachers in the implementation and application of knowledge and skills in a new context (the classroom); allowing teachers the chance to try new ideas with adequate support and resources.

Inquiry /discovery learning- are terms used interchangeably in this study to mean an approach to instruction through which students interact with their environment-by “exploring and manipulating objects, wrestling with questions and controversies, or performing experiments" (Ormrod, 1995, p. 442). Inquiry lessons include activities in which students are allowed to discover and accumulate data, evaluate and understand data and relate their findings to new situations in the classrooms and in real life.

In-service training refers to any educational efforts directed toward enhancing the skills of teachers in the classroom including mandatory, one-shot workshops required by some districts.

Job-embedded professional development refers to organized efforts to improve teacher learning based on situations in every day classrooms. Learning activities take place during teachers' workday allowing teachers to participate in a continuous cycle of life-long learning as they address real-life problems that derive from teaching. Activities are designed to enhance teachers' knowledge and skills in the content areas and improve student achievement. (NSDC, 2003; Guskey & Yoon, 2009).

Mixed methodology an approach to research that combines quantitative and qualitative elements for data collection and evaluation. This approach to study seems appropriate for this study, because investigations of human behavior are not introduced into a sterile laboratory, but rather take place in complex social environments. Therefore, it is more fruitful to use a variety of data collection methods (Tashakkori and Teddlie, 1998) and (Creswell and Plano-Clark, 2007).

Professional development *a*s used in this study will include those experiences which, steadily, over a continual period of time, allow teachers or other active educational professionals to gain and apply knowledge, understandings, skills and abilities to achieve relevant educational goals and to make possible the learning of students.

Research-Based Instructional Strategies are teaching strategies that are supported by extensive educational research as having a positive impact on student achievement. As defined in NCLB (2002), research-based instructional strategies "are methods and strategies documented by a scientific process describing the quality and merit of the strategies". The documentation for these teaching strategies is derived from controlled experimental studies, quasi-experimental studies, and meta-analyses of relevant research studies such as those used by Marzano (2000). According to Marzano, Pickering and Pollock (2000), these strategies are effective across all content areas and all grade levels. They further explain that, if used with specific teaching techniques, use of the strategies result in effect sizes that can be easily translated into percentile gains. Examples of these categories of strategies in this study include, identifying similarities and differences, and cooperative grouping.

Transfer of Learning "the effective application by program participants of what they learned as a result of attending an educational or training program.'' There should be observable changes in the participant's knowledge, skill, or attitudes following participation in professional development activities or programs. (Caffarella, 2002, p. 204**).**

Triangulation refers to the use of several data sources or methods to study the same occurrence or trend. This approach is most often mentioned as the main advantage of using a mixed methods approach.

Zone of Proximal Development - is a concept developed by Soviet psychologist and social constructivist Lev Vygotsky (1978) which describes the difference between what a learner can do without help and what he or she can do with the help of an adult or peers.

Limitations of the Study

The nature of the study lends itself to certain limitations. Mixed methodologies, though viewed as strength overall, compounds the weaknesses of the individual methods and impose certain limitations. Among the limitations of the study are the following:

Measurement Error. Survey results are subject to errors in measurement. Measurement error results when participants survey responses are not relevant to the specific questions asked, or if incomplete answers to open-ended questions are provided, or if participants fail to follow directions.

Sampling Error. By design, the purposive sampling in the study excludes many LaSIP participants. The survey will be used to collect quantitative and qualitative data only from the people who are included in the sample. Therefore, the degree to which this sample does not represent the general population of LaSIP participants can lead to sampling error.

Non-Coverage Error. Participants in the study are limited to responding science teachers who were former participants in the LaSIP and those teachers presently in the work force in the Greater New Orleans and Greater Baton Rouge Areas that respond to the survey. Other members of the teaching profession who have participated in professional development activities are not covered by the sample frame and will therefore have no chance of being selected into the sample.

Non-Response Error is the result of not being able to reach people who would be eligible to take the survey. It is bias that results due to the difference in responses of those people who complete the survey compared to those who refuse to do so for any reason. .

Observer objectivity-Personal interviews are an integral part of the data collection for the study. The extent to which the observer knows what to look for and can, to the extent possible, operate in an unbiased manner can make the difference between a defensible study and one that is characterized as one person's opinion. Because some of the participants were known to the project co-director, observer objectivity is a potential limiting factor.

Summary of Chapter One.

In spite of considerable funding at both the district, state, and national levels, many researchers report that professional development for teachers remains fragmented and teachers' roles in the development and implementation process are marginalized. Yet, there is wide-spread agreement amongst practitioners and researchers alike that teachers are the key to school reform and student achievement.

There is clearly a need to increase the role of teachers in improving their own professional growth and in making professional development relevant to the needs of the students in the classroom. This change in focus require paradigm shifts in both the content of professional development and teachers' understanding of both the theoretical basis of needed changes in teaching and learning and the practical contexts in which these changes are to take place.

Professional development must be viewed through a wide lens that includes theoretical, psychological, physiological, social, and practical perspectives. Theoretically, the conceptual framework for this study embodies a constructivist view of professional development as it relates to teachers' perceptions of research-based practices. Constructivism is a theory of learning that is widely held by science reform leaders and researchers. The needs of teachers, along with the context in which professional development is offered, must be taken into account when planning professional development activities. Implementation of research-based practices in the classroom depends on how well we address the professional development needs of teachers from multiple perspectives.

This study carries with it various limitations. Among the limitations are non-coverage errors, sampling errors and possible subjectivity issues that may arise during qualitative interviews and data interpretation. Though no research study is perfect, every effort will be made to address these limitations as they arise and to account for the errors in any conclusions drawn.

Chapter Two

Review of the Literature

"We teach a subject not to produce little living librarians on that subject, but rather to get a student to think ....for himself, to consider matters... to take part in the process of knowledge getting. Knowing is a process not a product."
Jerome Bruner...Towards a Theory of Instruction

Introduction

This study attempted to determine teachers' perceptions of the usefulness of professional development experiences in changing and improving their levels of implementation of research-based teaching strategies in the classroom. Professional development for teachers has taken on great urgency in light of lagging student performances in many schools across the United States and cash-strapped budgets in many school districts. In spite of this urgency, professional development for teachers has been characterized by some researchers as being sporadic and fragmented and poorly defined both conceptually and in practice (Reitzug, 2005). The evolving definitions of professional development are indicative of the struggles to describe in explicit terms how school districts and schools must organize and implement professional development in order to increase teacher learning and student achievement (Mizell, 2008).

An initial review of the literature indicates that the terms *in-service*, *staff development* and *professional development* are often used synonymously. However, as factors that influence professional development emerge in research findings the need to distinguish between these three terms becomes more evident. For example, Bellanca (1995), distinguished between the three terms based on how each may be seen from a school system's point of view. From such a perspective, he distinguishes between *professional development, staff development and in-service* as follows:

> *Professional development,* is a planned, comprehensive and systemic program designed by the system to improve all school personnel's ability to design, implement and assess productive change in each individual and in the school organization. *Staff development* is the efforts to correct teaching deficiencies by providing opportunities to learn new methods of classroom innovations. I*n-service* is the scheduling of awareness programs usually of short duration, to inform teachers about new ideas in the field of education or in a worst case scenario, to fill mandated institute days with any topic or speaker, (Bellanca, 1995, p.6).

Other definitions can be found in the National Science Education Standards (NRC, 1996) and in the No Child Left Behind Act (2002). Learning Forward, (formerly the NSDC), released a more extensive definition for professional development in 2011 that has been proposed as an amendment to Section 9101 (34) of the Elementary and Secondary Education Act, reauthorized by the No Child Left Behind Act of 2002 and ARRA, 2009. If provisions of the amendment are accepted and implemented, it will represent sweeping changes to what is now the focus and intent of professional development. These changes are not likely to take place overnight. As officials at Learning Forward have pointed out, making the proposed definition of professional development a reality is likely to be a long struggle (Mizell, 2008).

The new definition for professional development by Learning Forward is based on its standards for professional development (National Staff Development Council (NSDC), 1995; 1995a; 1995b). It supports the ideas outlined in the conceptual framework for this study, that professional development for teachers should be viewed from multiple perspectives and that teachers should be involved at all levels, including planning that is based on teacher and student learning needs. Support for professional development of science teachers is important as noted in the recommendation of Bybee (2010), who supports professional development programs that are intense, constant, pay attention to content and encourage participation in professional learning communities. He recommended that educators take precise action in this regard: First, establish summer institutes that focus on building teachers' *pedagogical content knowledge*, a term attributed to Shulman (1986), and requisite skills with follow- up experiences during the academic year. Second, build up online communities that sustain participating teachers. Bybee further recommended that such programs extend beyond one year.

Regardless of the source of the proposed definition of professional development, such definitions generally focus on the *content* of the activity (what is taught or learned), and/or *context* (where learning takes place and under what circumstances and/or the *process* (how learning takes place and the duration of learning); (NSDC, 1995). Although, definitions change as new evidence evolves, a clear understanding of what is meant by professional development helps to set boundaries for this study. Therefore, for purposes of this study, the terms professional development and staff development will be used to describe intense study focused on developing science teachers' content knowledge and pedagogical skills over periods of time that are several weeks in length with appropriate follow-up activities directed toward reinforcement and learning transfer.

The literature review includes evidence that earlier, widely accepted models of professional development may be at odds with models proposed in later research studies. Therefore, features of the LaSIP will be explored as part of a larger picture of professional development focused on science education. In the early 90s, the LaSIP was part of the systemic initiatives funded by the National Science Foundation and the matching funds supplied by state grant recipients. The statewide initiatives were designed to improve teaching and learning in mathematics and science.

Federal grant programs like those supported by the National Science Foundation in partnership with states like Louisiana, require grantees to use scientific research as a basis for making decisions concerning what educational interventions and reform-based initiatives to implement in the classroom. Student improvement in the sciences is considered to be critical to the United States' ability to compete globally. Therefore, educational researchers are required to develop scientifically based research concerning the best ways to teach science (Bybee, 1993; 2010; Beghetto, 2003). Further, teachers who participate in programs like the LASIP are encouraged to use *research-based teaching strategies (RBTS)* with proven effectiveness and reject unproven fads (Sparks, 1995; Slavin, 1998; NCLB, 2002).

There are many studies of teacher learning and its connection to the process of teaching science, but few of these studies connect teacher learning and student achievement, (Fullan, 2001; Guskey, 2011). This literature review describes some of the early efforts aimed at providing professional development for improving teaching and learning in science and determines where the research presently stands concerning professional development and its implementation in the classroom.

Social and political events such as the end of World War II and the launch of Sputnik, often define changes in our educational system. Therefore, the effects of many of those changes will be reflected in the type and focus of the research studies in this review. The literature review will be divided into three broad areas of study (1). Early Efforts in Professional Development (2) Current Issues That Guide Structuring and Implementation of Professional Development and (3)

Research Needs Themes identified in the conceptual framework for this study will serve as focal points throughout the review.

Early Efforts: "Telling is not teaching. . .Listening is not learning.''

Professional development providers should be able to help teachers understand what teaching strategies work and why they work. Although constructivism is viewed as the theoretical basis for understanding teachers' perspectives of professional development in this study, this view of professional development was not always the basis for decision-making and indicative kind of learning opportunities offered to teachers. Early efforts to provide learning opportunities for in-service teachers were usually limited to changing the behavior of teachers in training provided in teacher institutes presided over by experts or those in authority. Teachers were perceived as being deficient in knowledge and therefore had little to offer in improving teaching and learning. It was assumed that the experts or those in authority could decide what teachers needed, tell them what to do and that these efforts alone would result in improvement of teaching (Corey, 1953).

Such thinking and assumptions prevailed for many years, but came under questioning in the early 1950s. Until this time, the teacher institute had dominated professional development efforts and consisted of sessions in which teachers were lectured to and expected to carry out activities as prescribed when they returned to the classroom. However, as a result of the enactment of higher standards and the emerging professionalism of teaching, this view was challenged by a newer view that recognized the role of the school and the need for collaboration among faculty members in implementing changes in teaching and the way teachers learn (Goodlad, 1975; 1984 and Edelfelt & Johnson, 1981).

Therefore, in the late 1950s, research studies began to focus attention on the emerging professional status of teachers. Educational researchers gained new knowledge of group dynamics and recognized the importance of including teachers in efforts designed to improve teaching. This new focus on teacher professionalism challenged the notion that teachers were deficient in knowledge and therefore needed to be closely supervised by those in authority (Parker, 1957).

Decades later studies by Loucks-Horsley (1989) reconfirmed these findings noting that, an investigation of research and practice in professional development suggests that effective programs support teacher growth and focus on relevant content that is either research-based or has confirmed efficacy in schools and classrooms. Loucks-Horsley *et al.* (1998) in a review of effective professional development programs presented a summary of these findings noting that effective professional development programs:

1. Ensure opportunities for teachers to participate in decisions about what they will learn, how they will learn, and how they will use what they learn;
2. Include program designs based on knowledge about learning and the process of change;
3. Provide opportunities for teachers to work together as they learn, plan to use, and implement their new knowledge and practices;
4. Establish norms that support experimentation and risk taking;
5. Include time for teachers to participate fully in the learning experience, to practice, to master new behaviors, and to incorporate new practices in teaching routines;
6. Integrate staff development into other initiatives of the school or district, with a connection between individual, school, and district goals;
7. Provides direction and clear expectations, coupled with ongoing support for teachers to learn and to use what they learn and
8. Offers appropriate and sufficient incentives and rewards. (Loucks-Horsley *et al.*, 1998, pp. 1-7)

According to the views espoused above, effective professional development embodies the constructivist model for good science teaching. The constructivist model involves active learning techniques, connecting new learning to teachers' current conception of science, teaching and learning, sufficient time for learning new ideas, and multiple opportunities to observe models and apply new knowledge in practice (Loucks-Horsley *et al.*, 1987; Loucks-Horsley, 1998).

The Training Model

Although many of the beliefs outlined above underlie effective professional development today, it was the training model of professional development that permeated the literature during the late 1950s and well into the 1960s (Edelfelt & Johnson, 1981). Hence, much of the attention of researchers was focused on the in-service provider rather than on the needs of the classroom teacher. A professional development provider was viewed as someone, who in today's parlance, was capable of multi-tasking, offering new ideas and problem-solving. (Miles & Passow, 1957). These researchers expanded the list of tools providers should use, which included surveys, study groups, workshops, clinics, institutes and academic work. Their work contributed greatly to the knowledge base in three areas: techniques of group operations, techniques of research and evidence gathering and systems for the delivery of services. In this process-oriented approach to the study of teacher in-service, Miles and Passow participated with schools, documented their findings and developed generalizations based on the documentation.

Like most institutions, teaching was subject to changes in political and social circumstances due to World War II. Teacher shortages resulted in the hiring of unqualified teaching personnel with emergency certificates. During this period, the earlier push toward teaching as a profession was stymied by emergency licensing and teacher shortages brought about by the baby boom. Much of the research in teacher education in the 1950's and 1960's was in the form of large scale studies conducted by organizations like the National Education Association (NEA) and later the National Council of Accreditation of Teacher Education (NCATE). These organizations worked collaboratively to develop standards governing both pre-service and in-service educational needs of teachers. However, standards for pre-service education dominated these efforts diverting attention away from needed in-service teacher education.

Process issues heavily influenced researchers in the '60s and mid-'70s when education shifted attention to issues concerning the subject matter taught and national curriculum studies emerged (Fosnot, 1989; Ferguson & Womack, 1993). Debate again emerged concerning the importance of subject matter versus pedagogy and remediation of deficits in teacher training versus professional growth. As a result, teacher training underwent changes in emphasis and length. The previous normal school training which was equivalent to two years of college training was changed to four year teacher colleges that included courses in foundations of education and methods courses (Edelfelt & Johnson, 1981). Therefore, in-service providers were forced to learn to cope with a better trained teaching force. Teachers began seeking more involvement in their education and were less willing to accept the prescriptive approach to training that dominated most professional development activities, so that research shifted to study of the classroom environment (Anderson, Ryan & Shapiro, 1989; American Educational Research Association (AERA), 1992).

Focus on the Needs of Individual Teachers….More Teacher Input.

The shift toward study of the classroom environment continued in the 1970's with the publication of a five volume report focusing attention on in-service teacher education (Joyce, Weil & Calhoun, 1976). The report was an attempt to review the literature, present the issues surrounding teacher education and emphasize the need for in-service education. Other reports, prepared by the National Center for Education Statistics (NCES) and the Teacher Corps provided clarification for definitions, structures and variations in in-service needs, including the changing needs of individual teachers. Organizations like the NEA continued to emphasize the need for teacher involvement in the planning of in-services and the relevance of teacher in-service theory and training to practices in the classroom (Jackson, 1972; Hall & Loucks, 1979).

The Space Race and New Emphasis on Mathematics and Science

Russia's launch of Sputnik in 1957 prompted the United States to re-focus on America's schools and its teachers as well as encourage politicians and other policymakers to pour vast amounts of resources into the National Science Foundation (NSF). The NSF used its resources to organize subject-matter oriented institutes designed specifically to increase the content knowledge base of high school science teachers. The number of institutes increased dramatically, from four in 1956 to 85 in 1958 to more than 300 by 1970 (Edelfelt and Johnson,1981). The NSF later received grants to develop science curricula such as the Physics Science Study Committee (PSSC) in Physics and the Biological Science Curriculum Study (BSCS) and trained teachers to implement the curricula.

Following the launch of Sputnik by Russia, the prevailing belief in the United States was that education was the first line of defense against Soviet domination. This view is evidenced by the creation of the National Defense and Education Act (NDEA) of 1958 which provided financial support to numerous organizations and individuals. Support included financial support to undergraduate and graduate students, contracts to schools and universities for research and development, funding for study, training and development of materials by in-service teachers, capital for equipment, upgrading and maintenance of facilities and support of basic research and dissemination of information. From the late '50s through the early '70s the NDEA along with the Higher Education Act awarded more than 300 million dollars to efforts aimed at improving education (Willson & Garibaldi, 1972: Berman & McLaughlin, 1978; Edelfelt & Johnson, 1981). Large institutes to improve teacher training and overall student education were common. The institutes emphasized acquiring knowledge of subject matter and were reported to be successful in improving the knowledge of individual teachers. Many science teachers were able to earn advanced degrees resulting in a better trained workforce (Bybee, 1993).

Providers of professional development for the teacher institutes failed to make the content of activities relevant to issues teachers faced in the classroom (Ainsworth, 1976; Berman & McLaughlin, 1978). Moreover, the science institutes were found to have little success in changing the way science teachers taught or in selecting the materials teachers used. Classroom teachers, who were in many instance beneficiaries of these large teacher institutes, exercised little control over curricula being implemented in their school districts. Therefore, in spite of the amount of federal funds expended, these efforts produced limited improvement in science teaching and student learning.

Schools…An Important Context for Professional Development

Professional development for teachers has shifted directions several times over the years. The 1970s saw a shift toward focusing on the school as an important context for professional development. The most effective efforts in professional development were those designed to extend beyond acquisition of subject matter and involve teachers in the school improvement process as well. Researchers began to pay attention to what teachers did in the classroom that impacted student learning (Lieberman & Miller, 1979). Research efforts were directed toward probing facets of teacher behavior and to offering insights into how teacher behaviors affected student learning. Rubin (1972) provided some valuable insights into in-service education, noting that problems that teachers face in the classroom are a powerful instrument of continuing education. Another researcher noted that through effective professional development involving teachers, "new students can be served, new knowledge can be developed into meaningful and useful educational content, new means of learning can be devised and new uses of learning can be developed." [Further, he notes,] "Constructive involvement of teachers in attacking the real educational problems that they face is a powerful instrument of continuing education.'' (Tyler, 1972, p.7). Tyler's comments underscored the importance of using teacher expertise to improve teacher professional development.

Other researchers have advocated improving in-service offerings by enhancing teachers' ability to solve problems and develop attitudes and skills of educational inquiry. Therefore, prevailing wisdom would dictate that both the individual teacher and the school should play a part in the teacher's professional growth. Tyler, however, noted with great clarity that teachers should have a pivotal role in the process….

> assuming that the teacher has a strong desire to become as adept as possible in assisting children to learn, it may be that in many instances his own estimate of his professional needs is more reliable than any other which can be made (Tyler, 1972, p. 7).

Since the behavior of teachers in the classroom is more likely than not to be dictated by the perception of their role as educational professionals, providers would be better served by respecting their opinions in designing and offering professional development activities. Jackson (1972) notes that, "the single most important source of knowledge about teaching is the act of teaching itself", [but goes on to caution that] "experience alone is not sufficient to stimulate continued professional growth" (Jackson, 1972, p. 5). In order to reach this goal, teachers must be given time to reflect on their learning experiences and make sense of it away from the pressures of the classroom where the experiences occur.

They must be given opportunities to confer with colleagues and observe other professionals in a classroom setting. Teachers, like their students must be given the opportunity to solve real problems. Thus, providers, teacher leaders and principals cannot persist in designing professional development activities without input from the teachers they purport to serve. These views of the teachers' role in professional development changed the role of in-service providers, teacher leaders and principals. The top down approach gave way to efforts intent on enhancing teacher judgments concerning their professional needs and helping them to clarify their insights and perceptions of teaching and learning (Hall & Loucks, 1979; Devaney & Sykes, 1988; Aubusson & Webb, 1992).

Lieberman and Miller (1979) developed a perspective concerning the social realities of teaching. Accordingly, the social realities of teaching encompasses the experiences and shared perceptions that characterize teachers' work as seen from the teachers' points of view or perspectives. They proposed eight social system concepts to characterize the nature of teaching. From teachers' perceptions: teaching style is personal, the greatest reward for teaching is derived from students, there is no definite link between learning and teaching, the knowledge base for teachers is weak, teaching is an art the goals of teaching are unclear, there is a need for control norms of teaching and professional support is lacking.

As pointed out in the eight social system concepts above, not all data concerning professional development of teachers and teaching are quantifiable. The concepts identified by Lieberman and Miller defined the day- to- day nature of teaching…. the rhythms, rules, interactions and feelings that dominate the teaching profession. The perspective of Lieberman and Miller was noteworthy because it was explanatory rather than normative. It portrayed what teaching looks like from a teacher's point of view and was seen as flowing from an acknowledgment of the real, social world of teaching.

Struggles concerning the importance of in-service education of teachers were not limited to just elementary and secondary teachers. Some researchers in the early 1970s suggested that the whole spectrum of teaching from pre-K through College needed scrutiny. Many of the NSF sponsored institutes of the 70s were focused on educating college and university teachers. This focus makes sense in light of the fact that teachers tend to emulate their college professors. They teach the way they are taught (Britzman, 1991).

Throughout the mid- 1970s the prevailing schools of thought was that professional development activities should take place in teachers' workplace rather than external environments that have no relevance to where and how teachers do their job. Hence through the work of researchers like Sarason (1971) and Goodlad (1975; 1984) the context of professional development took on greater importance. Discussions were focused on the school as the entity of change. Dialog, Decision-making, Action and Evaluation (DDAE), was a process described by Goodlad in his 1975 study of 18 schools over a 5 year period. Goodlad suggested that the DDAE process characterized authentic school improvement efforts and supported the connection between school improvement and professional development. He noted that both (school improvement and professional development), required time, leadership, structure and support from a large portion of the staff in order to promote successful dialog. Thus the school improvement process from a political and cultural viewpoint gained prominence in the literature and focused on issues like organization renewal, leadership, teacher efficacy and commitment of organizations to professional learning (McLaughlin & Marsh, 1979; Hall & Loucks, 1979; Vaughn, 1983;).

The Rand Change Agent Study

According to McLaughlin and Marsh (1979), the Institute on Education and Training, a division of the Rand Corporation (a non-profit organization), sought to improve policy and decision-making based on research and analysis of data collected from federally funded programs. The Rand change agent study generated considerable dialog among researchers and professional development providers concerning school improvement. Its efforts were broad in scope and encompassed some 293 federally funded school improvement programs in 18 states. The study set forth five basic assumptions concerning teacher learning and the role of the school that still guide design and implementation of professional development:

1. Teachers possess important clinical expertise, that should be used in place of outside consultants
2. Professional learning is an adaptive and heuristic process that leads to change in both the innovations and the people implementing them.
3. Professional learning is a long-term, nonlinear process that cannot be predicted and controlled external to those involved.
4. Professional learning must be tied to school site program building efforts rather than focused on isolated technical skills.

5. Professional learning is critically influenced by organizational factors in the school site and in the district and involves role groups at all levels, especially, the school principal as the gatekeeper of change (McLaughlin & Marsh, 1979, p.7).

Not everyone agreed with conclusions drawn in the Rand Study. Among the educators who disagreed was Slavin (1998), who noted that contrary to views in the Rand Study, “it is not necessary for teachers to invent a program in order for them to be fully committed to making it a success; it is necessary, however, that they have unfettered choice.” (p. 1)

Concerns-Based Adoption Model (CBAM)

The Concerns-Based Adoption Model (CBAM) as reported by Hall & Loucks (1979) was designed to describe how people develop as they learn about an innovation and the stages of concern they experience during the process. The stages of concern depicted in Figure # 2, are shown as stages in human learning and development during the implementation of an innovation. The lowest stage represents the stage of awareness with a description of what participants may say concerning the innovation. As the learner progresses through the various stages, they learn more about the innovation and become more proficient in the use of the innovation, and finally move to concerns about how the innovation may affect others.

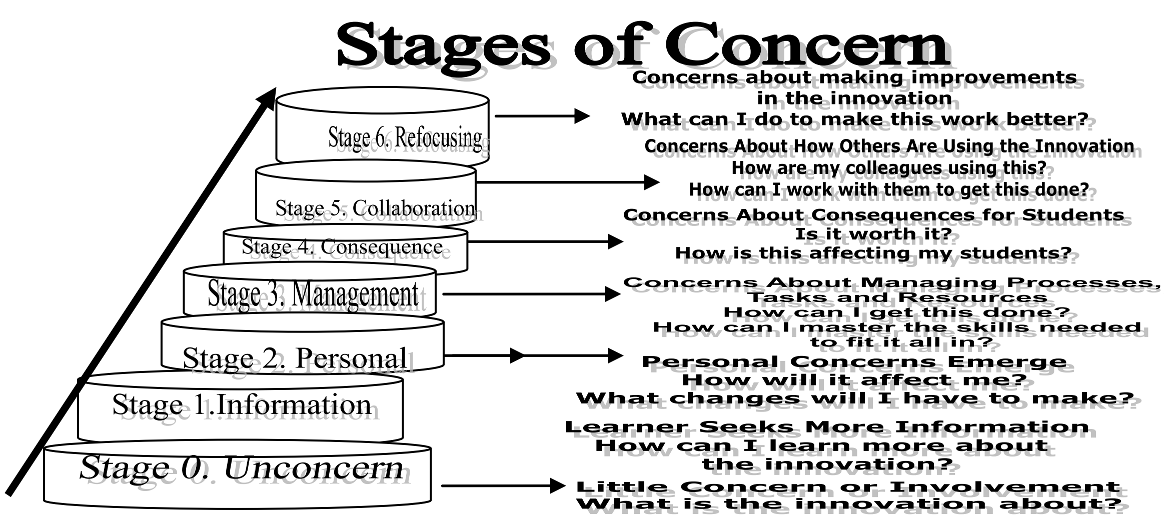

Figure 2 CBAM: Stages of Concern (adapted from Sweeney, 2008)

According to its founders, CBAM is a developmental model that acknowledges that the learning process brings about change and if learning is to progress, people must be supported during the various stages of concern that make up the learning process. As seen in Figure 2, initial questions are more self-directed: What is it? ... How will it affect me? Once these concerns are resolved, questions that are more task-oriented emerge: How will I do it? … How can I use the materials effectively? … Why is it taking so much time? What does it mean for my students?

The stages of concern have major implications for professional development. It is important that providers understand where participants are along the continuum of concerns and address their concerns when they are expressed. Professional development efforts often fail, because providers may move to explaining how to do it before they address participants' concerns about what it all means to them.   They may attempt to focus on the training will affect student achievement before teachers are comfortable with using the strategies or materials themselves. Therefore, follow-up is seen as a crucial element in the C-BAM model. Proponents of the model suggest that monitoring of implementation should continue for several years.

Showers, Joyce & Bennett (1987) offered further support for professional development as a way of furthering school improvement goals. They conducted a meta-analysis of more than 200 research studies related to professional development.   Significant among their findings was the notion that the act of teaching involves conscious reasoning and thinking and that approaches to professional development that stress external teaching modes are less effective than those that allow teachers to decide on the practices to be incorporated and used correctly in the classroom.

Showers, Joyce & Bennett (1987) also identified the four most effective components of teacher training as effective explanations of theory, modeling of strategies that are to be implemented, opportunities for participants to apply the strategies in a workshop setting and providing meaningful advice to participants concerning efforts to transmit learning to the classroom (p.79). They promoted instructional coaching in the school setting as a means of sustaining implementation of new strategies. Their focus on coaching supported the notion that all teachers need social support as they strive to transfer information and skills into classroom practice. This also underscores the importance of follow-up in providing effective professional development.

Although the metaphor of professional development as culture building evolved from a later work of Lieberman & Miller (1990), this notion was supported and embellished by Hargreaves (1988); Rosenholtz (1989) and Little (1981; 1993). The works of these researchers changed the thinking about professional development for teachers and about the problems and probabilities for change. Significantly, they based their findings exclusively on qualitative data about how teachers work in schools.

In studies of schools in Denver, Little (1981) and Rosenholtz (1989) focused on conditions in the workplace and made strong cases for the linkage between professional development and building a new program culture in schools. Rosenholtz examined teacher perspectives of schools and teaching where she identified the conditions that influence teachers' opportunities to learn: goal setting, teacher evaluation, shared goals and teacher collaboration. Rosenholtz further explained that in school cultures where teachers faced *barrier*s to collaboration such as isolation and limited or no principal support, teachers reported that teacher learning opportunities were limited. These findings led to the conclusion by Rosenholtz and others that teachers, working in settings conducive to collaboration, tended to participate in life-long learning or continuing education (Thomas & Taylor, 1983). Unfortunately, these findings did not lead to immediate changes in the way professional development was offered or implemented.

Educational practices are often resistant to change. Although researchers emphasized the connections between professional development, professional learning cultures and teacher learning during this period, many policy makers continued to cling to the deficit model of professional development. Some in-service providers also ignored the research and continued to see staff development as a way to correct deficiencies in teacher training. They continued to use traditional short term or one shot strategies to remedy the problem. Hence, well into the 1980s, professional development for teachers continued to be a series of events isolated from the realities of classroom life, and planned and administered by district personnel.

Focusing on Content … Ushering in a New Wave of Educational Reform

At times, changes in schools and school policies are brought about by changes taking place far from the school house door. Such was the case in 1983. The release of "A Nation at Risk" (National Commission on Excellence in Education, 1983) emphasized the nation's need to focus on higher standards, more tests and more courses. For several years, professional development of teachers was placed on the back burner and the 'mediocrity of schools and teachers' dominated the literature. There was a mounting need for a broad strategy for educational reform and school improvement. Instead, policy makers and educators alike focused single mindedly on content.

The Carnegie Foundation Report was issued in 1986. The report ushered in a new wave of educational reform. The emphasis was on ideas concerning teacher professionalism, school standards and superiority in education. The need for professional development was driven by the urgent need to train more teachers. During this period, the aging of the teaching profession and the need to attract and retain good teachers elevated the discussion of professional development to new levels (Cochran-Smith & Lytle 1990; Darling-Hammond, 1990; Devaney & Sykes, 1988;

Fullan, Roleiser & Bennett, 1990). The Carnegie report and the research studies that followed it, helped to create a new vision of education and hence a new vision for professional development. This new vision encompassed the ideas that schools should be places where teachers are viewed as professionals and have leadership roles in the schools where they teach and learn. Therefore, researchers began to focus on the practical knowledge of teachers and the teaching behaviors of teachers in the classroom and on the special kinds of knowledge possessed by teachers (Shulman, 1987; Koshy, 2005)

1990s…A Shift in Focus

The focus of professional development shifted again in the '90s. Research studies concerning professional growth of teachers in the 1990s were dominated by interest in teacher professionalism, effect of teaching on student achievement, increasing the knowledge base for teachers, action research, reflective practice and the teacher as leader. Researchers began to focus study on the powerful influence of the school as an environment conducive to teacher learning. Emergent themes like peer assistance, mentoring and coaching influenced both what was offered as professional development and how it was designed and delivered. Research on work in the classroom from teachers' perspectives gained respect and credibility (Miles & Louis, 1990; McLaughlin, Talbert & Bascia, 1990; Aubusson & Webb, 1992). However, as important as these advances were, Little (1993) noted that inclusion of mentoring and coaching as parts of professional development were not included often enough to make a difference in teaching in the classroom. Lamenting the lack of rigor of professional development offerings, Sykes (1999) urged providers to put increased emphasis on the content of professional development:

> "The concern for linking teacher learning with improvements in student learning is what recommends an emphasis on content. One difficulty with the prescriptions for effective

professional development is their lack of grounding in evidence of impact on student learning." (Sykes, 1999, p .1)

The supportive research for the link between teacher training and classroom practices were well documented in the 1990s (Bybee, 1993; Fullan, 1993; Bellanca, 1995; Brooks & Brooks, 1999; Guskey & Sparks, 1996), but as many researchers have noted, many of these findings were still largely ignored.

> Despite a decade and a half of reform talk, teachers mostly continue to teach as they have in the past. In the absence of substantial professional development and training, many teachers naturally gravitate to the familiar methods they remember from their own years as students. (Sparks & Hirsh, 2000, p. 1).

Decades later, these sentiments are still being heard in some forums. In many instances, it is clear that we must change the way we structure professional development, if it is to have the intended impact in the classroom (Guskey & Yoon 2009; Van Dusen and Otero, 2011).

Current Issues That Guide Structuring and Implementation of Professional Development

New Roles for Teachers. The dominance of the accountability issues that now frame the dialog in education reform and the development of new standards of teaching and learning in science demand new roles for teachers. The new roles also demand new approaches to teacher training. Seemingly, professional development should provide opportunities for continuous learning that include teacher input concerning teachers' learning needs and respect for teachers' perspectives about what works. This study was designed to gain insight into the effectiveness of professional development efforts as seen from the perspective of teachers. The data collected was used to understand what knowledge, skills, abilities and teaching conditions teachers perceive as being conducive to learning and are perceived to have a positive impact on what they do in the classroom. Further, what is the perceived impact of teachers' professional development experiences on student performance?

Attributing different roles to teachers also requires a different vision of professional development. Within this new vision of professional development, teachers are engaged in continuous learning, conducting action research, questioning decisions concerning curriculum, instruction and assessment, and reflecting on practice. To reach such lofty goals there must be a paradigm shift in teacher beliefs and practices. Within such a worldview, teacher professional development would not be just an end, but a means for developing a professionalism of teaching that is based on realities in the classroom. (Devaney and Sykes, 1988; Von Secker and Lissitz, 1999; Loucks-Horsley *et al.*, 1998; 2003; Darling-Hammond & Bransford, 2005).

The Faces of Systemic Reform. The designs of professional development activities to reach these goals are many and varied, and include programs like the State Systemic Initiatives (SSI) programs launched by the National Science Foundation. Many of these programs are ongoing, though many have been modified due to changes in funding or lack of funding at the state level. The primary goal of these initiatives was to improve science and mathematics instruction and technology throughout entire schools or school districts or states in order to bring about systemic reform (Cohen, 1995; Ishler, Johnson &Johnson, 1998).

According to studies of SSI conducted by Breckenridge and Goldstein (1998) and Horizon Research, Inc. (HRI, 2000), specific goals identified for the systemic initiatives included engagement of teachers in active learning during 120-160 hours of high quality professional development, clear learning goals and evaluation plans that included formative and summative feedback. Since 1992, thousands of teachers have been involved in hundreds of science projects funded under Louisiana's Systemic Initiatives Program. A typical project provides 120-160 hours of contact per participant over a full year. A typical LaSIP professional development program has three components (1) rigorous, content- rich, classroom-relevant studies at State Universities during 2-3 week summer sessions (2) structured follow-up during the academic year; and (3) site coordinators with extensive classroom experience to serve as liaison between faculty and participants and to provide support to participants during the academic year (Finley, 1999). In spite of the many positive results of the Louisiana Systemic Initiatives Program (Breckenridge and Goldstein, 1998; Radford, 1998; Banilower, Boyd, Paisley, & Weiss, 2005), research studies indicated that only a small percentage of most professional development experiences were actually implemented in the classroom. Similar reports of low levels of classroom implementation were reported in other studies of professional development: (Hirsh & Ponder, 1991; Killion & Kaylor, 1991; Loucks-Horsley, *et al.*, 2010; Kington, Sammons, Day & Regan, 2011).

Few of the aforementioned studies have focused specifically on the LaSIP. However, Breckenridge and Goldstein (1998) described a case study of the Louisiana Systemic Initiative Program (LaSIP) covering the years 1992-1996. They reported on the overwhelming task of implementing comprehensive reform in a state that performed poorly on many indicators of educational quality and efficacy. In spite of the task before them, directors of the program made progress that warranted several rounds of additional funding.

The LaSIP, like other SSI professional development projects was judged on its impact on teachers' classroom practices and during its first five years produced mixed reviews. The program focused primarily on changes implemented at the classroom level which limited its effect on systemic changes at the school and district levels. Reportedly, individual teachers had positive attitudes toward reform and increased their professional participation. However, the extent to which teachers were able to implement the main beliefs concerning mathematics and science instructional reform in their classrooms, varied extensively (Breckenridge & Goldstein, 1998). Based on anecdotal records, Breckenridge and Goldstein noted that a "few teachers were transformed" following their LaSIP experience and were comfortable implementing the learning in the classroom, but:

> more often, teachers understand the changes conceptually, but are uncomfortable applying them in the classroom. Others are enthusiastically trying new things in the classroom, but do not seem to grasp what the changes are about. Most need more time and practice to make the changes significant and lasting. Classroom observations as part of the LaSIP's own evaluation activities indicate that LaSIP teachers were less apt to use lecture techniques, more apt to probe for prior knowledge, and more apt to use cooperative group activities. (Breckenridge & Goldstein, 1998, p. 25)

Their findings concerning the Louisiana Systemic Initiatives program were similar to those found in studies of Local Systemic Change through Teacher Enhancement (LSC) programs in other states. Though similar in scope to SSI projects, the LSC program added specific curriculum materials and focused on whole districts as units of change. Supovitz, Mayer & Kahle (2000), investigated the longitudinal impact of LSCs in promoting inquiry-based instruction in the state of Ohio. The study focused on changes in teacher attitudes toward inquiry-based instruction, the capability of teachers to adopt inquiry-based teaching strategies, and use the strategies in the classroom. According to reports by Supovitz, Mayer & Kahle (2000), significant growth was sustained over several years in both mathematics and science.

In another study conducted in 1997, Supovitz and Turner (2000), used data from 24 Local Systemic Change (LSC) Teacher Enhancement programs from across the United States to study the link between professional development and visions of change in the practice of teaching. They described the sample (3464 science teachers with varying levels of formal exposure to high quality professional development and 666 principals) and listed the following findings:

1. Teachers' use of inquiry-based (research-based) practices was greatly influenced by supportive principals, and the availability of resources such as availability of relevant science supplies, time for teachers to plan and prepare lessons.
2. The largest school level influence on teachers' practice and classroom culture was poverty. In schools with high percentages of students receiving free or reduced lunch teachers used inquiry-based practices 20% less frequently and had about 30% less frequent use of investigative culture.
3. Only teachers with more than two weeks of professional development reported teaching practices and classroom cultures above average. The big change in teaching practice came after 80 hours of professional development and the big change in investigative culture came after 160 hours of professional development.
4. Content preparation was one of the strongest predictors of reform-based teaching practices. (Supovitz & Turner, pp. 972-975)

The LSC and Teacher Enhancement (TE) programs made a concerted effort to provide teachers with relevant curriculum materials. The efforts were based on the premise that, if teachers are provided with opportunities to expand their "pedagogical content knowledge," (Shulman, 1987) in a framework of excellent instructional materials, it would result in a better prepared teaching force (Greenwald, Hedges & Laine, 1996). Additionally, teacher learning could be further enhanced by receiving ongoing support during the academic year (follow-up). These practices would increase teacher capacity to meet national standards and make teachers more likely to change instruction in order to do so. The ultimate goal of the teacher enhancement programs was improved instruction that leads to higher student achievement. Supovitz and Turner concluded that although the LSC and TE programs were based on research findings concerning successful professional development, increased usage of the curriculum materials in science classrooms varied and the negative impact of poverty outweighed gains in other areas (Supovitz & Turner, 2000). The LaSIP focused resources on teachers in low performing schools and underserved student populations as well. It is possible that studies like this will be impacted by some of the same factors and conditions.

In another study, Banilower, Boyd, Paisley& Weiss (2005) explained that the success of the LSC programs was due in large measure to the fact that nearly half of the professional development time was dedicated to engaging teachers in mathematics content and science investigations which allowed teachers to experience activities as students do. Teachers were engaged in working through problems in small groups and participating in guided discussions. Teachers also received standards-based content, examined classroom best-practices and analyzed student work. However, the study did not emphasize or focus on implementation levels. It follows that, the accomplishment of any professional development activity depends on effective delivery to the target population and the quality and quantity of implementation at the classroom level. This is also the point at which many teacher enhancement programs fall short (Frechtling, Sharp, Carey & Vaden-Kiernan, 1995).

There is a place for programs that seek systemic change through large scale initiatives, but implementation in individual classrooms is still ‘where the rubber meets the road’ (Steinberg, 2011). This statement is true even when comparisons are made between classroom environments in the United and those in other countries. Trends in International Mathematics and Science

Study (TIMSS), conducts comprehensive state-of the-art assessments of student achievement that is supported with extensive data about classroom learning environments. What can we learn from TIMSS results of high performing countries like Finland and South Korea?

The Impact of International Studies on Professional Development. The main focus of teacher professional development is implementation is the classroom. No matter how innovative the training experience, it is what teachers do in the classroom that is most important (Anderson, Ryan & Shapiro (1989); Von Secker, 2002; Wenglinskey, 2002; 2004). The studies conducted by Anderson, Ryan & Shapiro (1989) took place between 1981 - 1983 The studies were focused on the classroom environment where they compared teaching practices in various countries and linked effective teaching behaviors to greater student achievement. They identified the two most important categories of teaching behaviors which were practices in classroom management and instructional practices and described the protocol as having administered pre and post tests prepared by the international center. Qualitative data collection included from six to ten classroom observation at regular intervals. They listed the following countries as participants in the study: Australia, Canada (Ontario and Quebec), Hungary, Israel, Korea, Netherlands, Nigeria, and Thailand. The Federal Republic of Germany conducted the study two years later. The following results were reported:

1. Across countries, teachers relied heavily on whole classroom instruction. Little time was spent in small group instruction or work.
2. The opportunity to learn the content included in the posttest differed greatly within countries. Students in some classrooms were taught two or three times more of the content than were students in other classrooms.
3. The three most often observed classroom activities were lecturing, seatwork (either written or laboratory), and classroom management. They accounted from one-half to more than four-fifths of all the activities observed in all countries except Hungary).

4. The six most often registered teacher behaviors were - explanation - explanation with materials - asking recall questions - responding to questions - attending to procedural matters - silence. Teacher behaviors were more consistently associated with academic engagement than with final achievement. Thus, what teachers do in their classroom appears more highly related to what students do than to what they learn.
5. Students who spent more time actively engaged in learning achieved higher posttest scores. Students' perceptions of the task orientation of their classrooms also influenced their achievement as well as their academic engagement.
6. Students' initial achievement influenced their final achievement, and their initial attitudes influenced their final attitudes. Students' home backgrounds influenced primary initial achievement and aspirations. Home background did not have a direct effect on student achievement.(Anderson, Ryan & Shapiro,1989, pp. 291-292)

The results reported in this study apply to much of what is still being reported for classrooms in the United States (Jeanpierre, Oberhauser & Freeman, 2005). Though 4^{th} and 8^{th} graders are still performing at or above the average in math and science on international tests, United States students continue to lag behind other countries like Singapore in both mathematics and science. In this new information age, students of the United States are expected to compete not just locally and nationally, but internationally as well. Yet, they are not the top performing students in the world in math and science. Students in the United States have made only meager gains in the areas of mathematics and science since 1995, as indicated in the results of the latest TIMSS conducted in 2011 (Provasnik, *et al.*, 2012. These results are confirmed in the Program for International Student Assessment (PISA), conducted in 2009.

This trend in student data is disturbing to educators at all levels. Students need better training in mathematics and science, if the United States is to maintain its competitive edge in the world. Studies of the effects of standards-based content, research-based instructional strategies and authentic assessment on student achievement have taken on great importance for researchers and in-service providers in light of these findings. Accordingly, there is a need for highly qualified teachers who have acquired a conceptual understanding of standards-based content and instructional strategies and have been given sufficient practice in their use. Teachers' knowledge of standards- based content and their abilities to implement research-based teaching strategies in the classroom are keys to bridging the achievement gap between diverse groups of students in this country. This also holds true for the gap that exists between the U.S and other countries.

The Standards Movement. One of the most promising trends in professional development is that a number of organizations have developed standards to ensure quality for professional development. These efforts have been led by the National Staff Development Council (1995; 1995a; 1995b) and in science by the National Research Council (1996) which established the National Science Education Standards (NSES) on professional development in science. The science standards for professional development advocate training teachers in the use of inquiry teaching and learning versus reading from a textbook or listening to lecture as the primary mode of instruction. Further, collaborative and cooperative learning should replace emphasis on individual learning and that professional development should be on-going rather than episodic, one-shot ventures.

New standards to guide creation and implementation of professional development and new standards for identifying the content knowledge and skills of students have led to new directions and emphases for researchers (Killion, 1999). There is a substantial data base of research concerning the importance of the connection between the quality of the content of professional development and the effects of professional development on student achievement.

(Bellanca, 1995; Darling-Hammond, 2000; Reitzug, 2005; Kocher, Morrison & Geer, 2009). Reitzug (2005), however, described several conditions as qualifiers to the statement. Namely,

> staff development must adhere to certain principles such as, (1) emphasis on school level control (2) focus on instruction and student learning (3) commitment of resources over an extended period of time and development of professional development activities that engage teachers collaboratively in inquiry learning and reform-based instructional strategies. (Reitzug, 2005, p.1)

The innovative strategies that define the constructivist model of professional development are still a distant vision in many districts (Fullan, 2000; 2001).

Innovations are not one-dimensional. Changes in classroom culture are complex. Therefore, despite the growing need for research-based professional development that focuses on the classroom, many researchers indicate that the one size fits all models of professional development are all too prevalent (Fullan & Stiegelbauer, 1991; Lieberman, 1995 and Bellanca, 1995). Fullan & Stiegelbauer (1991) identified at least three components or dimensions at stake in implementing any new program or policy:

> (1) the possible use of new or revised materials (direct instructional resources such as curriculum materials or technologies) (2) the possible use of new teaching approaches (i.e., new teaching strategies or activities), and (3) the possible alteration of beliefs (for example, pedagogical assumptions and theories underlying particular new policies or programs. (Fullan & Stiegelbauer, 1991, p. 37).

Hence, many policymakers are demanding a closer fit between the principles of educational reform and professional development offerings for teachers because the content of these offerings are thought to be important to classroom instruction and student performance (Bybee, 2010). Some researchers take the argument a step further in stating that the content of teachers' professional development will be most effective when it emphasizes content that is directly related to the curriculum of students. They suggest that to increase the effect of teacher professional development on student learning, providers should involve teachers in learning about the content of the discipline they teach in the same way that students learn the content. (Ferguson & Womack, 1993; Garet et al, 2001; Bybee *et al.*, 2006; Bybee, 2009) In other words, ground the subject matter of professional development in the student course of study to establish a connection between what practitioners learn in professional development and what students learn in the classroom. Therefore, teacher in-service learning should apply to the same concepts, topics and skills required of students (Sykes, 1999; Brand & Moore, 2011).

Many providers and designers of professional development are heeding this advice and incorporate linkage of curriculum, instruction and assessment as tenets of school improvement plans. State policymakers are developing curriculum frameworks as they attempt to meet recommendations contained in documents like the National Science Education Standards (NSES) and the high quality professional development requirements of national mandates of the No Child Left Behind Act. According to NCLB, the requirements for high quality professional development should meet the following criteria:

1. It should be sustained over time, intensive and focused on the content that the teacher teaches.
2. It should be aligned with state academic curriculum standards and assessments.
3. It should be designed to increase teachers' knowledge of the subject matter they teach.

4. It advances teachers' understanding of effective instructional strategies that are based on scientific research.
5. It is evaluated regularly for impact on teacher effectiveness and student achievement. (NCLB, 2002)

It stands to reason that in light of these criteria, more rigorous requirements for professional development and teacher performances in the classroom are needed. Researchers will be challenged to conduct studies that meet high standards of research design in order to provide scientifically reliable evidence that teaching strategies, adopted by classroom teachers, are effective in improving student achievement.

Based on these requirements, researchers are charged with seeking answers to questions based on empirical studies that can establish the linkage of teacher professional development and student achievement. Is this approach to professional development for science teachers the answer? Are results of participation in these programs the same for all teachers? What accounts for the differences in implementation and hence differences in student achievement? No one study can answer all of the questions surrounding teacher professional development and student achievement ((Armour, *et al.*, 1989; Desimone, Porter, Garet, Yoon & Birman, 2002; Caffarella, 2002; Porter, Garet, Desimone, & Birman, 2003). Because the issue is so complex, providers must seek innumerable ways to provide effective in-service education and thereby provide pathways to understanding the links between teacher learning and student achievement (Guskey, 2000; Fullan, 2001).

Teacher Learning…Key to Educational Reform. Many researchers express beliefs that teacher learning is the key to educational reform (Sparks & Loucks-Horsley, 1989; 1990; Smylie, 1995)**.** However, based on reports from the National Science Board (2008), the various features of professional development such as active learning, relevant content, alignment with school and district goals and long-term participation, identified as being effective in bring about changes in teaching practices, were not widespread. Highlights of some the findings are included below:

> In 2003, more than 70% of mathematics and science teachers in public middle and high schools participated in professional development focusing on the content of their subject field. About two-thirds attended professional development in using computers for instruction. Professional development most frequently took the form of workshops, conferences, and training sessions (91% in 2003).
>
> Recent research has found that intensive participation of at least 60–80 hours may be necessary to bring about meaningful change in teaching practice. In 2003, 4% – 28% of mathematics and science teachers in public middle and high schools attended professional development programs for 33 hours or more over the course of a school year. (National Science Board , 2008)

These findings indicate that there is a need for more and better professional development programs to address the needs of in-service teachers (Caffarella, 2002; Hall & Hord, 2006). In 2011, Learning Forward (formerly NSDC), recommended that all professional development be built into the work day…job-embedded. Other studies, however, indicate that there is precious little time built into the workday to address teachers' professional development needs. The NCTAF (1996) notes that:

> most elementary teachers have only 8.3 minutes of preparatory time for every hour they teach, while high school teachers have just 13 minutes of prep time per class hour. Teaching loads for high school teachers generally exceed 100 students per day and reach nearly 200 in

some cities. Understandably, the average class size is 24 students, with some areas of the country averaging 30 students per classroom. (NCTAF, 1996, p. 54)

These figures are being further exacerbated by budget crunches due to the poor economic climate of today. Clearly, substantial changes in the way schools are structured are needed in order to move toward the job-embedded model of professional development envisioned by Learning Forward (2011).

As noted earlier, a growing segment of the literature on professional development for teachers is focused on the teacher as the most important factor in student achievement. Of great importance in fueling this perception has been the study on teacher quality conducted by Sanders and Rivers (1996), in which they collected data for teachers throughout the state of Tennessee. The longitudinal study set out to determine how effective teachers were by testing and following student progress over several years. These researchers found that “students assigned to the most effective teachers for two years could boost the scores of their low achieving students up to 50 percentile points compared to similar low achieving students who had ineffective teachers for two years” (Sanders and Rivers, 1996, p. 7) . This and several subsequent studies have corroborated the findings that indicate how important teacher effectiveness is to student achievement.

Many states have launched systemic reform efforts driven in part by the No Child Left Behind (NCLB) mandates. The amount of teacher input into efforts to meet these mandates varies from school district to school district. Yet, most of the research supports the view that innovations in education rise and fall on the basis of teachers’ acceptance of change and the willingness to implement strategies and programs related to the changes (Guskey, 2000; Guskey & Yoon 2009). While professional development efforts under NCLB have been directed toward helping all teachers reach highly qualified status and raising student achievement levels to make annual yearly progress, they often result in top-down approaches to professional development that is less than successful (Garet, *et al*., 2001; Joyce and Showers, 2002).

Several research studies attributed student learning to the qualification of teachers (Darling-Hammond, 2000; Ferguson, 1991; Haycock, 1998, 2000; Wenglinsky, 2002). These researchers confirm the notion that what teachers know is the most important factor influencing what students learn. In Darling-Hammond (2000) study of results from a 50 state survey, it is noted that teacher preparation is a stronger indicator of student achievement than class size and overall spending or teacher salaries and that it accounts for 40% to 60% of the total differences in student attainment after taking students' demographics into account. The study examined several factors related to teacher quality and student achievement which included teachers' verbal ability, knowledge of subject matter and, teachers' skillful use of a broad range of approaches to teaching. Just as importantly, the study identified teacher participation in continuing, voluntary professional learning and passion for learning as contributing factors to teachers' effectiveness in increasing student learning.

The link between teacher quality and student achievement has also been examined in studies with a focus on student learning in science and mathematics. Wenglinsky (2000) examined the scores of 15,000 8th grade students on the 1996 National Assessment of Education Progress in Mathematics and Science (NAEP). He found that commendable instructional practices can affect the within-school achievement gap, but not the between-school gap between African- American students and white students in science and math..

Haycock (1998,) asserts "parents have always known that it matters a great deal which teachers their children get." (p. 4), In order to bridge the gap between what we know that works to improve student achievement and what is takes place in teachers' classroom, providers must become avid consumers of educational research. They must offer programs that meet teacher needs with respect to professional development. This in turn will enable teachers to implement research-based teaching strategies based on student identified needs.

Teacher Professional Development and Student Achievement. In spite of gains in making professional development more learner-centered, the achievement gap for minority students still remains (Martin et al., 2000; Lee, 2002). As noted by several researchers, low income and minority students are nearly twice as likely to be assigned to the least effective teachers and only half as likely to be assigned to the most effective teachers (Sanders and Rivers,1996; Haycock,1998; Ferguson, 2007). Even more striking is that some data indicate that generally, African-American students are less likely to have a well-qualified teacher than low-income white students (Darling-Hammond, 2000 and Peske & Haycock, 2006).

High quality professional development can help to bridge the achievement gap as shown in research by Kahle, Meece & Scantlebury (2000). They examined the:

> influence of standards-based teaching practices on the achievement of urban, African American, middle school science students. Science classes of 8 teachers, who had participated in professional development in Ohio's statewide systemic initiative (SSI), were matched with classes of 10 classes of teachers who had not participated in the initiative. Data was collected via group administered questionnaires and achievement tests specifically designed for Ohio's SSI. (Kahle, Meece & Scantlebury, 2000, p. 1019)

Results indicated that participants who used research-based teaching practices on a regular basis had a positive influence on the science achievement and attitudes of urban African American students. This was especially true for African American boys. Data indicated that there was a positive relationship between teacher participation in the program and reported levels implementation of standard-based teaching practices in the classroom. The findings tend to support the idea that effective professional development is influential in modifying teaching practices and to enhancing student achievement.

Teachers are better able to meet minority student needs, if they are given access to the latest research on how students learn (Caine & Caine, 1991) and what research-based teaching strategies best meet their needs (Beasley & Apthorp, 2010). Providers must receive input from teachers concerning their learning needs and the needs of the diverse student groups in their classrooms in order to plan relevant learning activities. Professional development that establishes a connection between teacher learning and what is implemented in the classroom is most likely to be successful in reducing the achievement gap between minority students and their Caucasian counterparts (Peske & Haycock, 2006).

The connection between teachers' professional learning activities and student academic progress is documented in other studies. Yoon *et al.* (2007) reviewed more than 1300 studies and assessment reports appraising the effect of teachers' professional learning activities on student achievement. A team of research scientists from the American Institutes for Research used the U.S. Department of Education's What Works Clearinghouse Standards to assess the quality of the evidence reported in the studies. They found only nine of the investigations were sufficient to draw valid conclusions concerning the aspects of professional development that are effective in improving student achievement. The study confirms reports of the small number of thorough studies addressing the effects of teacher learning on student academic progress. The good news is that "teachers who receive substantial professional development—an average of 49 hours in the 9 studies- can boost their students' achievement scores by about 21 percentage points."(Yoon *et al.*, 2007, p. 1).

Blank, del Alas, & Smith (2007), analyzed data from twenty-five teacher professional development programs in fourteen states. The programs in mathematics and science were sponsored by the National Science Foundation and nominated by states as being outstanding. Yet, only seven of the twenty-five programs reported quantifiable effects of teacher professional development on student academic progress. Thus, there is a gap between what is believed to be effective professional development and studies that establish actual links of professional development to assessable student outcomes.

Focusing on teachers' understanding of the subject they teach is of primary significance for planning professional development programs. In spite of a paucity of rigorous studies in this area, teacher quality and teaching quality are increasingly confirmed in the literature as essential factors in student achievement (NCTAF, 1996; 1997; 2007). Both Blair (2000) and Wenglinsky (2002) affirmed that professional development can be used to improve the effectiveness of teaching and improve student learning, if teacher learning activities are connected to what teachers implement in the classroom. Blair (2000), in a study conducted by the Educational Testing Service, reported correlations between exemplary teaching methods and increases in student test scores. These results have been repeated in other studies (Newman, *et al.*, 2012). While these results were inspiring, it was also noted that not many teachers were using the practices related to higher scores. The National Research Council (1996) set forth standards of quality for science teachers' professional development. The framework for K-12 Science was released in 2012 and the Next Generation Science Standards (NGSS) were released in 2013. Each of these documents envisions dramatic changes in the way science is taught in America's schools, K-12. Therefore, new approaches to professional development and deeper understandings of factors that influence implementation of research-based practices in the classroom are warranted. Several approaches to professional development that seem to hold promise for enhancing teacher professional growth have emerged.

Research Needs and Future Directions

The Promise of Lesson Study. Lesson study is one approach to professional development for teachers that is gaining support in the U.S. (Lewis, Perry and Murata, 2006). The lesson study approach to professional development, had its inception in Japan and gained acceptance in the United States following publication of the Third International Mathematics and Science Study (TIMSS) in 1999. The focal point of teacher learning are *research lessons* that are prepared by teams of teachers and viewed publicly by other teachers including university professors. (Lewis, 2002; Lewis, Perry & Hurd, 2004). Lessons are taught by participating teachers and closely analyzed by observers. Following the presentation of the lesson, observers and the presenter of the lesson meet to discuss the teaching and learning process. The presenter receives feedback and shares views of the lesson with the group. Teachers use the knowledge gained from the experience to refine or change their practices. The whole process is student-centered, hence teacher observations are focused on student learning. The objective of lesson study in Japan is to use the professional knowledge that is gained from these activities to transform teaching in elementary classrooms from teaching students isolated facts to teaching for understanding, *(*Lewis, Perry & Murata, 2006*).* The phrase also describes the aim of reform-based professional development in the United States.

How is lesson study different from other forms of professional development? ... What is its promise for improving professional development in the U.S.? Perhaps the greatest difference between lesson study in Japan and professional development in the U. S. is the social nature of teaching, the collaborative planning of the research lesson and ability of teachers within the school to observe the lesson being taught by a colleague. Based on observations during the teaching and learning process, the lesson is revised or enhanced. Professional development activities take place within the school setting. Additionally, in contrast to many of the top down approaches to professional development in the U.S., teachers study student needs and make decisions concerning what is taught and how frequently research lessons are held. (Watanabe, 2002; Lewis, Perry & Hurd, 2004).

When changes in educational policy are made that are not informed by adequate research, they are often doomed to failure. This notion prompted a recommendation by Lewis, Perry & Murata (2006) that specific pathways to research on lesson study are needed. They made three recommendations for continued research on lesson study, including expansion of the descriptive knowledge base on Japanese and U.S. lesson study:

1. In order to provide a fuller view of lesson study, reveal its constants and varying features and identify adaptations relevant to needs in diverse U.S. settings.
2. Explicate the mechanism by which lesson study improves instruction in order to develop models that enable innovators to avoid rote implementation of surface features and to adopt a more thoughtful and flexible approach to the innovation.
3. Conduct design-based research cycles to progressively hone in on an innovation, while also building theory about how it works…. not merely fine tuning what works (Lewis, Perry & Murata, 2006, p. 3).

Teacher Collaboration: Focusing on Learning Communities. The key element in lesson study is teacher collaboration. Along these lines, Lieberman and Pointer-Mace (2008) recommended that we reform professional development efforts so that learning becomes more social (rather than individual) through "learning communities.'' In an open letter to the

President of the United States, they further recommended transformation of teacher in-service education as a powerful means of education reform. School populations are becoming more diverse. Lieberman and Pointer-Mace noted that teachers are on the front lines of a changing society. We are constantly reminded that we live in an information age. Today's students must be prepared to consume massive amounts of information, to think critically and, engage in problem solving as described in the K-12 Standards for Engineering (2010). The world is shrinking because of advances in science and communication technologies; hence students must be adaptable to changing social contexts, scientifically literate and able to function in a digital age. Teachers must be consummate learners themselves in order to keep pace with today's student learning needs. Therefore, professional development must be designed to meet dynamic and demanding teacher needs. Therein lies the challenge.

The isolation of teaching in many classrooms has done little to alleviate the perception that professional development efforts are "fragmented, disconnected and irrelevant to classroom practice" (Reitzug, 2005, p. 1). However, there is research that establishment of learning communities within schools may be an answer to ending teacher isolation and improving the ability of teachers to learn from each other (Addis, Quardokus, Bassham, Becraft, Coffman, Colbert &Powell-Coffman, 2013). Learning communities manifest themselves in many ways and among them are in-school groups such as grade level teams, subject-matter or departmental teams or whole faculty study groups. These types of learning communities afford opportunities for teachers to learn from and with other teachers within a school setting (Lieberman and Pointer-Mace, 2008). According to Lieberman and Pointer-Mace:

"people learn from and with others in particular ways. They learn through practice (learning as doing), through meaning (learning as intentional), through community (learning as participating and being with others) and through identity (learning as changing who we are)." (Lieberman and Pointer–Mac, 2008, p. 227)

The concept of "learning communities" has been expanded to include networks of organizations across districts and implementation of national partnerships. These external networks and partnerships tend to support collegial teacher learning, facilitate teacher collaboration and foster efforts to promote development of teacher leadership. Their effectiveness has also been documented by researchers such as Lieberman & Miller (1990); and Shulman (1999).

Learning communities, according to Lieberman & Pointer-Mace (2008), focuses on what researchers think are the most effective aspects of professional development:

1. Instruction that is sustained over time rather than episodic or one shot opportunities.
2. Opportunities are provided for teachers to learn from each other, both inside the school and outside the school, formally and informally.
3. Provisions exist for teachers to influence how and what they learn, and teachers can engage in reflecting on what they need to know. (Lieberman & Pointer-Mace, 2008, p. 233)

We are learning more about how teachers learn and how that learning affects practice. This expanding data base has led to fundamental changes in approaches to science teaching and learning.

A Paradigm Shift: New Approaches to Science Teaching and Learning

Research-based, Inquiry-Oriented Teaching and Learning. The science standards subscribe to research-based, "inquiry-oriented" teaching and learning. According to the National Research Council (1996):

> learning science should be an active process and should involve students in making observations and posing questions about natural phenomena. Students should be involved in critically examining books and other forms of information to understand what is known in order to plan investigations and experiments that allow them to gather information, analyze data and offer reasonable explanations of their findings. (p. 23)

These types of student engagement require teachers with new kinds of skills and knowledge. Unfortunately, these types of inquiry learning and teaching are not what frequently occur in most science classrooms. More often than not, students are passive recipients of information and succeed in science classes on the basis of their ability to memorize large quantities of facts and manipulate formulas of which they have little or no understanding (Burry-Stock & Oxford, 1994; Bybee, 2009).

A Constructivist Approach. Requiring science teachers to be certified in science and demonstrate proficiencies in science teaching have not had the desired impact on student performance and many researchers note that the way that science is taught in most science classrooms has changed very little (NCES, 1999; NCES, 2009). Use of the constructivist approach is often the exception not the rule in most science classrooms (Jenkins, 2000; Peske & Haycock, 2006; Yero, 2011) Brooks and Brooks (1999) noted that becoming a constructivist teacher requires a 'paradigm shift' in the way teachers view teaching and learning. Change is not easy. Therefore, becoming a constructivist teacher may seem overwhelming to some teachers. The feeling of being overwhelmed prompts many teachers to settle into a comfort zone and become satisfied with the status quo. Brooks & Brooks (1999), suggested several descriptors of constructivist teaching behaviors to be used as a framework for teachers who are willing to become constructivist teachers. The descriptors include searching for and valuing student opinions, differentiation of instruction based on the needs and benefits of students, testing student suppositions, presenting curricula that are relevant to student lives, focusing lessons on conceptual understanding, and including a variety of on-going assessments of student learning.

Effects of Teacher Belief Systems on Levels of Classroom Implementation. Numerous studies have documented the effectiveness of constructivism as a model of teaching and learning. Smith, et al (2007) used the term *inquiry-oriented instruction* to describe the kind of constructivist teaching that is being advocated in today's science classrooms acknowledged that at the time neither the field nor the National Science Education Standards (NSES) included an operational definition for inquiry-oriented instruction. They acknowledged that "although there is a limited research base suggesting that inquiry-oriented instruction has a positive effect on student learning, there has been comparatively little work investigating the characteristics of teachers who are most likely to begin this kind of instruction in science classrooms." (Smith, et al 2007, p. 170) Dancy and Henderson (2004) examined qualitative evidence in a study based on interviews with four non-physics education research faculty. Although the professors expressed beliefs compatible with objectives of reform-based teaching in physics, they demonstrated conventional instructional practices in the classroom. The results of the study suggested that conflict between individual beliefs and traditional influences resulted in implementation of research-based curricula being only minimally being integrated into introductory physics courses.

Teachers' beliefs concerning changes in curriculum or changes in teaching strategies impact teachers' levels of classroom implementation of such strategies. as pointed out in the study above. (Luft & Roehrig, 2007) These findings have been found in other studies as well. Cronin-Jones (1991) conducted a qualitative study of teacher beliefs concerning classroom implementation of a 20 lesson curriculum package. The data was based on observations of two middle level teachers. Their analysis of the data revealed four major categories of teacher beliefs describing how students learn, the part of the teacher in the classroom, the relationship of student ability levels to a specific age group and the comparative significance of the subject matter:

> Both of the teachers believed that the most important student outcome is factual knowledge, that middle-grade students learn through repeated drill and practice and that middle –grade students require a great deal of direction . The teachers' beliefs differed in other areas including about a teacher's role in the classroom and in beliefs concerning curriculum content topics. Although certain components of both teachers' belief structures enhanced the success of curriculum implementation, "overall their existing belief structures were incongruent with the underlying philosophy of the intended curriculum, thus hampering implementation. (Cronin-Jones, 1991, p.225)

The impact of teachers' belief systems on implementation of changes in science teaching was also confirmed in a study by Yerrick & Parke (1997). They conducted a study of teachers' beliefs following a two- week summer program, intended to change teachers' approach to teaching science concepts and using assessment strategies. Although they sought to make lasting and deeply rooted changes in teachers' beliefs, they reported that teachers maintained their entry beliefs.

In a more recent study, Lumpe, Czerniak, Haney & Beltyukova (2012), sought to determine whether teacher beliefs concerning their effectiveness in teaching science were influenced by participation in a long-term science professional development program and whether changes in teaching practices affected student achievement. Findings from the study included the following:

1. Several background variables were found to be predictive of teacher beliefs including how often teachers spend teaching science.

2. Males tended to display more positive beliefs [concerning science] than their female counterparts.

3. Although a small portion of the variance was explained, teacher beliefs and the number of hours participating in the research-based professional development program were significantly predictive of students' science achievement.

4. Other factors may be involved in teachers' beliefs and their connection with student learning, including classroom practices, curriculum materials, support systems, and student background variables. (Lumpe, Czerniak, Haney & Beltyukova, 2012, p. 153)

Teachers' belief structures are complex and are firmly held in spite of receiving evidence to the contrary. Their beliefs influence how and to what degree they will implement changes in classroom practice. Providers, who are willing to take teacher beliefs into account when planning professional development activities, are more likely to have a positive effect on changing teachers' practices. Fortunately, providers do not have to start from scratch in order to engage teachers in effective research-based professional development models.

Effective Models of Professional Development: How Can We Improve? A variety of models of professional development for improving science teaching can be found in the literature. Unfortunately, in many instances models are tried by teachers without proper training or understanding and are soon abandoned (Fullan & Stiegelbauer, 1991; Doherty, 2011). The more stable models are based on studies focused on implementation of research-based practices. These instructional models encourage active learning in student-centered classrooms rather than passively listening to lectures in traditionally teacher-centered classrooms. Such classrooms feature teachers using research-based teaching strategies that include: alternative assessments, hands on laboratory activities, cooperative learning, short-term and long-term investigations of real life problems, meaningful use of computer technologies, and the use of calculators (Desimone et al, 2002; Minner, Levy & Century, 2010; Brand and Moore, 2011).

Research-based teaching strategies focus on student constructed learning as opposed to teacher-transmitted information. The role of the teacher is not that of a "sage on the stage" but a "guide on the side" (King, 1993, p.30) as described by many in the reform movement in science education. However, in order for science teachers to use this constructivist approach to teaching science, they must be allowed to experience the approach themselves (Shymansky, 1992; Penuel, Fishman, Yamaguchi & Gallagher, 2007). According to Keys and Bryan (2001), teachers of science must facilitate learning in a classroom environment that encourages students to seek answers to questions on their own and use assets for learning that reach beyond the classroom. This leap from traditional classroom cultures often require teachers to make a paradigm shift in their own thinking in order to implement research-based teaching strategies in the classroom (Fullan, 2001). Some researchers attribute the lack of success in implementing wide-spread reform in science classrooms to the fact that providers often fail to take teachers' belief system into account when offering professional development (Yero, 2011). Therefore, in spite of the tremendous amount of emphasis placed on the constructivist model for teaching science, many researchers report that too few teachers are using research-based practices in the classroom. There is a need for studies of professional development that demonstrate how to connect theory to practice.

A number of authors have indicated that in spite of an expanding database on professional development, there is a need for more empirical studies of teacher professional development. (Guskey & Yoon, 2009; Desimone, 2009). Attempting to meet this need, Thompson (2009) conducted studies focused on the Oklahoma Urban Systemic Initiatives Program. The study was entitled *Preparation, Practice and Performance (P3*). The population for the study was made up of approximately 10,000 public-school students from the Oklahoma City school system and 408 teachers in grades 6 to 9 divided equally between science and mathematics teachers. The study was conducted during the 2000-01 and 2001-02 school years using randomly selected math and science classrooms. Demographics indicated a diverse urban student population made up of Caucasians, Hispanics African-American and Asian students. Randomly selected science and math classrooms of teachers and students in grades 6 to 9 reflected the demographic composition of the school district.

According to Thompson, activities in mathematics and science classrooms were classified as either “standards-based instruction (SBI) or non-standards-based instruction (non-SBI).” (Thompson, 2009, p. 4) The study used a self-reporting, teacher assessment form to assess teachers’ knowledge in the discipline and their attitudes concerning standards-based teaching practices in mathematics and science. Thompson reported that the survey instrument was based on reform-based recommendations contained in the National Council for Teachers of Mathematics (NCTM) standards, National Science Education Standards (NRC, 1996) and test items from the TIMSS Survey, 2005. Teachers participating in the study were asked to reply to statements proposed by TIMSS (2005) that reflected their instructional beliefs or philosophies related to standards-based education. A high score on the teacher assessment form indicated strong agreement concerning implementation of standard-based instructional strategies in the classroom. Based on the investigator's descriptions of the study, classroom observations were conducted by math and science teachers serving as instructional coaches for the project. Thompson derived student achievement data from norm-referenced, Iowa Test of Basic Skills forms K, L and M. A summary of the findings from the study are as follows:

1. Although substantially more non- standards-based activities were observed than standards-based practices, virtually none of the non-SBI practices were found to significantly contribute individually or in multiple effects to students' math or science achievement.
2. Teacher lecture was found to contribute significantly to achievement in science among white students.
3. The use of manipulatives contributed significantly to students' math achievement for all students regardless of gender or ethnicity.
4. The use of student self-assessment was found to contribute to science achievement for all students regardless of gender or ethnicity.
5. The use of computer technology in science classrooms was identified as a key contributor to achievement for both male and female minority students.
6. Cooperative learning-based projects were identified as a significant contributor (from multiple effects analyses) to students' math achievement.
7. The use of inquiry-based projects and activities in science classrooms was found to be a significant contributor to white students' science achievement. (Thompson, 2009, pp. 4-6)

Researchers are often confounded by the many variables that impact student achievement that are not under their control. The study was an attempt by the author to gather empirical evidence of the impact of standards-based instruction on student academic progress. Yet, in spite of the results listed, it is plain to see how difficult it is to control for the numerous variables identified in the study. However, the standards-based instructional (SBI) strategies used in the study (Thompson, 2009) have been found to be effective in other studies (Wise & Okey, 1983). The strategies used in the study parallel strategies identified for investigation in this study and used in many of the LaSIP projects.

Professional development programs like the LaSIP are designed to impact large numbers of teachers in states and school districts throughout the United States. The aforementioned findings (Thompson, 2009) were from a systemic initiatives project. However, the findings indicated that SBI strategies were not in use in most classrooms that were observed during the study. Standards in both science and math and teaching strategies for their implementation were adopted more than a decade ago, yet many teachers are choosing not to use SBI or research-based instructional strategies. The study also shed light on the need for classroom observations as part of intense follow up to teacher participation in off-site professional development efforts.

The terms inquiry teaching and learning, standards-based instruction, research-based practices and reform-based practices are used through-out the literature review of professional development for teachers. There are common elements of professional development encompassed in each of the terms. The term used definitively in this study is research-based teaching practices. Teacher perceptions of research-based teaching strategies such as cooperative learning, high order thinking skills and alternative assessment will be the focus of this study.

Like the Thompson study, this study was also undertaken following teacher participation in a systemic initiative project. This study, too, provides useful insights into factors that influence transfer of training into classroom practice

The literature review also reveals a need for more studies that focus on the study of the effects of teacher use of research-based teaching strategies on student achievement. Teacher perceptions of the effects of the use of research-based teaching strategies on student achievement are investigated in this study. There is an even greater paucity of studies that pinpoint the facets of effective teaching that can be replicated in order to produce models of effective teaching. It is important to note, however, that Porter et al, (2003), in a review of professional development studies, indicated that failure of most studies to meet evidentiary standards lies in the design of the study rather than in the strategies investigated. Therefore, investigating teacher perceptions of factors that influence implementation of research-based practices in the classroom seems worthwhile.

As pointed out in explanations of the conceptual framework, constructivism forms the theoretical basis for this study. It is used to explain a kind of learning and also a method of teaching that involves connecting students' prior knowledge to new learning. Constructivist teaching practices are supported by a considerable research base and there is every indication that making teachers aware of the research is worthwhile. According to Yager (1991), the constructivist movement is very strong in science, although, researchers like Burry-Stock and Oxford (1994) suggested that based on their findings:

> even nominated expert science teachers are not well-informed constructivists."
> Moreover, "the proportion of students scoring on the upper level of the Student

> Assessment Rubric is not very high which suggests that our nominated expert science teachers are not teaching at a particularly high conceptual level. (Burry-Stock and Oxford, 1994, p. 29).

Other researchers have pointed out the need for more studies on how to bridge the gap between teacher participation in professional development activities and the actual implementation of research-based teaching and learning strategies in the classroom (Guskey, 2011).

Researchers at Mid-continent Research for Education and Learning (McRE**L**) have summarized research for the research-based teaching strategies targeted in this study. In 2000, Marzano, Pollock & Pickering working with researchers at McREL, used a research strategy called a meta-analysis. This approach combines results from a number of studies, translates and averages the results and converts them into effect sizes (Marzano, Pollock & Pickering, 2000). According to their reporting, effect size is an expression of the "increase or decrease in achievement of the experimental group in standard deviation units." (Marzano, Pollock & Pickering, 2000, p. 4) Effect sizes can then be converted to percentile points. For example, analyzing similarities and differences had an effect size of 1.6 which translates into 45 percentile points.

They point out that each strategy requires specific implementation techniques in order to produce the effect sizes reported. Therefore, teachers must learn to use the strategies, correctly. In the study, they identified nine categories of research-based teaching and assessment strategies (Marzano, 2000). The categories are multi-dimensional. For example, the category of analyzing similarities and differences include the processes of comparing and contrasting, classifying, using analogies and creating metaphors. Other categories identified in the study included generating and testing hypotheses, using nonlinguistic representations, cooperative learning and, use of cues, questions and advance organizers.

Emphasis on the research-based teaching strategies examined by researchers at McCREL, can be found in the National Science Education Standards (NRC, 1996) and have been implemented in the Louisiana Systemic Initiatives Program (LaSIP) science projects since their inception. For example, LaSIP teachers in the Greater New Orleans Area science projects were engaged in the use of relevant often authentic science content, research-based teaching strategies and use of alternative forms of assessment. The strong emphasis on content in many of the courses involved teachers in active participation in real-life problem-solving (Radford, 1998). For example, in the LaSIP project held at Tulane University in New Orleans, teachers were led by participating scientists in gathering real-time data from authentic sources while studying the ecology of the Lake Pontchartrain Basin and the causes and effects of coastal erosion. The emphasis on relevant content and use of research-based teaching strategies that can be easily transferred to the classroom have proven to be successful as shown in a review of the literature (Sykes, 1999: Garet et al, 2001; Desimone *et al.*, 2002; Jeanpierre, Oberhauser and Freeman, 2005).

The various disciplines in science are also fertile grounds for research on the effects of various instructional innovations on student performance. Educators have often expressed dissatisfaction with the traditional, lecture-based model of instruction typified in many physics classes (Steinberg 2011; Iverson, 2011). Dissatisfaction with traditional lecture-based model of instructional delivery in traditional physics classes has led to development of a number of reform-oriented instructional innovations. Iverson (2011) reported that though many innovations have had positive results on student learning overall results have been inconsistent. In order to understand the causes of the high variability of results, the study analyzed 79 previously published studies of instructional innovations in undergraduate physics. The innovation that was found to be most effective was Workshop/ Studio Physics, an active learning model. . Although this study involved undergraduate physics students, several researchers have noted that models of teaching that involves students in active learning and use research-based teaching strategies are effective in improving student learning at all levels (Keys and Bryan 2001; Keeley, 2005; Lieberman and Pointer-Mace, 2008).

Although, effective research-based teaching strategies have been identified in numerous studies, there have been fewer studies on what teachers are most likely to implement the strategies (Burry-Stock and Oxford, 1994; Stronge, Ward and Grant, 2011). Stronge, Ward and Grant (2011), attempted to address this problem using persistent student learning gains to measure the disparities between teachers whose students experience increases in academic growth in mathematics and reading and teachers whose students experience a smaller amount of academic growth in those subjects. The purpose of the study was two-fold, "first, to examine the impact that teachers had on student learning and then to examine the instructional practices and behaviors of effective versus less effective teachers." (Stronge, Ward & Grant, 2011, p. 339) The advantage noted for this study over other value added studies (Sanders & Rivers, 1996), was the more in-depth examination of the beliefs and practices of the high and low performing teachers. (Stronge, Ward & Grant, 2011, p.342)

The phase one of the study included examination of records more than 4600 fifth grade students and 307 teachers in mathematics and reading over a period of one year. Teacher beliefs were assessed using a "short form of the Teacher Sense of Efficacy Scale" (Stronge, Ward & Grant, 2011, p.345)

Studies by Darling-Hammond (2000) and Haycock and Peske (2006) have found that strings of highly effective or "ineffective teachers can have an enormous impact on student learning during the K-12 learning path." (Peske & Haycock, 2006, p. 1). These findings were reconfirmed by Stronge, *et al.* (2011). They found that the differences in student achievement in math and reading for effective versus less effective teachers were more than 30 percentile points. Other findings included better classroom management skills and personal qualities among more effective teachers, but no significant difference effective and less effective teachers in the areas of instruction or assessment. The results point to the dynamics of teaching and confirm the need for multiple measures of teaching strategies and various means of assessing learning in today's classrooms.

This study is designed to examine teachers' perceptions of factors that impact levels of classroom implementation of research–based teaching strategies following participation in formal professional development. Teachers' willingness to use these strategies in the classroom depends not only on the usability of these strategies, but also on their perceived value to teachers. Unless teachers value the strategies and can fit them into their own belief system concerning how students learn, the strategies will be quickly abandoned. Moreover, teachers must feel a sense of ownership in adapting the strategies for effective implementation that meets the needs of the students they teach (Caffarello, 2002; Hall & Hord, 2006; Henderson & Dancy, 2007; Henderson & Dancy, 2008; Fung & Chow, 2010). Examining the factors that influence teachers' implementation of research-based teaching strategies from teachers' perspectives can offer additional findings in this regard.

Summary of Chapter Two

A review of the literature reveals that the changes in focus of teacher training programs are often influenced by political and social factors that can be local, national or global in nature, For more than a half century, professional development has involved significant changes in attitudes toward the role of the teacher in deciding on the purpose, content, context and process of teacher learning. However, the preponderance of research in this review indicates that the teacher is the key to meaningful school improvement and student achievement.

Early efforts at providing professional development for teachers were dominated by the deficiency model. Learning activities were therefore focused on the role of the providers. The goal of the providers was to provide training for "ill–prepared teachers.'' Professional development was designed to correct teachers' deficiencies or lack of knowledge by telling teachers what they needed to know and be able to do in the classroom. Most training was dictated without input from teachers. However, the increased duration of pre-service education from two year to four years resulted in a better trained and more demanding teacher workforce. This in turn put pressure on providers to improve the quality of in-service training and to look to teachers within schools to provide answers to questions concerning effective teaching behaviors. Studies of teacher learning needs in the context of the school by Goodlad and others shifted research toward qualitative studies focused on understanding the processes of authentic teacher learning.

The launch of Sputnik by Russia in 1954 sparked a revival of interest in the quality and quantity of science and mathematics courses in schools and fostered a closer look at the qualifications of the teaching workforce. Arguments concerning the importance of pedagogy vs.

content were ignited and curriculum studies in Biology and Physics emerged. Institutes for teachers with heavy emphasis on science and mathematics content were implemented to close the gap between the United States and Russia. The prevailing view was that the United States needed to produce more scientists and mathematicians. Hence, teachers needed to be more knowledgeable of mathematics and science.

Unfortunately, most of these institutes were conducted by university faculty with limited or no training in pedagogy and little, if any, input from teachers (Frechtling et al, 1995). Large expenditures of federal funds and content-laden training sessions were only mildly successful in improving teaching and learning in the classroom. As pointed out earlier, changes in the direction and focus of education reform is often dictated by social and political changes beyond schools or institutions of higher learning. This observation is demonstrated by the events leading to publication of a less than flattering report on the nation's educational system.

In April of 1983, the Commission on Excellence in Education released its report entitled "A Nation at Risk: The Imperative for Educational Reform.'' (ES, 1983, p. 1) The following paragraph set the tone for yet another era of reform in education and the need for a better trained teacher workforce.

> "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves. We have even squandered the gains in student achievement made in the wake of the Sputnik challenge. Moreover, we have dismantled essential support systems which helped make those gains possible. We

> have in effect, been committing an act of unthinking, unilateral educational disarmament." (p. 9)

The content of "A Nation at Risk" shook up the educational community in much the same manner as the results of the TIMSS 1995 caused changes in the way mathematics and science are taught. The Third International Mathematics and Science Study, known as TIMSS 1995, was the most comprehensive and most ambitious global study of student attainment accomplished up to that time.

TIMSS 1995 did much to reinforce the idea that well-prepared teachers are important in meeting the challenges of today's global society. The explosion in knowledge and technology during this period has made "teaching as telling" untenable. Changes have occurred rapidly because of new technologies and student populations have become more diverse. Therefore, teachers must now operate in an information-based society in which learning how to learn is more important than being given information. Research studies have emerged concerning students learning that require teachers to make a paradigm shift from didactic forms of instruction to constructivist-based teaching (Brooks & Brooks, 1993; Penuel et al, 2007).

Additionally, there have been other studies that have focused on identifying replicable methods of effective teaching. Hence, the research base on professional development has increased substantially over the years. We know more about what strategies are likely to increase student learning. As a result of these advances, professional development must focus on helping teachers to become more knowledgeable concerning the nature of the research that support the teaching strategies that are used. This change in the focus of professional development will enable teachers to implement research-based strategies in their classrooms that promote life-long learning for their students and empower students to cope with an ever changing world. Teaching in this manner, will be unfamiliar to many teachers.

In many instances, professional development is based on the assumption that teachers are receptive to new ideas and theories of learning like constructivism and will accept new inquiry-based strategies as means of improving their practice. Yet, the literature is replete with studies that indicate that even while expressing acceptance of new ideas, many teachers fail to implement them in effective ways. The question is why? Yero (2011) suggests that there is considerable variability in the cognitive filters of individual teachers through which the answers provided by others must past. Yero goes on to point out that “even when there is surface agreement on what should be done, variations in the way teachers perceive the task create huge differences in implementation.” (Yero, 2011, p.1). If we are to provide learning opportunities that meet the desires of teachers, we must explore teachers’ beliefs, values, metaphors and the meaning they attach to theories like constructivism and allow them to reflect on how the use of research-based, inquiry teaching and learning fits within their own view of the world. (Yager, 1991; Yore, 2001; Wise & Okey, 2006; Brand & Moore, 2011; Yero, 2011)

The findings in this review of the literature support the need for more studies of factors that influence levels of implementation of research-based teaching strategies in the classroom and the effects of implementation on student achievement in science. Fullan (2011) noted that despite numerous studies of professional development, few empirical studies link professional development to student achievement. Desimone, *et al.* (2009) also cited the need for more empirical studies of the learning needs of practicing teachers and factors that affect transfer of training into teachers’ classrooms, but indicate that researchers are often stymied by the sheer complexities of such studies. Examining teachers' perspectives concerning what works in professional development as proposed in this study can add to the data base for understanding teacher needs and beliefs.

As Sparks (2002) noted, educators know a great deal about the content and processes of well- designed professional development that improves student learning. Unfortunately, in far too many schools, the space between what we know and common practice widens each year. "As the research base increases, professional development, as it is experienced by teachers, remains virtually unchanged," (Sparks, 2002, p 7). The task that is before professional development providers is to find relevant and effective ways to increase teacher transfer of learning. The most promising educational advancement is doomed to failure, if it cannot be sustained in the classroom.

Chapter Three

Methodology

Introduction and Organization of the Chapter

The purpose of this study was to examine teachers' perceptions of factors that influence levels of classroom implementation following participation in formal, long-term professional development programs such as the Louisiana Systemic Initiatives Program (LaSIP). The assumption was that teachers who have participated in research-based professional development programs can provide unique insights and perspectives about what constitutes quality professional development and what features of these long-term programs are likely to enhance the implementation of research-based teaching strategies in the classroom. Further, teachers who have participated in long-term professional development programs are more likely to implement research-based teaching practices than teachers who have not participated in such programs. The survey, personal interviews and focus group interviews were designed to collect data to test these assumptions and to provide answers to the five research questions raised in the study.

This chapter will include an overview of mixed methods research, an explanation and description of the mixed model design used in the study, a description of the participants and an explanation of the rationale for including individual interviews and focus group discussions in the study. The participant recruitment process and human subject treatment protocol are outlined in the remainder of the chapter. The instrumentation section includes descriptions of the process used to develop the survey, descriptions of the methods used to establish validity and reliability of the instrument and descriptions of Subscales A-G of the survey instrument. A list of the research questions has been included in the procedures section along with a statement of the hypotheses. Explanations of the way the survey and quantitative data collection techniques were used to answer research questions and test the hypotheses are also included. Descriptions of the qualitative procedures used in collecting and organizing data from individual interviews and focus group discussions is followed by a summary of the chapter.

Mixed Methods Research: An Overview

There are several types of mixed methods study designs (Creswell, 2003; Tashakkori and Teddlie, 1998; Johnson, Onwuegbuzie & Turner, 2007; Plano-Clark & Creswell, 2010). Mixed methods research involves collecting both quantitative and qualitative data and is an umbrella term for both mixed method and mixed model designs. Accordingly, *mixed method* research studies use qualitative and quantitative data collection and analysis techniques in either parallel or sequential phases. For example in the convergent triangulation design, mixing occurs in the interpretation phase and is marginal at best. Tashakkori and Teddlie (1998) introduced the term "mixed model design" to describe a special type of mixed methods research. In mixed *models* research, mixing of data and findings occurs in many or all stages of the study (questions, research methods, data collection, data analysis and in the inference process).

This study's design required establishing links between findings from quantitative and qualitative data throughout the investigative process. Although there is no universal agreement on this strategy, some researchers have offered strong reasons for its use (Johnson & Onwuegbuzie, 2004). For example, Rossman & Wilson (1994) suggested that "combining methods can enhance the research purposes of corroborating, elaborating, developing and initiating. Understandings of social phenomena." (p. 315). By way of explanation, linking quantitative and qualitative research informed each other through confirmation or proof of each other via triangulation, elaboration or augmentation of findings to provide more detail, and initiation or origination of new lines of thinking, re-examining ideas to gain new insights. These ideas are confirmed in (Creswell & Plano-Clark, 2007; Creswell, 2008; Creswell, 2009; Merriam, 2009; Sammons, 2010 and Lichtman, 2011).

In spite of earlier dissenting voices, use of a mixed methods research design has found increasing acceptance amongst researchers. Creswell & Plano-Clark (2007) found more than sixty articles that employed mixed methods research between 1995 and 2005. Moreover, mixed methods research is a fast evolving field. Castro, Kellison, Boyd and Kopak (2011), used the term "integrated mixed method" (IMM) to describe the design of their study in the article cited above. The focus of the article is the presentation of a conceptual framework, and descriptions of the methodology and data analysis procedures for conducting mixed-methods research studies. Also included are illustrative examples of the research design from the authors' ongoing integrative mixed methods research studies. They reported having conducted studies using the IMM design for over a decade. The design is closest to the designs described in Tashakkori and Teddlie (1998) and in Day, Sammons and Gu (2008).

Castro, *et al.* (2010) mounted a strong defense for the IMM design as indicated below:

> Within the context of these design approaches, the need persists for a methodology that affords a rigorous and integrative analysis of qualitative textual evidence and quantitative numeric data. Given the noted strengths and weaknesses of the qualitative and quantitative approaches, it would be advantageous to have a truly *integrative* methodology for the *concurrent* use of both methods in a manner that offers the descriptive richness of text narratives and the precision in measurement and hypothesis testing afforded by quantitative approaches. (Castro, *et al.*, 2010, p. 344).

Yet, with any emerging field of research, problems exist that require additional study. This is especially true of steps required to conduct and analyze the qualitative-quantitative transformations of data required in the integrated mixed methods IMM) design (Creswell, 2003).

Increased use of mixed methods research has also generated considerable discussion amongst researchers concerning the underlying world view. Drawing from its roots in both qualitative and quantitative methods, mixed methods research is typically associated with pragmatism as a world view. Over time, three schools of thought concerning a worldview for mixed methods research have emerged. Pragmatism as the single world view underlying mixed methods research has been articulated by early scholars like Dewey (1916) and more recently by researchers like Tashakkori and Teddlie (2003). Other researchers argue that mixed methods research can use multiple world views or that world views may vary according to the type of mixed method design (Creswell, 2008).

As previously stated, advocates for mixed methods research assume three stances in regards to a worldview: single or one best worldview, multiple worldviews or variability of worldviews depending on the design. The latter stance, allows researchers to employ a number of philosophical foundations for its justification and use. One worldview that is widely held is Pragmatism. Pragmatists focus on what works in finding the truth regarding the research questions under investigation. Accordingly, pragmatists reject an either/or choice and instead, support the use of mixed methods in research while acknowledging that the "values of the researcher play a larger role in the interpretation of results" (Tashakkori & Teddlie, 2003a, p 713).

The pragmatist' worldview for research "focuses on the nature of the questions asked and uses multiple methods of data collection to provide answers to problems being studied"

(Creswell, 2003, p. 23). Both quantitative and qualitative data collection methods have intrinsic strengths and weaknesses (Merriam, 2009). In line with these arguments, pragmatism as a paradigm or worldview for the design of this mixed model study seems logical.

Design of the Study

The design used in this study was an adaptation of the multi-strand, concurrent mixed model designs described by Tashakkori & Teddlie (1998); Day, Sammons and GU (2008) and the integrated mixed model (IMM) of Castro, Kellison, Boyd, and Kopak (2010). The resultant design helped me to reach the goal of this study which was to examine teachers' perceptions of factors that impact levels of classroom implementation of research-based teaching strategies in depth. Drawing on the strengths of both qualitative and quantitative methods, merging of the data strands occurred throughout the investigative process. Data from the survey enhanced findings from interviews and focus group discussions. Conversely, data from interviews and focus group discussions deepened understanding of findings from the survey.

This approach is supported in studies by Tashakkori and Teddlie (2003b), Day, Sammons and Gu (2008) and Castro, Kellison, Boyd and Kopak (2010). These researchers make the case for greater integration of findings beyond the initial "conceptual, and methodological integration" in which the qualitative and quantitative (data) create findings "greater than the sum of their separate effects" (Day, Sammons & Gu, 2008, p. 331). This design offers the advantage of providing consideration of a greater range of data in greater detail. For example, explanations for issues like those involving changes in teacher behaviors as an outcome of collaboration with colleagues and teacher perceptions of occurrences in professional development that impact levels of implementation at the school site would not have been possible by use of quantitative data alone Although this study was more limited in scope than the studies cited above, integrating the quantitative and qualitative data in an ongoing and interactive way yielded an enriched set of data concerning teacher perceptions of factors that influence implementation of research-based teaching strategies in the classroom.

A diagram of the design for this study is outlined in Figure 3. The design is an adaptation of models proposed by Day, Sammons and Gu (2008), as well as the mixed model design proposed by Tashakkori and Teddlie (1998) and the IMM proposed by Castro, *et al.* (2010).

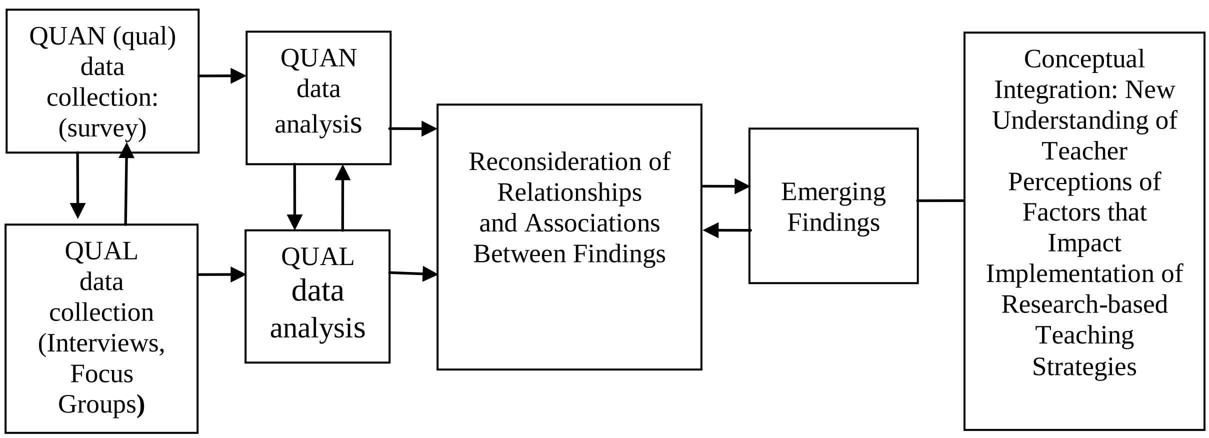

Figure 3 *Adaptation of Integrated Mixed Methods Design (Castro et al, 2012)*

The proposed integrated mixed methods design was used to obtain both primary and complimentary data. This approach enhanced understanding of the factors teachers perceived as having an impact on implementation of professional development experiences in the classroom. Accordingly, I was able to bring together the differing strengths of the quantitative and qualitative methods throughout the data collection and analysis processes rather than pursuing separate tracks for quantitative and qualitative methods and merging findings at the end.

Additionally, the use of the mixed methods design allowed for formulation of new associations from emerging findings that would not have been possible from either quantitative or qualitative methods alone. The re-conceptualization of relationships and associations between findings that resulted from this approach offered new insights into teacher perceptions of factors that impact implementation of research-based teaching strategies in the classroom, (see the flow chart of these activities in Figure 3, page 112).

Participants

Rationale for including individual interviews and focus group discussions. The qualitative strand of this investigation involved collection of data via personal interviews and focus group discussions.

Table 1 Comparison of Quantitative and Qualitative Approaches to Data Collection

Strength of QUAN Approach	Strength of QUAL Approach
Precise measurement of a specific construct	Fully contextualized*;* Examines the whole person in a natural setting.
Capability of conducting group comparisons	Ability to generate rich detailed accounts that define human experiences
Ability to scrutinize the strength of correlations between variables of interest	Produces storylines that are examined within the original settings in which they occur.
Capability to construct specific models and test research hypotheses.	Provides a comprehensive analysis of multifaceted human organizations, and educational experiences in a manner that cannot be fully captured with fixed scales and complicated models.
Limitation: Information is detached from its "real-world" context	Limitations: Difficulties in reliably integrating information across observations or cases, Difficulty in evaluating links and relations that occur connecting observations, cases, or constructs Lack of adherence to well-defined or rigid procedures Limited capacity for drawing definitive conclusions. Wholly qualitative studies operate with use of very small samples, which limits the capacity to produce findings that can be generalized to other populations.

Note: Table based on discussions in Castro *et al.*, 2010, pp. 342-344.

The advantage of using both types of data is supported in the literature. For example, Castro, Kellison, Boyd and Kopak (2010) described the strengths and weaknesses of qualitative and quantitative research methods. The differences in strengths and weaknesses of the two methods formed the basis for their advocacy for mixed method research and the authors' development of a "paradigm" for integrative mixed method designs. These views are summarized in Table 1.

Although surveys can be valuable in collecting large amounts of data from large numbers of participants at once, the depth of reflection possible in interviews and focus group discussions could not have been obtained in responses to the survey questions alone. Additionally, social interactions during discussions among focus group members were not possible during personal interviews. Moreover, both personal interviews and focus group discussions allowed for in-depth probing of teacher responses to ascertain teachers' interests and mindset and how these factors influence teacher attitudes toward changes in practice. Therefore, the results of merging findings from the qualitative and quantitative sources of data throughout the investigative process enhanced the overall quality of this study (Day, Sammons and GU, 2008; Tashakkori and Teddlie, 2003).

Selection and treatment of participants. Selection and treatment of participants in the study were done according to the University of New Orleans protocol for treatment of human subjects. Copies of consent forms and other required communications are included in the appendices. Participation in the study was strictly voluntary. One hundred-fifty surveys were distributed to teachers in elementary, middle and high schools in the Greater Baton Rouge area, which includes the parishes of East Baton Rouge, West Baton Rouge and Point Coupee and in the Greater New Orleans area which included the parishes of Orleans, St Bernard, Plaquemines and Jefferson. The LaSIP targeted mathematics and science teachers in elementary and middle schools and projects that focused on grades 7–12 were far fewer in number. Generally, teachers in elementary schools are less likely to have schedules that include teaching science full-time.

Therefore surveys distributed in elementary schools reached both LaSIP and non-LaSIP teachers assigned to teach science either full-time or part of the school day.

Copies of the survey were mailed to Distinguished Educators (DEs), whom I contacted, personally. Because rate of return on surveys is never 100%, the DEs were asked to aid in the distribution, collection and return of the surveys to insure a higher rate of return. Each DE was mailed a distribution packet containing instructions for distribution and collection of the surveys, a letter to the principal of the school seeking access to teachers, 10 copies of the survey, survey consent forms (enclosed in each survey booklet) and letters from the researcher which explained the purpose of the survey to participants.

One hundred-fifty surveys were distributed. Seventy-seven copies of the survey were returned. The return rate for the 150 surveys distributed was 50.66%. Of the 77 surveys returned, 11 were not used, because sections of the survey were left blank or respondents failed to indicate a current teaching assignment. When the 66 useable surveys were divided based on LaSIP versus non-LaSIP science teachers the results were 39 LaSIP science teachers and 27 non-LaSIP science teachers. Samples of consent forms for individual interviewees, survey participants and focus group participants are included in the appendices.

The science coordinators and professional development coordinators for three of the parishes were former LaSIP participants. The coordinators were mailed packets for distribution like the ones mailed to Distinguished Educators. Coordinators work with both elementary and secondary public schools in the parish, therefore respondents included both LaSIP and non-LaSIP teachers in the Parish.

Upon request, the LaSIP office in Baton Rouge supplied a list of names of former participants from the Greater New Orleans Area. The remaining surveys were mailed to former

LaSIP participants on the list whose addresses were obtained via personal contact with teachers and other school officials in the Greater New Orleans Area and through Zabasearch, an online people search engine.

One of the science coordinators (a former LaSIP participant) and two more of the survey participants were asked to participate in personal interviews. The science coordinator completed the survey and shared insights concerning personal participation in professional development and services now offered to other teachers. Personal interviews were scheduled at sites convenient to the interviewees.

The remaining interviewees were former LaSIP participants or other science teachers who volunteered to be interviewed or participate in the focus groups. The group included classroom teachers at the elementary, middle and high school levels. The two focus group discussions took place at the school sites of the participants. One of the schools was an elementary school located in a rural area of the state. The other school was a middle school located in a suburban area. The 3-members of focus group #1 consisted of teachers of science from grade levels 6-8. Although every effort was made to include as many LaSIP teachers as possible, much was gained in having intact faculty groups participate in the focus group discussions that included both LaSIP and non-LaSIP teachers. Participants in the individual interviews and the focus groups also completed surveys prior to participating in the interviews Consent forms were prepared for interviewees and signed by each participant.

Instrumentation

Development of the survey. . . Establishing Validity. Validity refers to the extent to which we are measuring what we think we are measuring. Measurement of *face* and *content validity* was used to determine the extent to which the survey measured teacher perceptions of features of the LaSIP professional development program, effects of reform-based training experiences on levels of implementation of research-based teaching strategies and teacher perceptions of the effects of the use of research-based teaching strategies on student achievement. Face validity is concerned with how the survey appears. Does it seem like a reasonable way to gain the information the researcher is attempting to obtain? Content validity is based on the extent to which the survey reflects the specific intended domain of content. The following paragraphs describe the survey and steps used to establish validity of the survey.

The instrument used for data collection in this study was a researcher designed survey entitled *"Survey of Teacher Attitudes Toward Change and Classroom Implementation of Research-Based Strategies"* that was designed to collect both quantitative and qualitative data. The survey was made up of 71 items divided among 7 sub-scales and 5 open-ended questions. The content of the survey was based on information in the literature concerning characteristics of effective professional development and factors that influence teacher implementation of research-based teaching strategies in the classroom. Dr. Yvelyne McCarthy reviewed the survey and suggested that the section on student achievement be added and that other similar surveys be reviewed.

Although there are other instruments in the literature, many are designed to measure a single strategy or limited numbers of research-based teaching strategies or focuses on strategies specific to a program or subject. For example, Ishler, Johnson & Johnson (1998) studied the factors that impacted teachers' implementation of cooperative learning following participation in a South Carolina Systemic Initiative Program. Findings in the study indicated that: (1) demographics such as gender, age and ethnic membership (2) Technical support and (3) Positive views of training were all important in long term levels of use of cooperative learning. However, the only statistically significant predictor of degree of long-term implementation was membership in a collegial teaching team.

The survey used in this study focused on research-based strategies that were stressed most often in LaSIP Projects. Dr. Debbie Silver was consulted following a review of an instrument she used in her doctoral study of LaSIP participants in Project Life in 1999 and it served as a model for the survey used in this study. One of the suggestions for further investigation in her study was to follow-up on qualitative, open ended questions included in the survey. Therefore, the addition of personal interviews and focus group discussions allowed for greater follow-up on qualitative data collected in the survey.

Five Distinguished Educators (DEs) assigned to schools in the Greater Baton Rouge and Greater New Orleans Area, reviewed the survey and made suggestions for needed changes. Distinguished Educators (DEs) are highly skilled educators, trained in the use of research- based teaching strategies and use of standards-based content. They work in low-performing public elementary, middle and high schools throughout the state of Louisiana as change agents in the state accountability and school improvement program. Additionally, Dr. Louis Hall, chairperson of the Division of Natural Sciences at Mississippi Valley State University and Dr. Clyde Smith, Professor of Chemistry at Dillard University were asked to review the survey, check for obvious biases in survey items and make suggestions for needed changes. No substantive changes were recommended.

Measurement of reliability of the survey instrument. Internal consistency measures whether a number of items intended to measure the same general idea produce comparable scores (Cronbach, 1982; Leech, Barrett & Morgan, 2008). It was measured with Cronbach alpha which is a statistic calculated from the pair-wise correlations between survey items. Internal consistency estimates of reliability were made by grouping questions in the survey that measure the same construct. For example, items in subscales A, B, C and G relate to programmatic features that are thought to impact teacher transfer of training into classroom practices. Measurement of inter-item reliability were used to determine if questions in a subsection of the survey were associated with each other and yielded consistent scores. Correlations between scores of these groups were used to determine if the survey was reliably measuring the concept. The commonly used threshold for acceptable reliability is alpha > 0.70. All subscale readings exceeded the threshold.

Theoretical basis of the survey: Core features of effective professional development. The survey included seven subscales (A –G), in which teachers were asked to indicate their perceptions of the effects of professional development experiences on classroom practices and on student achievement.   Researchers have identified a nucleus of features that define effective professional development. These features are "*content focus, active learning, coherence, duration* and *collective participation."* (Desimone *et al.*, 2002, p. 83) Items within the survey reflected a focus on these core features. These features are critical to providing effective professional development, Desimone (2009). They are thought to increase teacher knowledge and skills, improve their practice and hold promise for increasing student achievement. Evidence that these features are critical components of effective professional development is also confirmed in the work of other researchers including Darling-Hammond (1997); Lieberman (1995); Supovitz and Turner (2000); Garet, *et al.* (2001); Borko (2004) and Penuel, et al (2007). The LaSIP project directors were required to focus on these features as well when submitting and defending professional development proposals for funding.

These features will be reviewed in the sections which follow because they formed the basis for questions in sections A - G in the survey.

Content focus. According to Desimone (2009), professional development is greatly influenced by the *content focus* of professional development. Research evidence over the past decade points to connections between a focus on subject matter content during professional development and the ways in which that content is learned by students. That is, a focus on content leads to increases in teacher knowledge and skills, improvement in teacher practice and in most instances to improvement in student achievement.

Active learning. Involving teachers in *active learning* also has a positive impact on professional development, Garet, et al (2001); National Research Council (1996). Teachers benefit from being actively engaged in the learning process as opposed to passively listening to lectures. Active learning for teachers during professional development can be achieved in a number of ways. For example, teachers may observe other teachers and engage in interactive feedback and discussions. Teachers may review students' work and lead discussions or make recommendations for improvements in teaching concepts that have not been fully mastered by the students. During the LaSIP projects teachers often engaged in micro-teaching activities where they prepared and taught model lessons and received constructive feedback on ways to improve the lessons and enhance learning.

Coherence. Coherence is another characteristic that contributes to the success of professional development. It refers to the degree to which teacher learning during professional development is in line with teachers' knowledge and viewpoints and correlates with school and district objectives and guidelines (Aubusson & Webb, 1992; Guskey, 1997; Keys & Bryan, 2001; Keeley, 2005). The reforms proposed in the National Science Education Standards are irreconcilable with textbook-centered curricula and obsolete lecture style teaching strategies. Hence, implementation of the science standards requires teachers to be able to integrate various content strands into coherent lessons and organize students' time on task, efficiently. This research-based approach often represents a substantial departure from teachers' prior experiences and established beliefs about how students learn. Just as important, the findings in some studies indicate that it runs contrary to teachers' present practices (Tobin, 1993; Yore, 2001; Smith, 2007; Thompson, 2009). Therefore, professional development providers must ensure that teachers' learning experiences during professional development are aligned with school, district and state reform efforts and policies. (Desimone, 2009). Such activities must provide a platform for teachers to experience research-based strategies first-hand in order to change classroom practices that interfere with students' opportunities to learn.

Duration. Duration refers to the effective time period over which professional development is extended. Professional development spread over longer periods of time and the number of hours of exposure to professional development has an affirmative impact on cognitive gains and changes in pedagogy (Ishler & Johnson, 1998). Research studies tend to support activities that are extended over a semester of concentrated study and during summer institutes with accompanying follow-up during the semester (Guskey, 1994; Supovitz, 2000; Bybee, 2010). The projects in the Louisiana Systemic Initiatives Program advocated participation in 120-160 hours of professional development during the academic year in which the project was offered. The importance of duration as a feature of professional development that is valued by teachers is explored in the survey and can be pursued in follow-up questions during individual interviews and the focus group discussions.

Collective participation. Finally, *collective participation* is another feature that has an impact on the effectiveness of professional development. This feature was included in LaSIP projects by encouraging the participation of several teachers from the same school, grade level or department to enroll in the program. This feature of professional development encourages potential teacher interactions and discussions that extend beyond the professional development activity to promote teacher learning.

All of these features were emphasized to some degree in LASIP projects. They were the specific focus of items in Subscales A, B, C, D and G of the survey. Participants in the survey were asked to express their perceptions concerning these features on a five-point Likert scale. However, to ascertain why teachers think these features are important to their professional growth, required more time for in-depth reflection and expression. That is why the qualitative data gained from interviews and focus groups was important.

Other concepts and strategies included in the survey have been emphasized as elements of research-based teaching and learning in science by organizations such as the National Science Teachers Association (NSTA, 1992), American Association for the Advancement of Science (AAAS, 1989; 1993; 1998), the National Research Council (1996) by the National Staff Development Council (2001) and in publications by the National Assessment of Educational Progress (NAEP). Teachers were asked to report levels of implementation of research-based teaching strategies such as utilizing similarities and differences, teaching science as inquiry, involving students in hands-on experiences, cooperative learning, use of higher order thinking skills and alternative assessments. These research-based strategies have been emphasized in LaSIP and other science reform efforts as being important in improving science instruction and hence student achievement for over a decade, yet a review of the literature indicated that few of the strategies are seen in actual classroom observations (Supovitz and Turner, 2000; Payne, 2008; Guskey and Yoon, 2009; Iverson, 2011).

These core principles were emphasized in the LaSIP and form the basis for the seven sections of the survey. Constructs included in the seven sections of the survey are also supported in the review of the literature. They form the basis for the assumptions in the study that teachers' ability to implement research-based practices in the classroom following participation in professional development depend on both the quantity and quality of their experiences.

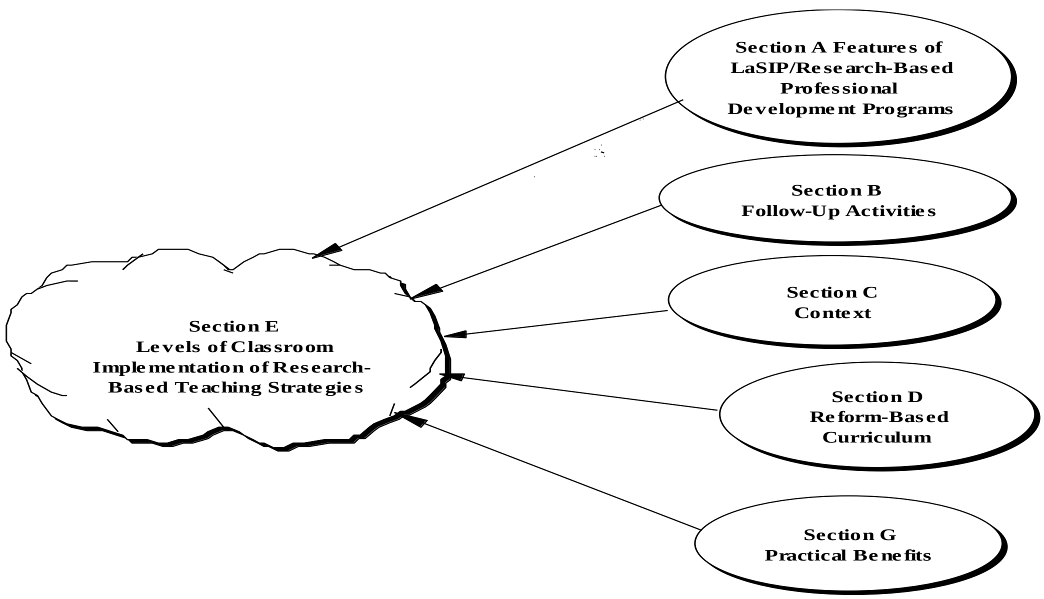

Figure 4

Theoretical Model of Factors Impacting Teachers' Levels of Classroom Implementation of Research-based Teaching Strategies (RBTS)

Factors Impacting Teachers' Levels of Classroom Implementation. Figure 4 is a theoretical model that illustrates the impact of factors such as follow-up, context and teacher beliefs on levels of implementation of research-based teaching practices. The correlations of these factors to levels of classroom implementation were subjected to statistical analysis using linear regression. The purposes of the statistical tests were to determine whether variables in

Sections A-D and G were predictive of implementation of research-based teaching strategies as described in Section E. The model shown in Figure 4 was modified in Figure 4a to reflect the findings from the analysis.

Description of the survey instrument. Part I of the survey was designed to collect demographic information from participants. This section included spaces for listing current position, years of teaching experience, areas of certification, grade(s) or subject(s) taught participation in LaSIP, if yes, years of participation, age, gender, ethnicity and type of school district. The remainder of the survey was divided into seven sections made up of 71 items on a five point Likert scale that allowed participants to select as follows: *Strongly Agree* (5), *Agree (4), Not Sure (3), Disagree (2) and Strongly Disagree (1).*

The seven sections are:

A. Features of LaSIP Professional Development Experiences Most Influential in Improving Teaching and Learning and Contributing to Classroom Implementation of Research-based Teaching Strategies

B. Follow-Up Activities as Components of Professional Development

C. Impact of Context on Implementation

D. Beliefs Concerning Implementation of a Reform-Based Curriculum

E. Frequency of Implementing Research-Based Teaching Strategies*

F. Teacher Perceptions of the Effect of Implementation of Research-based Teaching Strategies on Student Achievement**

G. Practical Benefits of Professional Development

* Note wording on 5- point Likert scale = *Always* (5), *3-4 times weekly* (4), *Twice weekly* (3), *Once a week* (2), and *Never* (1)

** Note wording on Likert Scale = *Increased tremendously* (5), *Increased moderately* (4), *Increased very little* (3), *Remained unchanged* (2), *Decreased* (1).

Section H was made up of five open-ended questions in which participants were asked to reflect on their professional development experiences and briefly describe the benefits of the following in improving their professional growth:

1. Job-embedded professional development
2. Two to four weeks of content-based summer program(s)
3. A college methods course
4. Attending professional conferences
5. Mentoring and/or coaching

Procedures

Conducting individual interviews and focus group discussions. Individual interviews and focus group discussion were tape recorded. Tapes were transcribed verbatim and kept under lock and key when not in use. Focus group effectiveness depends to a large extent on participants being comfortable with other members of the group and with the interviewer. Therefore, participants were assured that the raw data would not be shared or used for any purpose other than the ones stated in the consent form. Because of the social nature of focus groups, it would be unrealistic to offer any other guarantees of confidentiality. However, participants were asked not to repeat to others what was said in the interviews or focus group discussion. All of this was discussed with focus group participants and individual interviewees prior to asking them to sign the consent form. The consent forms were reviewed at the time of the focus group meeting and at the beginning of each individual interview.

Participants were asked to state their first name and last initial at the beginning of the interview and first name only throughout the course of the interview. This procedure allowed for accurate transcription of the audiotapes and helped to avoid possible confusion of voices.

Guides to questions used in both individual interviews and focus group discussions were included in the appendix.

Transcripts of the personal interviews and the focus group interviews were subjected to analysis using ATLAS.ti, qualitative data software that simplified analysis. This was especially true during use of content analysis which has been defined as “a systematic, replicable technique for compressing many words of text into fewer content categories” (Stemler, 2001, p. 1). Rules for coding and recoding the transcripts to establish reliability were followed. Within case content analysis of the narratives in the individual interview transcripts and the transcripts of focus groups was used to identify recurring phrases, themes and metaphors. Data chunks that made up similar themes and sub-themes were recorded for easy comparison and future reference when constructing logic and domain analysis matrices conceptual displays (Miles and Huberman 1984). Transcripts were searched for additional connections as warranted. As dominant themes were identified memos were developed and referenced to the research questions.

The mixed methods design used in this study involved examination of qualitative findings from the interviews and focus group and comparing and contrasting the findings with quantitative findings from analysis of survey data throughout the investigative process. This integrative mixed method approach provided a more in-depth picture of teacher perceptions of factors that influence implementation of research-based teaching strategies than either method alone.

Survey: Collecting Data and Answering Research Questions

Part I. Descriptive Statistics of Demographic Data. Part I of the survey allowed participants to input demographic data such as current position, areas of certification, age, number of years teaching and years of participation in a LaSIP. Descriptive statistics such as frequencies, percentages, means and standard deviation are depicted in graphs and charts that provide visual displays of the similarities and differences between LaSIP and Non-LaSIP respondents.

Part II. Overview of Procedures Used to Answer Research Questions. Data collected from the survey was analyzed using the Statistical Package for the Social Sciences (SPSS), Grad Pack 9.0. Principal component analysis and principal axis factor analysis were the statistical data reduction techniques used to identify patterns in variations and correlations among variables. Detected patterns were merged to form clusters of variables called components or *factors* which became the new composite variables. Structuring the survey items into highly correlated clusters in this manner helped make analysis of the raw data from the survey easier and more comprehensible. Selection of factor loadings of 0.4 or higher allowed for reduction of the large number of variables in the seven sections of the survey to be reduced to a manageable number. Test items clustered together in a way that indicated that they were measuring the same construct. This was interpreted as an indication of construct validity of items within sub-sections of the survey. Either direct obliminal or varimax rotation was used to make the final solution easier to understand by rearranging associations among factors without changing essential relationships among factors. (Leech, Barreett & Morgan, 2008).

The SPSS program generated a number of tables depending on the options that were chosen. Principal component analysis is the default selection for data reduction in SPSS. Principal axis factoring is another option for data reduction if one suspects latent variables. Correlation matrices were generated to show how survey items were associated with each other. The total variance explained table showed how the variance was divided among possible factors (eigenvalues) from which the s*cree plot* was generated. A rotated factor matrix displayed factor loadings of 0.40 or higher with highest loadings listed first.

An independent samples t- test was used to compare LaSIP and non-LaSIP teachers' mean scores based on responses to fourteen items (in Section E of the survey) that measured participants' frequency of use of research-based teaching strategies (RBTS). The SPSS program generated two tables, *Group Statistics* (included the means of the two groups, standard deviation and standard error of mean) and the *Independent Samples Test* which displayed results of the Levene's Test for equality of variances and the t-test for equality of means.

Audio-taped individual and focus group interviews were transcribed and subjected to analysis and coding using ATLAS.ti, a software program for analyzing qualitative data. Transcripts were coded and re-coded by the researcher. The coded data were used to create visual displays in the form of matrices and/or networks (Miles & Huberman, 1994). The five research questions which follow were answered by using both quantitative statistical analysis techniques and qualitative data analysis techniques:

Descriptions of Procedures Used to Answer Research Questions

1. *Which reform-based program features are perceived by science teachers as being important in improving their professional growth and are most likely to influence selection and frequency of implementation of research–based teaching strategies in the classroom?*

Research question number one was used to determine which features of the LaSIP were perceived by science teachers as being important in improving their professional growth and were most likely to have an impact on levels of implementation of research-based teaching strategies in the classroom. Examination of frequency distribution tables, principal component analysis and linear regression of scores in *Subscale A. Features of Professional Development,* were correlated with teachers' reports of levels of use of research-based teaching strategies in Subscale E. Personal interviews and focus group discussions were moderated by the researcher, audio-taped and transcribed. Transcripts of interviews of individual teachers and the interview of the focus groups were coded to identify relevant themes which were analyzed, compared and integrated with findings from the survey

2. *What are the differences, if any, in levels of classroom implementation of research- based teaching strategies reported by LaSIP versus Non-LaSIP science teachers?*

Survey respondents were divided into two groups based on participation in the *LaSIP* reported in the demographic data section of the survey. One group consisted of LaSIP trained science teachers who responded to the survey and the other group consisted of non-LaSIP science teachers who responded to the survey. The null hypothesis tested whether there was a significant difference in implementation rates between the two groups.

Null hypothesis: The difference between the mean summative scale scores of LaSIP trained science teachers and the mean summative scale scores of Non-LaSIP teachers is zero.

Alternative hypothesis: The difference between the mean summative scale scores of LaSIP trained science teachers and the mean summative scale scores of Non-LaSIP trained science teachers is not zero.

The hypotheses were tested by comparing sample means of the fourteen items in Section E of the survey for LaSIP and non-LaSIP teachers. Independent samples t-tests were used to determine if the frequency of use of RBTS of LaSIP science teachers differed from the frequency of use of RBTS by non-LaSIP science teachers. Results of the t- test were used to determine whether the t-statistic reached the threshold of statistical significance.

A p-value equal to or less than 0.05 was used as the basis for rejection of the null hypothesis and the ability to conclude that training in the LaSIP program made a statistically significant difference in teachers' classroom implementation of research-based teaching strategies.

3. *Which research-based teaching strategies/classroom practices do LaSIP teachers perceive as being most important in improving student achievement?*

Scores in *Subscale E. Implementation of Research-based Teaching Strategies and Subscale F. Student Achievement* were used to compare teacher reports of classroom use of research-based teaching strategies and their perceptions of how use of the strategies affected student achievement in their classes. Statistical procedures using SPSS included analysis of frequency distributions and correlation tables, principal component analysis and linear regression. Re-examination of the coding of the interview transcripts of individual teachers and the interview transcripts of focus groups was conducted to refine themes. Themes were reviewed, refined and compared with survey findings in order to provide additional insights into answers to items 38 - 65 of the survey.

4. *In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues knowledge and skills gained from professional development?*

Scores in *Subscales B. Follow-up Activities, C. Context, D. Implementation of a reform-based curriculum and G. Practical benefits of professional development programs that influence choice and attendance* were used to assess teacher perceptions of opportunities to collaborate with other teachers in their school and district by sharing resources and ideas and their perceptions of technical support for implementation received from providers, district personnel, administrators and parents. Statistical procedures via SPSS included analysis of frequency distributions, data reduction via principal component analysis and linear regression analysis to determine the predictive value of composite variables. Personal interviews and focus group discussions were conducted to obtain contextual data concerning program and school level factors that may have impacted classroom implementation. Coding of the interview transcripts of individual teachers and the interview transcripts of focus groups via ATLAS.ti were further refined. Emergent themes were reviewed and compared with survey findings to provide in depth answers to questions in Sections B - D and G of the survey.

5. *What do science teachers perceive as barriers to selecting and implementing research-based changes in curriculum, assessment and instruction in the classroom?*

Scores on Survey *Subscales w*ere computed and analyzed to assess teacher perceptions of barriers to implementing changes in teaching practices. Statistical procedures via SPSS included analysis of frequency distributions, data reduction via principal component analysis and linear regression analysis to determine the predictive value of composite variables. Personal interviews and focus group discussions transcripts, and reports and answers to open ended questions in Section H of the survey subjected to qualitative data analysis via ATLAS.ti to determine teachers' beliefs concerning barriers to reform-based changes in curriculum, assessment and instruction. Re-examination of the coding of the interview transcripts of individual teachers and the interview transcripts of focus groups were conducted to refine recurrent themes and provide additional insights.

Findings in qualitative data sources were reviewed and integrated with survey findings in order to provide answers concerning teacher perceptions of barriers to implementation of reform-based teaching practices. Summaries of these steps can be found in Table 1 and in the flow chart in Figure 5. Table 1.1

Table 1.1

Research Questions: Collection and Analysis of Data

Research Questions	Method of Data Collection	Analysis of Data
1. Which reform-based program components are perceived by science teachers as being important in improving their professional growth and are most likely to influence selection and implementation of research-based teaching strategies in the classroom?	Survey, Individual Interviews, Focus Groups	Frequency Distributions Principal Component Analysis Regression Analysis Content Analysis/ Matrix Analysis
2. What are the differences, if any, in the levels of classroom implementation of research - based teaching strategies by LaSIP versus Non- LaSIP science teachers?	Survey	Principal Component Analysis Correlations Frequency Distributions Independent Samples t-tests
3. Which research-based teaching strategies/ classroom practices do teachers perceive as being most important in improving student achievement?	Survey, Individual Interviews Focus Groups	Frequency Distributions Principal Component Analysis Content Analysis/ Matrix Analysis
4. In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues knowledge and skills gained from professional development?	Survey, Individual Interviews, Focus Groups	Frequency Distributions Principal Component Analysis Content Analysis/ Matrix Analysis
5. What do teachers perceive as barriers to selecting and implementing reform-based changes in curriculum, assessment and instruction in the classroom?	Survey, Individual Interviews, Focus Groups	Frequency Distributions Principal Component Analysis Content Analysis Matrix Analysis

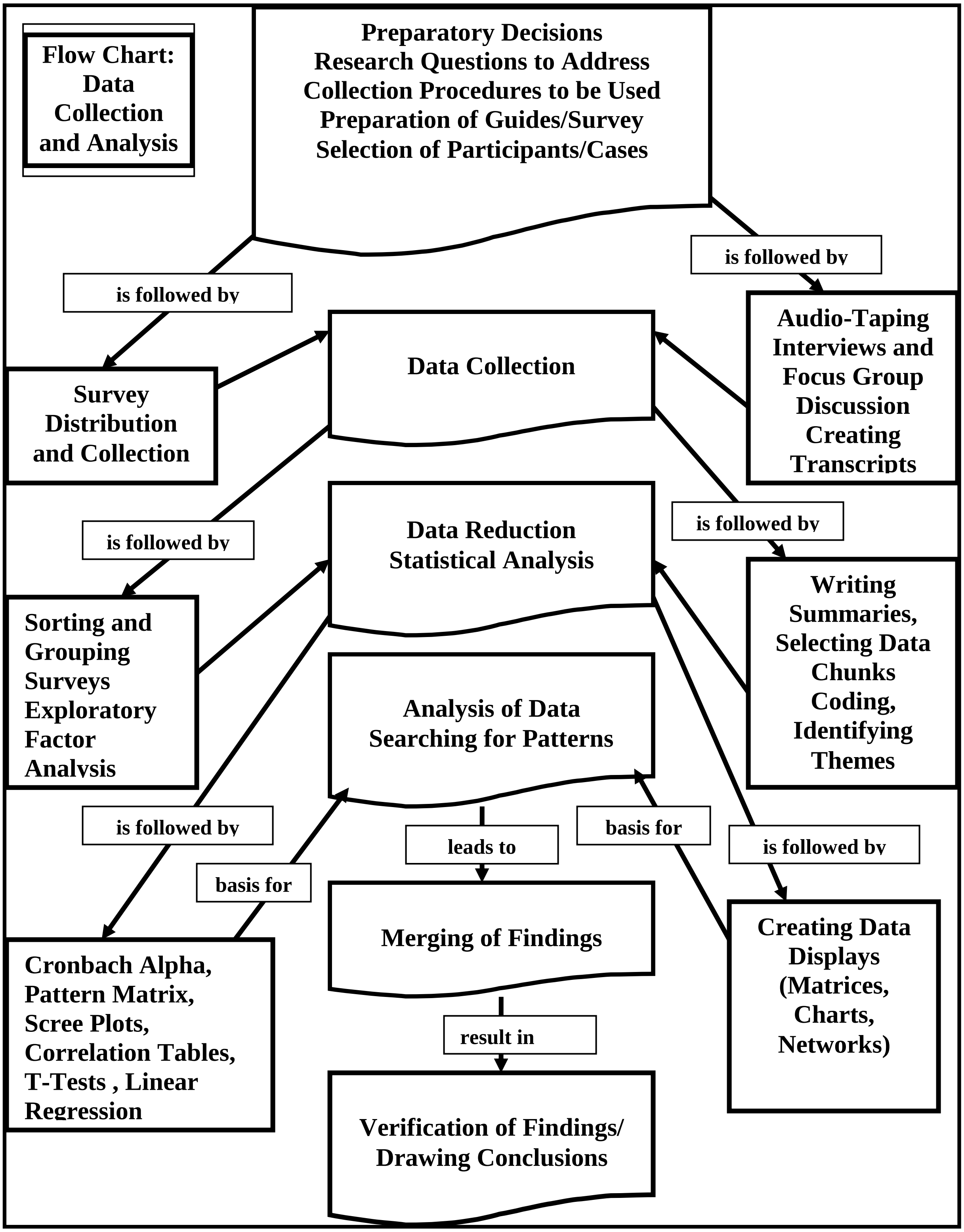

Figure 5

Flow Chart: Integrated Mixed Methods Data Collection and Analysis

Evaluating Trustworthiness and Monitoring Bias

Trustworthiness in qualitative research involves establishing criteria for evaluating its worth. Several criteria for establishing trustworthiness that have been identified by Lincoln and Guba (1985) and confirmed in later works by Creswell (2003) and Carlson (2010) include "credibility, transferability, dependability and confirmability" [According to Shenton (2004) credibility involves establishing] "confidence in the truth of the findings; Transferability" (Shenton, 2004, p. 73) refers to criteria of findings that establish applicability in other contexts; dependability *s*hows that findings are consistent and can be repeated and confirmability describes the extent to which findings in a study are shaped by the respondents and are not due to researcher bias, motivation or interest (Shenton, 2004)

There are several procedures used to evaluate these criteria and establish trustworthiness in qualitative research. Among them are "audit trails, reflexivity, thick and rich description, triangulation and member checking." (Carlson, 2010 p. 1102). The procedures used in this study included triangulation, peer review, member checking and reflexivity.

Triangulation involved using multiple data sources that included a researcher developed survey, personal interviews and focus group discussions. The sources yielded both qualitative and quantitative data that allowed for comparison of people with different viewpoints. Using multiple methods of collecting and analyzing data helped facilitate deeper understanding of teachers' perceptions of factors that impact transfer of professional development experiences into classroom practice.

Peer review by my colleagues, one a recent PhD recipient and dedicated science educator and the other a former distinguished educator, provided feedback to enhance credibility and ensure validity of the findings in this study. The feedback also helped me to become more aware of my own views about professional development and the role of teachers in its planning and implementation.

Typically, member checking is viewed as a technique for establishing validity of an account by “testing interpretations and conclusions with members of the groups from whom the data were originally obtained.” (Lincoln & Guba, 1985, p. 314). In this study, member checking was done informally as opportunities arose during the normal course of interviews and conversations and formally as a matter of course at the end of each interview and focus group discussion. My notes and bullet points were used to allow participants an opportunity to volunteer additional information or correct impressions or specific information and assess adequacy of the information while it was still fresh in their minds.

Reflexivity is important in avoiding undue bias in research, especially in qualitative research where the researcher is considered to be a human instrument of the process. As noted by Malterud:

> "A researcher's background and position will affect what they (sic) choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions" (Malterud, 2001, p. 483-484).

Perspectives, beliefs, values and positions held by the researcher shape both quantitative and qualitative research and introduce the propensity for bias. However, as noted by Malterud, "Preconceptions are not the same as bias, unless the researcher fails to mention them." (Malterud, 2001, p. 484).

As noted in Chapter 1, one of the things cited as a limitation of this study is the possibility of subjectivity due to my long association with the LaSIP. With this always upper most in my mind, I worked to ensure that findings in this study were based on data that was collected, analyzed, and interpreted, objectively. The decision to use both qualitative and quantitative sources was shaped by this knowledge of potential bias.

This is not to say that preconceptions were never in play. It is possible that my preconceptions of the effects of long-term professional development on classroom implementation may have shaped my initial assumptions. However, findings in this study were evaluated and reported as determined by the criteria I have described.

Summary of Chapter Three

Chapter three described the qualitative and quantitative methods that will be used to collect and analyze data in this study. A brief overview of the rationale for the design of the study and the research studies which support the rationale were included in the introduction to the chapter... Following the introduction, I presented a description of the design of the study. The study will use an adaptation of an integrated mixed model design (Tashakkori and Teddlie, 1998; Castro et al, 2010). The model calls for mixing qualitative and quantitative data throughout the data collection and analysis processes. Sections of the chapter which follow the introduction included descriptions of the participants and procedures used in developing the survey. The rationale for the qualitative data collection via personal interviews and focus group discussions was also included.

The procedures section listed the five research questions and the quantitative and qualitative methods that were used to answer the questions. Proposed statistical and analytical methods included measures of central tendencies, factor analysis, t-tests, and assessment of correlation matrices. Qualitative data collected via interviews and focus group discussions were used to transcribe, summarize, and analyze data using Atlas.ti software and integrated with findings from the quantitative strands of data from the surveys.

Chapter Four

Results: Presentation and Analysis of Data

Overview

The purposes of this chapter are to (1) present and analyze the data concerning science teachers' perceptions of features of professional development that impact levels of classroom implementation of research-based teaching strategies, (2) present and analyze data pertaining to the assumption that science teachers who have participated in LaSIP sponsored professional development are more likely to implement these strategies than Non-LaSIP science teachers. The integrated, mixed model design of the study involved concurrent collection and analysis of both quantitative and qualitative data sources. Data sources included quantitative data from a researcher developed survey, and qualitative data from transcripts of personal interviews and focus group discussions and five open-ended questions in the survey. Analyses of quantitative data from a survey were conducted using the Statistical Package for the Social Sciences Version 9 (SPSS). Qualitative data were collected from individual interviews and focus group discussions and subjected to analysis via Atlas.ti version 7. Qualitative findings and findings from quantitative data analyses are correlated throughout the study in order to provide answers to the five research questions.

The analyses of data from the survey are divided into two parts. Part I is used to present descriptive statistics based on analysis of demographic data reported by survey respondents. The statistical analyses of the demographic data are used to confirm equivalency of the LaSIP and Non-LaSIP groups. Part II is a presentation of the statistical analyses of teacher responses to the 71 closed-ended items in the survey. Responses are recorded on a 5-point Likert scale.

Analyses of individual and focus group transcripts and the five open-ended questions in Section H of the survey are also presented in this section. The concurrent quantitative and qualitative data strands were analyzed to determine teachers' perceptions of factors that make-up professional development experiences and what determines levels of classroom implementation of research-based teaching practices.

The results of analysis were used to answer the following research questions: (1) Which reform-based program features are perceived by LaSIP science teachers as being important in improving professional growth and are most likely to influence selection and frequency of implementation of research-based teaching strategies in the classroom? (2) What are the differences, if any, in the levels of classroom implementation of research-based teaching strategies reported by LaSIP versus non-LaSIP science teachers? **(**3**)** Which research-based teaching strategies/classroom practices do LaSIP teachers consider most important in improving student achievement? (4) In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues knowledge and skills gained from professional development? and **(**5**)** What do teachers perceive as barriers to selecting and implementing research- based changes in curriculum, assessment and instruction in the classroom? Although the quantitative and qualitative strands were developed concurrently in the study, statistical analyses of quantitative data from Section A-G of the survey are presented first. Analyses of the quantitative data are followed by analyses of the qualitative data.

Participants and Sample Results

Surveys were distributed to teachers in the Greater Baton Rouge area which also included the rural parishes of Pointe Coupee and St Helena, the Greater New Orleans Area which included

Jefferson Parish a suburban area of the state and Plaquemines Parish a rural area of the state. The return rate for the 150 surveys mailed out was 51%. Of the 77 surveys returned 11 were not used because sections of the survey were left blank or respondents failed to indicate a current teaching assignment in science either full-time or part of the day. When the 66 useable surveys were divided based on participation in the LaSIP, the results were 39 LaSIP science teachers and 27 Non-LaSIP science teachers. Further analysis of the demographics of the two groups is included in the section that follows.

Part I. Analysis of Demographic Data: LaSIP versus non-LaSIP Teachers. This section was used to analyze the demographic data from the survey and make comparisons of LaSIP vs. Non-LaSIP respondents. Demographic data include variables such as age, years of teaching and current teaching positions. Results of analyses are included in the graphs and descriptions which follow. The analysis of demographic data was used to establish equivalency of the two groups.

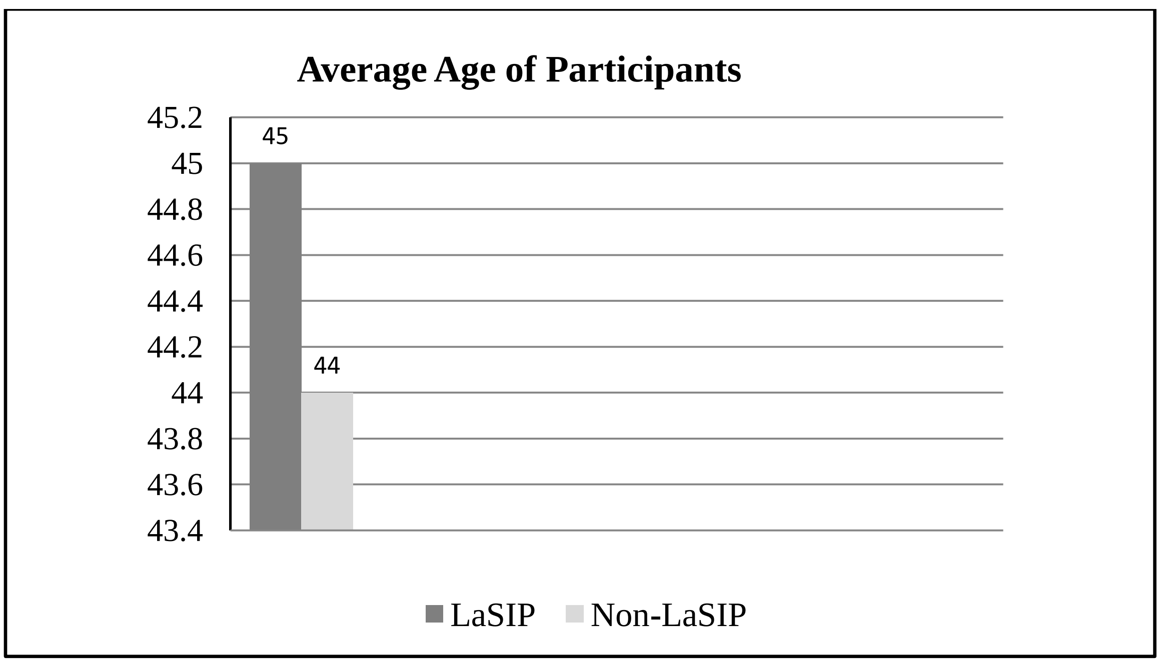

Figure 6

Average Age of Participants

The average age of LaSIP teachers was 45 years and the average age of non-LaSIP teachers was 44. On average LaSIP teachers were 1 year older than non- LaSIP teachers as shown in Figure 6.

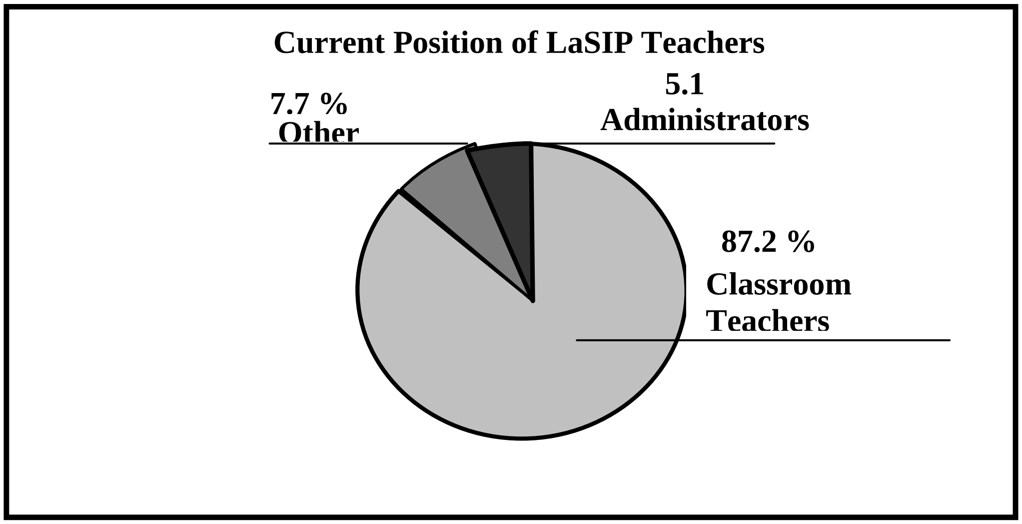

Figure 7
Current Teaching Position of LaSIP Teachers

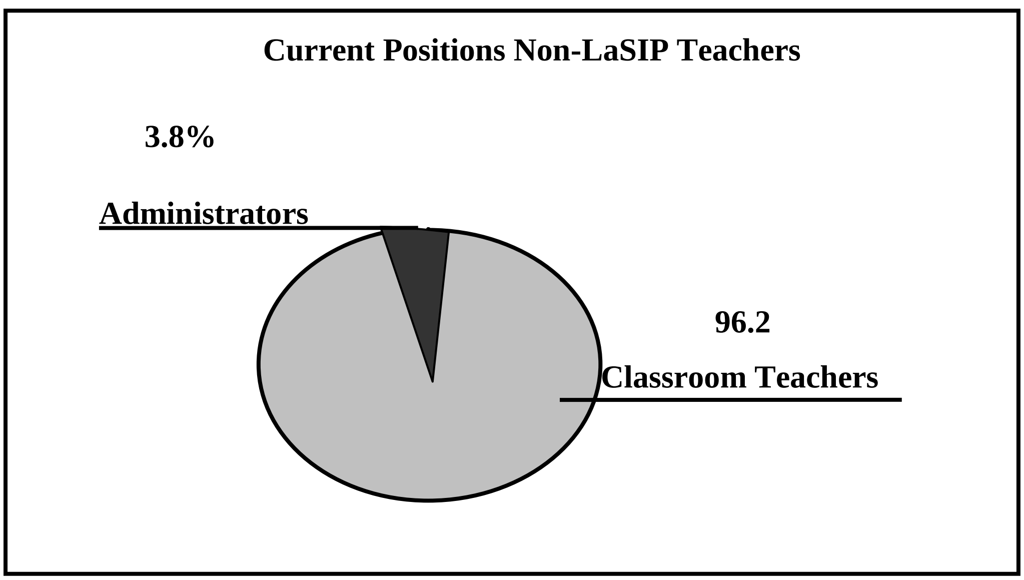

Figure 8
Current Teaching Position non-LaSIP Teachers

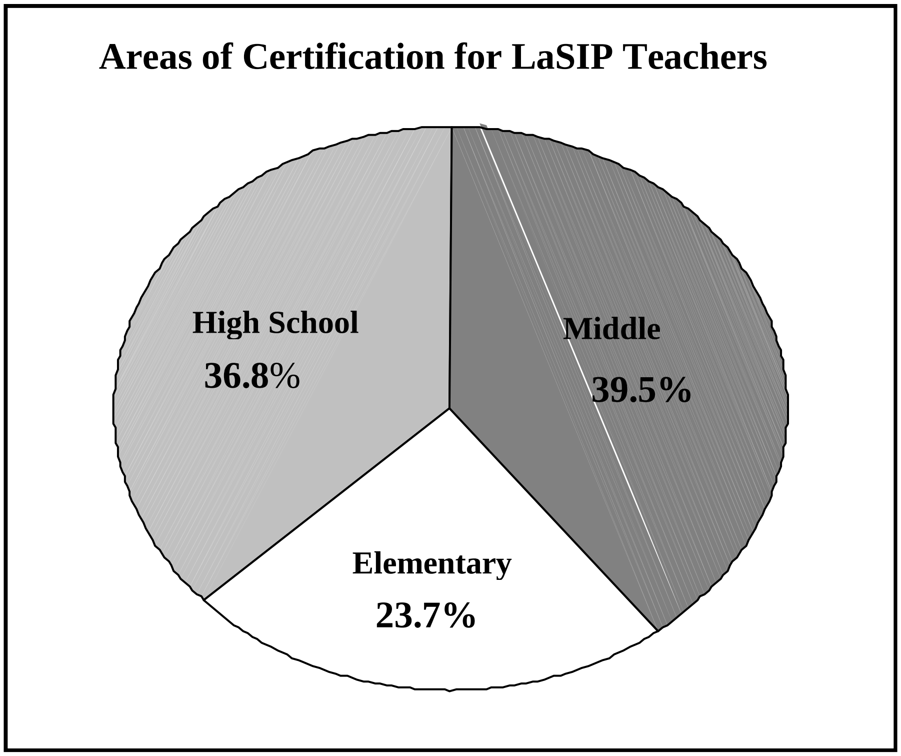

Figure 9
LaSIP Teachers Areas of Certification

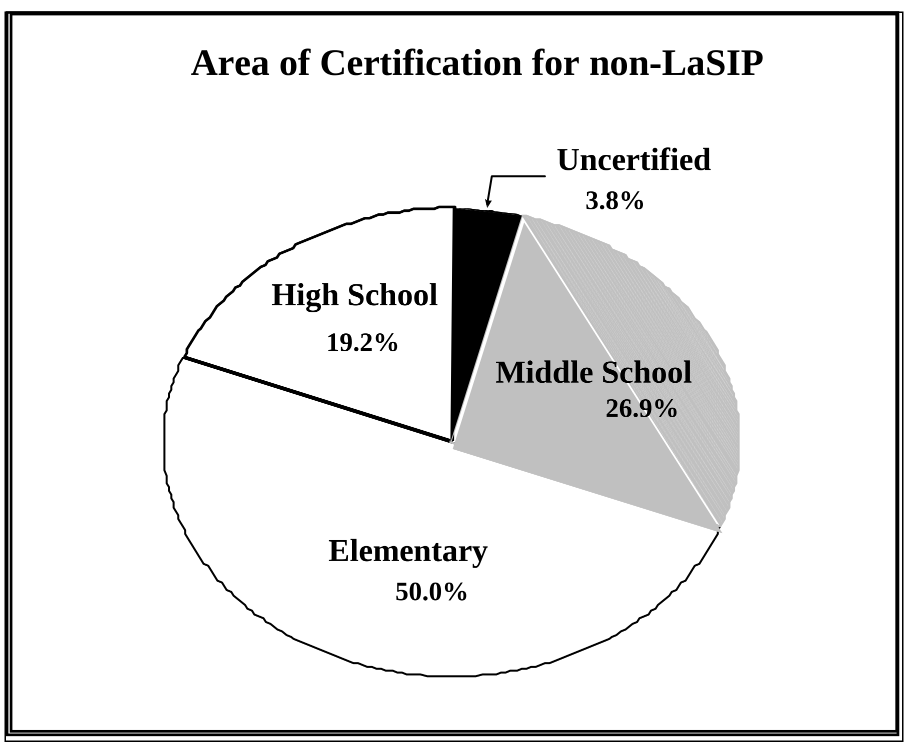

Figure 10
Non-LaSIP Teachers Areas of Certification

As shown in Figure 10, all of the LaSIP respondents were certified; 24% listed elementary certification, 39% listed middle school certification and 37% listed high school certification. Among Non-LaSIP teachers 50% listed elementary certification, 27% listed middle school certification, 19 % listed secondary certification and 4 % lacked certification.

Table 2

Years of Participation in LaSIP

Years in LaSIP	Number of Teachers	Percentage of Teachers
1992 - 1996	14	35.85
1997-2002	11	28.30
2003 or later	14	35.85
Total	39	100

The LaSIP program is an ongoing professional development program that had its inception in 1992. LaSIP teachers who responded to the survey noted participation that spanned the entire period from 1992 to 2003 or later. About two thirds of the group attended LaSIP over a ten year period between 1992 and 2002 as noted in Table 2.

The two groups differed years of experience. LaSIP teachers were more experienced than Non- LaSIP teachers as shown in Figure 11. LaSIP teachers averaged 17 years of teaching experience compared to an average of 13 years of experience reported by Non-LaSIP teachers.

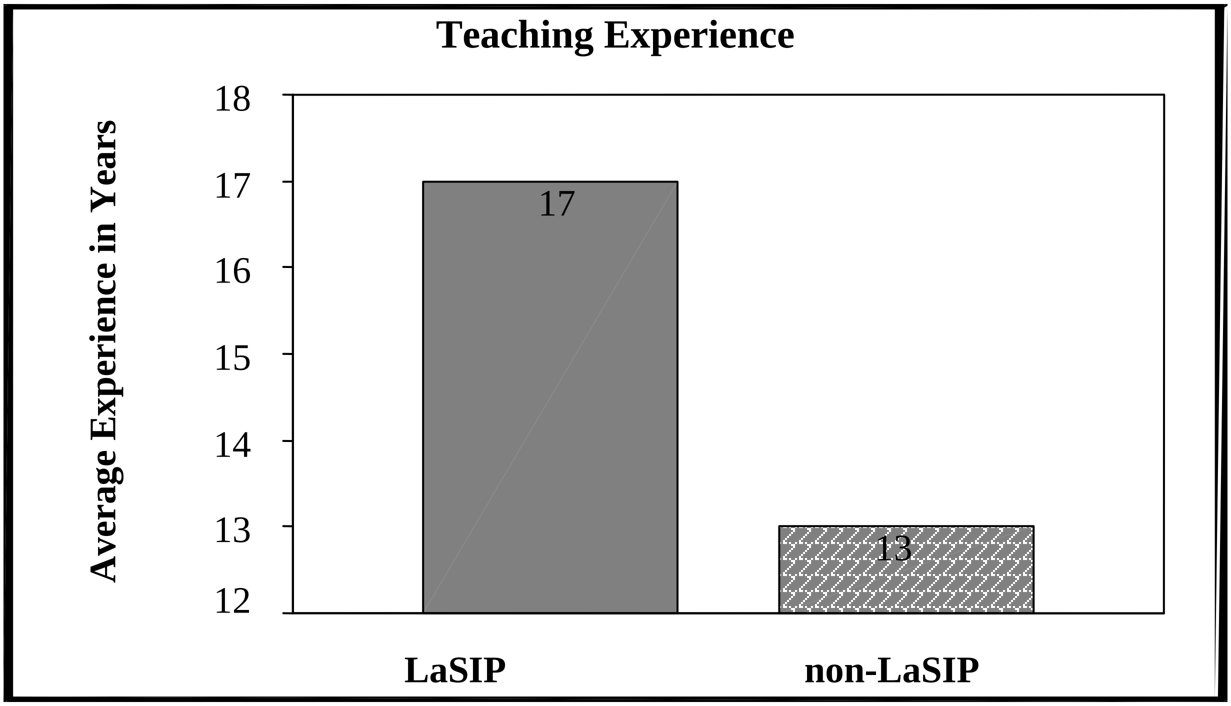

Figure 11

Mean Years of Teaching LaSIP versus Non-LaSIP

The ethnic makeup of LaSIP teachers consisted of thirty-three percent (33%) Caucasian and sixty-seven percent (67%) African-American as shown in Figure 12. Non-LaSIP teachers were slightly more ethnically diverse than LaSIP respondents. As shown in Figures 13, the Non-LaSIP group was made up of fifty- eight percent (58%) African Americans, thirty-four percent (34%) Caucasians and eight percent (8%) Hispanic teachers.

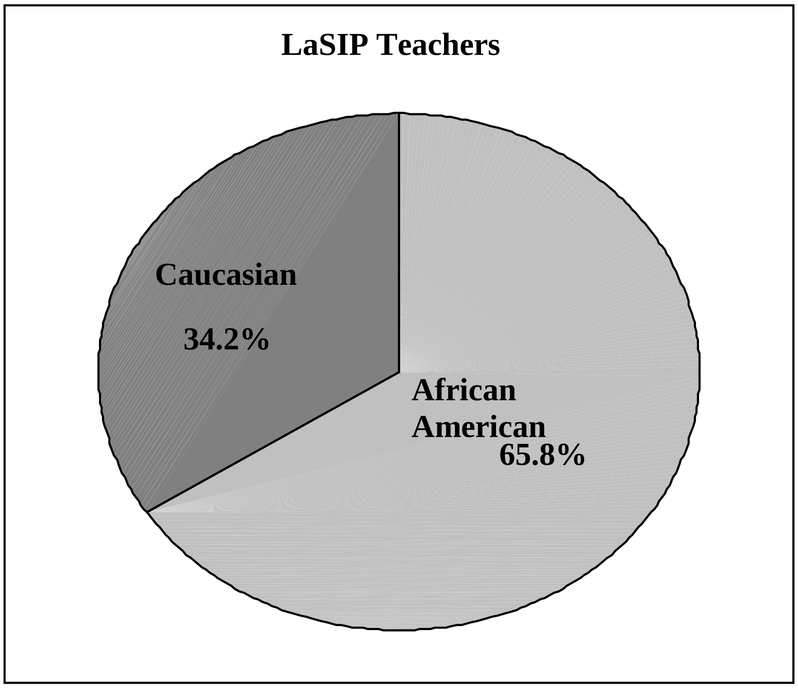

Figure 12

Ethnicity of LaSIP Teachers

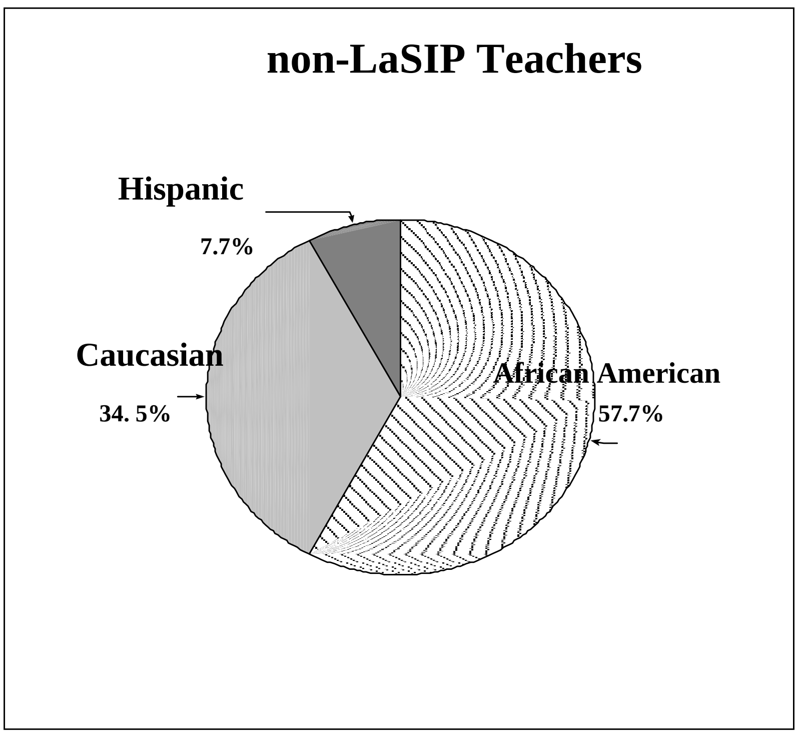

Figure 13

Ethnicity of non-LaSIP Teachers

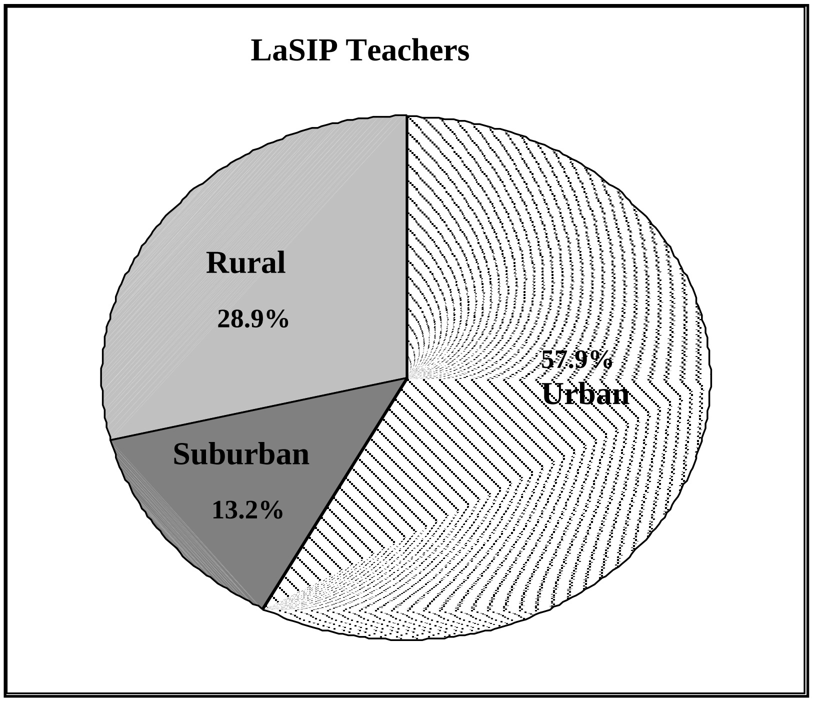

Figure 14

Type of School District LaSIP Teachers

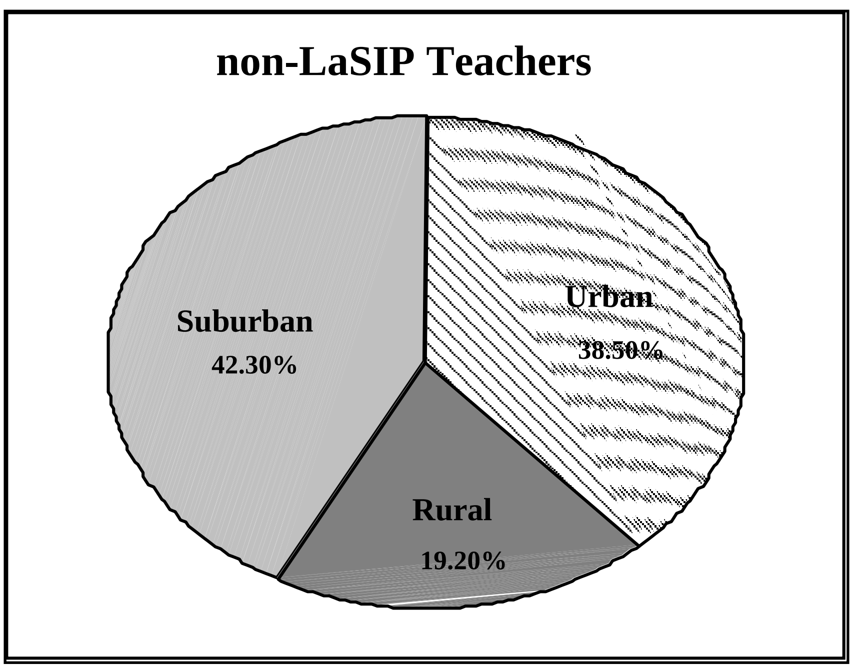

Figure 15

Type of School District non-LaSIP Teachers

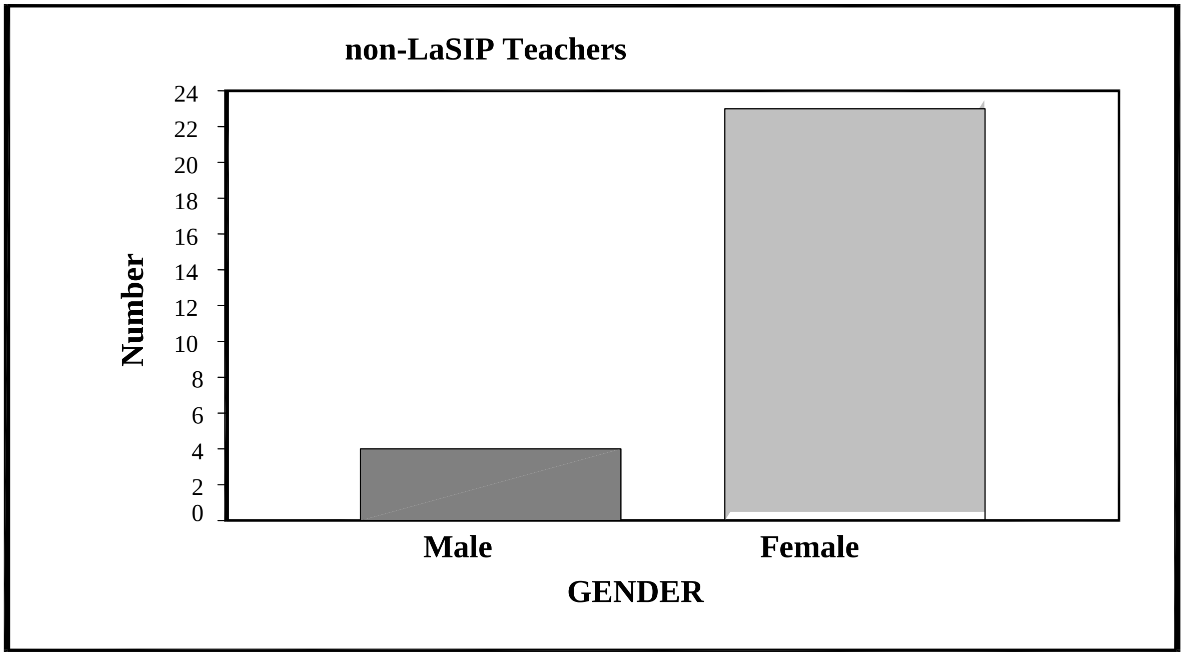

Figure 16

Gender of non-LaSIP Teachers

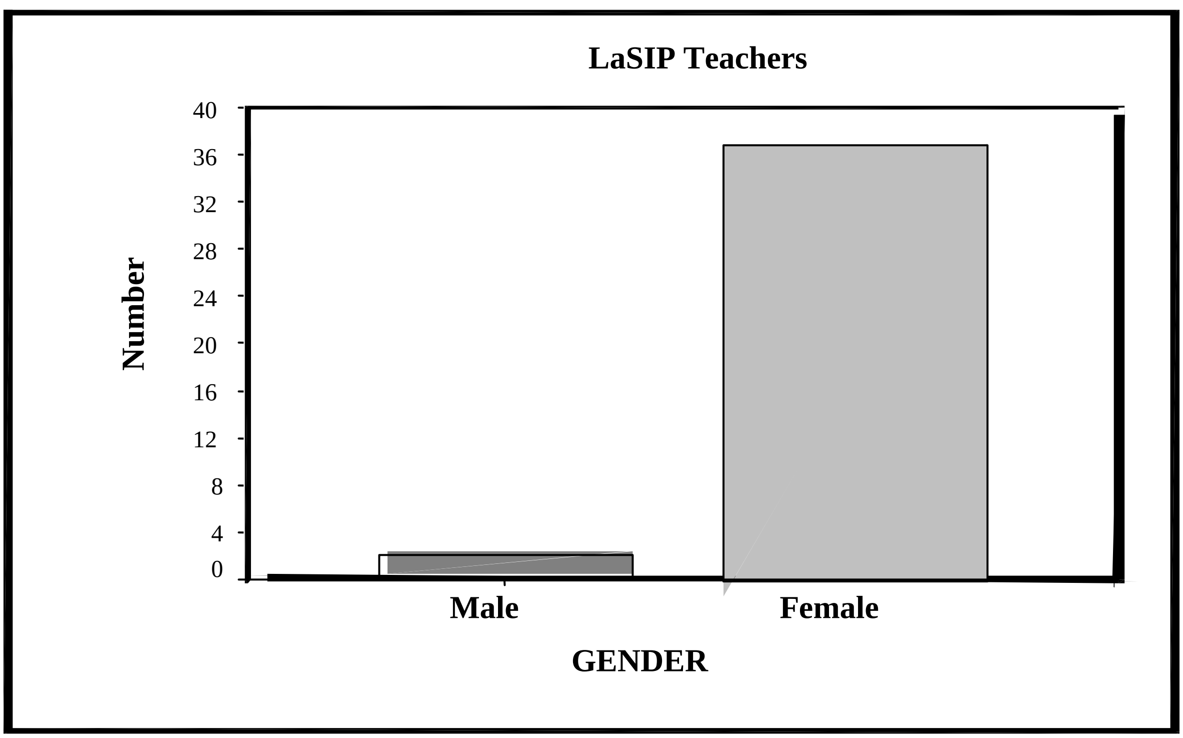

Figure 17

Gender of LaSIP Teachers

Teachers were also asked to indicate the type of school district where they worked as urban, suburban or rural as seen in Figures 14 and 15. Teachers in the LaSIP group were made up of fifty-eight percent (58%) urban educators, thirteen-percent (13%) suburban educators and twenty-nine percent (29%0 rural educators. The Non-LaSIP teachers were equally split between urban and rural teachers, forty-one percent to forty-one percent with eighteen percent (18%) from suburban districts.

As indicated in figures 16 and 17, males made up a smaller percentage of teachers than females. The difference between male and female respondents was greater in the LaSIP group than in the Non-LaSIP group. When expressed as percentages, females made up eighty-five percent (85%) of the Non-LaSIP group and ninety-five percent (95%) of the LaSIP group.

Part II. Overview of Statistical Procedures Used to Answer Research Questions. Part II of the study addressed in depth reporting of results for Sections A-G of the survey and transcription and analysis of the five open-ended questions in Section H of the survey, personal interviews and focus group discussions. Respondents to the survey indicated their perceptions of 71 close-ended questions on five point Likert scales and provided written responses to five short answer questions. The participants who consented to personal interviews and participation in focus group discussions also completed surveys.

Internal consistency of the survey subscales was measured using Cronbach's coefficient alpha which is typically a measure of the correlations between different items on the survey or subscales of the survey. The scores in Table 3 represent Cronbach's coefficient alpha results for subscales A-G of the survey. Values of alpha vary between 0 and 1. An alpha reading of 0.7 and above is considered an acceptable measure of internal consistency (Hair et al, 2006). An alpha greater than 0.7 was obtained for all the subscales indicating acceptable internal consistency.

Table 3.

Reliability of Survey Subscales

Sub-Scale	Number of Items	Alpha
A. Features of the LaSIP Professional Development Program	11	.8879
B. Follow-up Activities	9	8969
C. Context	11	.8820
D. Implementation of a Reform-Based Curriculum	6	.7830
E. Implementation of Reform-Based Teaching Strategies	14	.7309
F. Effect of Reform-Based Strategies on Student Achievement	14	.7574
G. Practical Benefits of Professional Development Programs	6	.7592

The data obtained from the survey was analyzed and used to provide answers or partial answers to the five research questions proposed in this study. The open-ended questions 72-76 in Section H were recorded case wise and subjected to analysis along with transcripts of personal interviews and focus group discussions. Sections A-G of the survey was subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS), version 9. For example, the responses to the 11 items in Section A of the survey were subjected to principal component analysis using ones (1s) as prior communalities estimates. The principal component method was used to extract the initial factors with eigenvalues greater than 1 which resulted in three factors that accounted for 68% of the variance. Examination of the scree plot also suggested that there were three factors of importance. Hence the first three components were retained and subjected to varimax (orthogonal) rotation. The results of the rotation with a list of survey items 1-11 and corresponding factor loadings for Section A are shown in Table 4.

Although factor loadings of 0.3 or higher are acceptable according to (Leech, Barrett & Morgan, 2008), factor loadings of 0.4 or higher were retained and used in regression analysis in this study. In Section A of the survey, Items 4, 7 and 11 loaded highest on Factor 1. Items 3, 5, 6 and 9 loaded highest on Factor 2. and Items 1, 2, 8 and 10 loaded highest on Factor 3. The three factors were then saved and used to represent three composite variables. Component 1 made up of items 4, 7 and 11 is a measure of features of the LaSIP program that dealt with the how (process) and what (content) of science teaching. The composite variable name was shortened to *PROCONT*. Items 3, 5, 6 and 9 loaded highest on Factor 2.

Table 4.

Principal Component Analysis Section A Features of the LaSIP

Components/Loadings			Questions
1 PROCONT	2 MODLING	3 TIMPRAC	Features of my professional development experiences that were most influential in improving teaching and learning and contributing to my use of the training experiences in the classroom included:
0.503		0.676	1. Sufficient time for acquiring the pedagogical content knowledge to implement the concepts and strategies in a classroom setting.
		0.418	2. Emphasis on standards-based teaching and learning.
	0.796		3. Time for reflection and writing about teaching and learning experiences.
0.815			4. Activities that emphasized the use of science process skills.
0.565	0.608		5. Instruction in alternative assessment that included models of authentic, real-life experiences.
	0.800		6. Modeling teaching and learning strategies during microteaching activities.
0.808			7. Emphasis on learning major science concepts.
.		0.796	8. Time to practice research-based teaching strategies.
	0.654	0.589	9. Opportunities to learn through a variety of methods
.	0.444	0.563 .	10. Attention to learning styles and multiple intelligences that were useful in classroom instruction.
0.824	0.404	0.877	11. Emphasis on teaching science as inquiry.

These items dealt with modeling of research-based teaching strategies and alternative assessment. The composite variable was renamed *MODLING*. Items 1, 2, 8 and 10, which loaded highest under Factor 3, were measures of the time afforded participants to practice research-based teaching strategies and to acquire needed pedagogical content knowledge. The third component was renamed TIMPRAC. The results of data reduction via principal component analyses are shown in Tables 4 -10. Composite variables were used as independent variables in regression analysis to determine the predictive value of the variables for the dependent variable RBTS.

Table 5

Principal Axis Factoring Analysis Section B. Follow-Up

Factor Loadings		Questions
1 COLLABOR	2 HANDEXP	My professional development experiences included follow-up activities that provided opportunities for:
0.735	0.497	12. Additional instruction and practice.
0.662	0.533	13. Sharing of resources and expertise with colleagues and fellow participants.
0.868		14. Exchange of ideas through visitation to other participants classrooms.
0.556		15. Presentation and sharing the results of research with colleagues.
	0.723	16. Acquisition of resources for classroom instruction.
0.645	0.540	17. Site visits by course teachers or program coordinators and staff.
	0. 951	18. Hands on experiences with materials and supplies.
0.645		19. Training for administrators in systemic educational reform.
	0.487	20. Active support from the principal in implementing new instructional strategies in the classroom.

Section B of the survey was used to investigate teacher perceptions of the nature of program follow up activities. Items 12-20 were subjected to data reduction. Principal axis factoring was the extraction method used in analysis of this section of the survey. Two factors were extracted that accounted for 63% of the variance. The factor matrix was subjected to varimax rotation. The resulting rotated factor matrix is shown in Table 5. The two composite factors were renamed HANDEXP and COLLABOR and used in regression analysis.

Table 6

Principal Axis Factoring Analysis Section C. Context

Factor Loadings		**Questions**
1 SCDSUP	2 COLLAB	School and District factors that have an impact on classroom implementation of research-based strategies include:
0.442	0.569	21. Discussions with other teachers in the school district about successful standards-based teaching strategies facilitates implementation of new teaching and learning.
	0.652	22. Collaboration with colleagues in the school/district has helped to improve my teaching and assessment skills.
	0.793	23. Having common planning time with other teachers rained to use research-based teaching strategies helps me to implement new ideas from professional development experiences.
	0.512	24. My principal is supportive of my efforts to implement new standards-based teaching strategies.
	0.543	25. Parents understand and support my use of new teaching strategies and alternative assessment methods.
0.587		26. The school provides ongoing technical support for implementation of standards-based teaching and learning.
0.780		27. The school district provides ongoing financial support for implementation of standards-based teaching and learning.
0.748	0.416	28. The district has adopted a standards-based curriculum and encourages teacher participation in job-embedded professional development.
0.733		29. Overall school climate at my school is not conducive to implementation of reform-based teaching practices.
0.430	0.450	30. Increased time for planning has helped me to implement reform-based teaching and learning in the classroom.
0.646		31. Ongoing technical assistance offered by the school district.

Section C Context of the survey was subjected to principal axis factoring using varimax rotation with Kaiser normalization. The two factors accounted for 51% of the variance. The rotated factor matrix is shown in Table 6. The two composite variables were renamed SCDSUP and COLLAB and saved for use in linear regression analysis.

Table 7

Principal Component Analysis Section D. Implementation of a Reform-based Curriculum

Component Loadings		Questions
1 BELREF	2 NOEQUIP	Indicate your beliefs concerning implementation of a reform-based curriculum in your classroom.
0.561		32. Promotes life-long learning.
	0.685	33. Requires equipment, supplies and technological resources that most schools cannot afford.
0.710		34. Can be accomplished by any classroom teacher.
0.853		35. Is needed to help students achieve state and national standards.
0.659		36. Incorporates strategies that can help students (including students with special needs) succeed, academically.
0.859		37. Can better meet the needs of students than traditional approaches requiring rote memorization of facts.

Participants were asked to indicate their beliefs concerning implementation of a reform-based curriculum in Section D of the survey. Section D was subjected to both principal axis factoring and principal component analysis. The two components extracted using principal component analysis accounted for 65 % of the variance while the two factors extracted using principal axis factoring accounted for 51% of the variance. A study of correlation matrices indicated that the factors were uncorrelated. The values shown in Table 7 are the results of principal component analysis using varimax rotation. Components were saved as variables and used in regression analysis.

Section E of the survey asked participants to indicate frequency of use of research-based teaching strategies in their classrooms. Section E was subjected to data reduction via principal component analysis using direct obliminal rotation. Results are shown in Table 8.

The two factors extracted were renamed RBTS for the 10 research-based teaching strategies and NONRBTS for the 4 non-research-based teaching strategies. The variables were saved and used in regression analysis.

Table 8

Principal Component Analysis Section E Implementation of RBTS

Component Loadings		Questions
1 RBTS	2 NONRBTS	Indicate the frequency of implementing the following strategies in classroom instruction:
0.440		37. Identifying similarities and differences.
0.524		38. Teaching science as inquiry.
	0.770	40. Lecture and /or lecture demonstration.
0.711		41. Hands-on science experiments.
0.704		42. Thinking maps and other graphic organizers.
0.778		43. Cooperative learning.
	0.502	44. Drill and practice.
0.612		45. Alternative assessments such as portfolios and exhibits.
	< 0.400	46. Reading aloud from the textbook.
< 0.400		47. Reflective logs and journals.
0.679		48. Long term science investigations
0.601		49. Writing about science.
	0.658	50. Worksheets.
0.485		51. Use of higher-order thinking skills.

Table 9

Principal Component Analysis Section F. Effect of Implementation of RBTS on Student Achievement

Components			Questions
1 LABRBTS	2 GENRBTS	3 NONRBTS	Indicate how your use of each of the following teaching strategies has affected student achievement in your classroom:
	0.814		52. Identifying similarities and differences.
0.782			53. Teach science as inquiry.
		< .4	54. Lecture and /or lecture demonstration.
0.865			62. Long term science investigations or class projec
0.682			55. Hands-on science experiments
0.491	0.588		56. Using thinking maps and other graphic organiz .
	0.634		57. Cooperative learning.
		0.766	58. Drill and practice.
0.521	0.566		59. Alternative assessments such as portfolios and exhibits.
		0.772	60. Reading aloud from the textbook.
	0.638		61. Reflective logs and journals.
0.761			62. Long-Term Science Investigations
0.761			63. Writing as a tool to increase comprehension and thinking
		0.667	64. Worksheets.
	0.694		65. Focusing on higher order thinking skills.

Section F of the survey asked participants to indicate their perceptions of the effects of using research-based teaching strategies on student achievement. Results were subjected to data reduction via principal component analysis with direct obliminal rotation. Results are recorded in

Table 9.   The components were renamed LABRBTS for lab related research-based teaching strategies, GENRBTS for general research-based strategies and, NONRBTS for none research-based teaching strategies. The three components were saved as variables and used in regression analysis.

Table 10.

Principal Component Analysis Section G. Practical Benefits

Components/Loadings		Questions
1 PRACBEN	2 GRADTEAM	Describe your agreement concerning the influence of the following benefits on your choice or attendance of professional development activities.
0.565	0.459	66. Receiving graduate credit.
0.780		67. Acquisition of free equipment and supplies.
0.815		68. Receiving a stipend for participation.
0.718	.	69. Time for learning and reflection of two weeks or more.
	0.883	70. Being allowed to participate as a school team.
0.709		71. Follow-up visits and assistance by a site coordinator.

Section G, Practical Benefits of the survey asked participants to describe their agreement concerning the influence of benefits offered as incentives for participation in professional development activities on their choice of and participation in such programs. Section G was subjected to data reduction via principal component analysis using varimax rotation. The six items loaded under 2 components. Five of the six items loaded highest under component 1. Item 70 loaded highest under component 2. The components were renamed PRACBEN, for practical benefits and GRADTEAM for participation in grade level teams. The components were saved and used in regression analysis.

Results and Analyses of Data to Answer Research Questions

Several steps were taken to analyze data and answer the five research questions. Each of the research questions is focused on factors that influence LaSIP teachers' selection and implementation of changes in teaching practices following participation in formal professional development activities. The first step was to compute and analyze descriptive statistics for each of the sections of the survey A-G. The raw data for both LaSIP and Non-LaSIP participants were recorded in SPSS data tables.

Recoding. Recoding is a feature available in statistical software such as SPSS that can be used to modify a data set by collapsing a larger number of categories into a smaller set. Instead of using a 5 category Agree-Disagree scale for the Likert items, I simplified the scale to three categories, *Agree, Not sure* and *Disagree*. This strategy simplified interpretation of the data and made reporting of the findings from frequency distributions easier without loss of information. The original data set was saved in a separate file in case it was needed for later analysis or verification.

The five -point Likert scales for Sections A-D and G were recoded to read, *Agree* = 3; *Not Sure* =2 and *Disagree* = 1. The subscale for Section E, Implementation of Research-based Teaching Strategies was recoded to read: *three or more times weekly* = 3; *two times weekly* = 2 and *once weekly or less* =1. The subscale for Section E. Effect of Research-based Strategies on Student Achievement was recoded as follows: *Increased* = 3; *Remained the same* = 2 and *Decreased* = 1. Descriptive statistics, frequency distributions and data from factor and regression analyses were generated using the recoded scales. The results were recorded in tables, analyzed and interpreted to answer the following research questions:

Research Question 1. Which reform-based program components are perceived by LaSIP science teachers as being most important in improving their professional growth and are most likely to influence their selection and implementation of research-based teaching strategies in the classroom?

Table 11 is a summary of frequency distributions for Section A, *Features of the LaSIP*. Items 1-11 of the survey were designed to ascertain teacher perceptions of features of LaSIP professional development programs that were most influential in improving teaching and learning and contributed to implementation of the training experiences in the classroom.

Table 11.

Summary of Frequency Distributions Section A. Features of the LASIP

Features of the LaSIP professional development experiences that were most influential in improving teaching and learning and contributing to my use of the training experiences in the classroom included:	Teacher Response in Percents		
	3 Agree	2 Not Sure	1 Disagree
1. Sufficient time for acquiring the pedagogical content knowledge to implement the concepts and strategies in a classroom setting.	80	5	15
2. Emphasis on standards-based teaching and learning.	90	2	8
3. Time for reflection and writing about teaching and learning experiences.	72	10	18
4. Activities that emphasized the use of science process skills.	72	13	15
5. Instruction in alternative assessment that included models of authentic, real-life experiences.	82	10	8
6. Modeling teaching and learning strategies during microteaching activities.	74	11	15
7. Emphasis on learning major science concepts.	69	10	21
8. Time to practice research-based teaching strategies.	69	10	21
9. Opportunities to learn through a variety of methods	75	10	15
10. Attention to learning styles and multiple intelligences that were useful in classroom instruction.	82	5	13
11. Emphasis on teaching science as inquiry.	64	15	21

There was widespread agreement among respondents that features of the LaSIP as described in Section A contributed to improvement of teaching and learning and influenced implementation of the training into classroom practice. The item that showed the greatest agreement among LaSIP teachers was Item Number 2, program emphasis on standards-based teaching and learning. Overall, an average of 75% of teachers agreed with the statements in Section A of the survey, 10% of teachers were not sure and 15% of teachers disagreed with the statements.

Based on the theoretical model shown in Figure 4, another part of question 1 to be answered is, which of the professional development program features in Section A are predictive of levels of implementation of research-based teaching strategies (RBTS) described in Section E of the survey? Sections A and E were subjected to regression analysis in order to answer this question. Results of principal component analysis of Section A are shown in Table 4. The three components were used as independent variables in regression analysis. Results of principal component analysis of Section E are shown in Table 8. The factor RBTS was used as the dependent variable subjected to regression analysis.

The items in Section A of the survey pertain to specific features of the LaSIP. Therefore, it seems feasible that a regression model that includes a majority of the features as independent variables or predictors could provide more detailed information than use of the composite variables shown in Table 4. Using a stepwise approach, each of the 11 items was used in regression analysis models. Results of the most inclusive model are summarized in Table 12.

Table 12 is a summary of the results of linear regression analysis of variables in Section A, Features of the LaSIP, as predictors for implementation of research-based teaching strategies (RBTS) in Section E. The model summary table (12 A.) shows that the multiple correlation coefficient (**R**) using all the 9 predictors simultaneously, is 0.98 ($\mathbf{R}^2 = 0.97$) and the adjusted $\mathbf{R^2}$ is 0.96 meaning that 96% of the variance in LaSIP teachers' perceptions of frequency of implementation of research based teaching strategies following participation in LaSIP can be predicted from questions 1, 2, 5, 6, 7, 8* 9, 10 and 11 combined, with 8 of the 9 variables significantly contributing to the prediction. The adjusted R^2 value of 0.96 means that 96% of the variance in implementation was explained by the model. According to Leech, Barrett & Morgan ((2008), this is a large effect. The findings were significant at $p < 0.001$ and therefore supportive of the model in figure 4.

Beta weight is a statistic that results from regression analysis. It is a measure of the relative importance of the predictor variable in predicting the criterion variable. In table 12 the predictor or independent variables are QUEST1, QUEST2, QUEST11, QUEST9, QUEST6, QUEST5, QUEST10, QUEST7 and QUEST8. The criterion or dependent variable is RBTS. Comparisons of the beta weights of the predictors in the regression equation help to understand the relative importance of each predictor. The beta weights presented in Table 12 (C) suggests that program emphasis on science as inquiry (QUEST11) contributed most to teacher perceptions of LaSIP features that influence levels of implementation of RBTS, followed by program emphasis on learning major science concepts (QUEST7) and having sufficient time to acquire pedagogical content knowledge to implement the concepts and strategies in the classroom (QUEST1).

With large numbers of independent variables, collinearity may prove to be problematic. Therefore, the model was also subjected to diagnostics for collinearity. The resultant statistics did not indicate that collinearity was a problem.

Table 12

Linear Regression Analysis: Features of LaSIP as Predictors for Implementation of RBTS

A.			Model Summary [b]						
Model	R	R^2	Adj. R^2	SEE	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	0.98	0.97	0.96	0.21	0.97	95.90	9	29	.000***

Note. Predictors: (Constant), QUEST1, QUEST2, QUEST11, QUEST9, QUEST6, QUEST5, QUEST 10, QUEST7, QUEST8. *Significant at *p < .001*

B		ANOVA			
Model 1	$\Sigma^{\text{of 2s}}$	df	F	M^2	*p*
Regression	36.76	9	95.90	4.09	.000***
Residual	1.24	29		4.260E-02	
Total	38.00	38			

Note. Predictors: (Constant), QUEST1, QUEST2, QUEST11, QUEST9, QUEST6, QUEST5, QUEST 10, QUEST7, QUEST8. Dependent Variable: RBTS; ***Significant at. *p < .001.*

C		Coefficients			
Variables	B	SE	β	t	*P*
1 Constant)	-2.66	.22		-11.99	.00
QUEST6	-0.13	.04	- .15	- 2.98	.01
QUEST8*	-8.16E- 02	.05	- .01	-1 .25	.14*
QUEST9	-0 .22	.05	- .27	-4.33	.00
QUEST11	.0 44	.05	.55	8.18	.00
QUEST10	0.15	05	.16	3.03	.01
QUEST7	0.31	.05	.36	5.99	.00
QUEST5	-0.20	.06	.18	3.60	.00
QUEST2	-0.14	.04	-.12	-3.24	.00
QUEST1	0.20	.04	.22	4.87	.00
**P > .05*					

(See the resultant table of values in Table 12 D Collinearity Statistics). According to Leech, Barrett and Morgan ((2008), VIFs less than 5 are not likely to be indicative of collinearity.

D	Collinearity Statistics	
	Collinearity Statistics	
Model 1	Tolerance	VIF
(Constant)		
QUEST 6	0.445	2.249
QUEST 8	0 275	3.631
QUEST 9	0.296	3.376
QUEST 11	0.247	4.043
QUEST 10	0.395	2.529
QUEST 7	0.315	3.171
QUEST 5	0.422	2.368
QUEST 2	0.807	1.239
QUEST 1	0.562	1.779

Research Question 2. Are there differences in reports of the frequency of classroom implementation of research-based strategies and teaching practices by LaSIP versus non-LaSIP science teachers?

The frequency data in Table13 was generated using raw data from the researcher developed survey. Survey responses were divided into two groups, coded as LaSIP (n = 39) and non-LaSIP (n=27). Teachers from both groups recorded their responses to questions 38 to 51 on a five-point Likert scale. As previously described, the data from the five-point Likert scale was transformed to a 3-point scale in which *3* indicated use of the strategy *three times a week or more*, *2* indicated use of the strategy *twice a week* and 1 indicated use of the strategy *once a week or less* in classroom instruction .

Data generated in the frequency distribution alone (See Table 13) do not indicate conclusive evidence of significantly greater implementation of reform-based teaching strategies by LaSIP versus Non-LaSIP teachers. However, a greater percentage of LaSIP teachers reported

more

Table 13

Frequency of Use of Research-based Teaching Strategies: LaSIP versus non-LaSIP

Teaching Strategies	LaSIP			Non-LaSIP		
	3 or More times/ week	2 times/ week	Once/ week or less	3 or More times/ week	2 times/ week	Once/ week or less
	Percentage of Teachers					
Using Similarities and Differences*	90	7	3	78	22	0
Teaching Science as Inquiry*	85	15	0	63	30	7
Lecture or Lecture Demonstration	67	28	5	18	78	4
Involving Students in Hands On Experiences*	90	5	5	78	18	4
Use of Thinking Maps*	82	10	8	67	26	7
Cooperative Learning*	92	8	0	56	26	18
Drill and Practice	49	28	23	74	22	4
Alternative Assessment*	82	13	5	37	41	22
Reading Aloud From Text	26	18	56	56	26	18
Reflective Logs and Journals*	82	10	8	30	52	18
Long Term Science Investigations*	77	20	3	44	48	8
Writing About Science*	95	5	0	74	22	4
Using Worksheets	64	26	10	22	70	8
Higher Order Thinking Skills*	92	8	0	82	18	0

Note:* Denotes Research-based Teaching Strategies frequent use of 6 of the 10 RBTS* than Non-LaSIP teachers. For example, LaSIP teachers reported more frequent involvement of students in hands-on experiences. On the other hand, Non-LaSIP teachers indicated more frequent use of three of the four non-research-based strategies, namely, lecture or lecture demonstration, drill and practice and reading aloud from the text.

The *t-test* was the method used to test the null hypothesis that there are no significant differences in the mean scores of LaSIP and Non–LaSIP teachers concerning reported frequency of use of RBTS. One reason for selecting the t-test is that the sample of participants in this study is relatively small. The t-test is, reportedly, effective in studies with n as small as 10 as long as variables are normally distributed within each group and variation of scores is not significantly different. A summary of the results of the t-test is shown in Table 14.

In order to conduct the t-test, data from the Section E subscale were recoded to indicate 3 for implementation of RBTS *three or more times weekly,* 2 for *two times weekly* and 1 for *once a week or less.* Data from the Section E subscale were analyzed to determine the mean for frequency of use for the two groups. The mean for frequency of use of RBTS by LASIP teachers was 2.17 and 1.99 for non-LaSIP teachers.

The independent samples t-test has two main parts, Levene's test for the assumption of equal variances and the t-test for equality of means. The variance (standard deviation squared) equaled 0.117 for the LaSIP group and 0.107 for the non-LaSIP group. Therefore, the variances of scores for LaSIP and Non-LaSIP groups were approximately equal. Levene's test provides an F and a Sig. p. As seen in 14. B, $p = 0.728$ which is greater than p = 0.05, indicating that there is no significant difference between the variances of the two groups. Therefore the top line (equal variances assumed) was used to interpret the t-test. Results of the t-test for equality of means are shown in Table 14 C: t = 1.462 with 26 degrees of freedom (14 + 14 - 2) and p = 0.156. The mean difference in frequency of use was 0.187.

Table 14

Independent Samples t-test for Frequency of Use: LaSIP versus non--LaSIP

A. Group Statistics

Variable	TCHRGRP	n	M	SD	SEM
FREQUSE	LaSIP	14	2.17	0.34	9.149E.02
	Non-LaSIP	14	1.99	0.33	8.782E.02

B. Levene's Test for Equality of Variances

Variable		F	*p*
FREQUSE	Equal variances assumed	0.124	.728

C. t-test for Equality of Means

t	df	Sig. (2-tailed)	MD	SED
1.462	26.000	.16	0.187	0.127
1.462	25.957	.16	0.187	0.127

The means are not significantly different in that the null finding of zero difference lies between the confidence intervals. Since p > .05, the null hypothesis that there is no significant difference in reported frequency of use of research-based teaching strategies between LaSIP and non-LaSIP teachers is accepted.

There was one exception to the results obtained in comparison of the two groups on overall frequency of use of RBTS which was use of *alternative assessment*. This finding was revealed in the examination of the correlation matrix comparing the two groups and further confirmed by conducting a t-test. The results of the t-test are shown in Table 15. Findings indicate that there was a statistically significant difference between LaSIP and non-LaSIP teachers on implementation of alternative assessment at $p = .02$.

Table 15.

Levene's Test and Independent Samples t-test for Implementation of Alternative Assessment

Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	MD	SED
ALTASES	Equal variances assumed	.49	.47	2.35	64	.02	-0.78	0.33

Research Question 3. Which research-based teaching strategies/ classroom practices do teachers perceive as being most important in improving student achievement?

In order to answer this question, survey respondents were asked to record answers to questions 52-65 concerning the effect of implementation of RBTS on student achievement. Data from the scale was recoded using the same variables to read 3 = *increased;* 2 = *remained the same* and 1 = *decreased.* The results of the frequency distributions are summarized in Table 16.

Overall, 87 % of LaSIP teachers indicated that use of the 10 RBTS* led to an increase in achievement, 10% indicated that achievement remained the same and 3 % reported a decrease in student achievement. Among non-LaSIP teachers, 63% indicated that student achievement increased as a result if implementing the 10 RBTS, 30 % indicated that achievement remained the same and 7% reported that student achievement decreased. Strategies for which over 90% of LaSIP teachers indicated an increase in student achievement included using similarities and differences, involving students in hands on experiences, writing about science and using higher-order thinking skills.

Table 16.

Effect of Research-based Teaching Strategies on Student Achievement

Teaching Strategy (* = RBTS)	LaSIP Achievement			Non-LaSIP Achievement		
	Increased	Remained the Same	Decreased	Increased	Remained the Same	Decreased
	Percentage of Teachers			Percentage of Teachers		
Using Similarities and Differences*	90	8	2	78	22	0
Teaching Science as Inquiry*	85	15	0	63	30	7
Lecture	18	28	54	18	78	4
Involving Students in Hands On Experiences *	90	5	5	78	18	4
Use of Thinking Maps *	82	10	8	67	26	7
Cooperative Learning *	92	8	0	74	19	7
Drill and Practice	23	28	49	59	33	8
Alternative Assessment*	82	13	5	37	41	22
Reading Aloud From Text	10	21	69	7	26	67
Reflective Logs *	82	10	8	30	52	18
Writing About Science*	95	5	0	74	22	4
HOTS *	92	8	0	82	18	0

Research Question 4. In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues knowledge and skills gained from professional development?

Section B, C D, and G of the survey were designed to provide answers to research question four and to gain insight concerning teachers' perceptions of follow-up and various contextual factors that may influence selection and implementation of reform-based professional development strategies. Teacher responses to questions in Section B, C, D and G of the survey are summarized in Tables 17-19. The five-point Likert scales were recoded to read 3 = *Agree*, 2 = *Not Sure* and 1= *Disagree.*

In the 9 questions in Section B, teachers were asked to indicate whether or not their professional development experiences included follow-up opportunities that enhanced learning and improved teaching. Included in the survey questions were descriptions of activities such as receiving additional instruction and practice, being able to visit classrooms of other participants, being able to share resources and expertise with colleagues and being able to present the results of research to their colleagues.

*A*nalysis of teacher perceptions concerning the inclusion of follow-up to professional development activities indicated the greatest agreement concerning item 18, *opportunities for hands-on experiences with materials and supplies*. According to survey results, 92% of teachers agreed, 3% were not sure and 5% disagreed. The item on which there was the least agreement was item 19, which concerned the *inclusion of training for administrators as part of systemic reform* with 36 % of teachers indicating agreement, 46% of teachers indicating they were not sure and 18% indicating disagreement.

Table 17

Summary of Frequency Distributions Section B Follow-up

Questions My professional development experiences included follow-up activities that provided opportunities for:	3 (Agree)	2 (Not Sure)	1 (Disagree)
	Teacher Response in Percents		
12. Additional instruction and practice.	77	5	18
13. Sharing of resources and expertise with colleagues and fellow participants.	79	8	13
14. Exchange of ideas through visitation to other participant's classrooms.	59	13	28
15. Presentation and sharing the results of research with colleagues.	67	15	18
16. Acquisition of resources for classroom instruction.	87	3	10
17. Site visits by course teachers or program coordinators and staff.	69	13	18
18. Hands on experiences with materials and supplies.	92	3	5
19. Training for administrators as part of systemic educational reform.	36	46	18
20. Active support from the principal in implementing new instructional strategies in the classroom.	79	13	8

The school and district factors that were reported to have an impact on teacher implementation of research-based teaching strategies were described in Section C. Context. Teacher responses to these statements are summarized in Table 18. The item on which teachers indicated the most agreement was item 24, having a supportive principal (90%). Also rated highly, (80%) was the ability to collaborate with colleagues to improve teaching and assessment skills. Less than half of teachers agreed with the statement in item 30, where 45% of teachers perceived of having additional planning time as a contributing factor in classroom implementation of research-based teaching strategies. Sixteen percent (16%) of teachers were unsure and thirty-nine (39) percent of teachers disagreed with the statement.

Table 18

Summary of Frequency Distributions Section C Context

Questions School and district factors that have an impact on classroom implementation of research-based strategies include:	Teacher Response in Percents		
	3 Agree	2 Not Sure	1 Disagree
21. Discussions with other teachers in the school district about successful standards-based teaching strategies that facilitate implementation of new teaching and learning.	69	10	21
22. Collaboration with colleagues in the school/district has helped to improve my teaching and assessment skills.	80	15	5
23. Having common planning time with other teachers trained use research-based teaching strategies helps me to impleme new ideas from professional development experiences.	69	8	23
24. My principal is supportive of my efforts to implement new standards-based teaching strategies.	90	5	5
25. Parents understand and support my use of new teaching strategies and alternative assessment methods.	54	28	18
26. The school provides ongoing technical support for impleme of standards- based teaching and learning.	69	5	26
27. The school provides ongoing financial support for implementation of standards-based teaching and learning.	54	15	31
28. The district has adopted a standards-based curriculum and encourages teacher participation in job-embedded professional development.	74	16	10
29. Overall school climate at my school is not conducive to implementation of reform-based teaching practices.	31	5	64
30. Increased time for planning has helped me to implement reform-based teaching and learning in the classroom.	45	16	39
31. Ongoing technical support is offered by the district.	62	15	23

Table 19

Summary of Frequency Distributions Section D. Implementation of a Reform-based Curriculum

Questions Indicate your beliefs concerning implementation of a reform-based curriculum in your classroom.	Teacher Response in Percents 3 Agree	 2 Not Sure	 1 Disagree
32. Promotes life-long learning.	79	18	3
33. Requires equipment, supplies and technological resources that most schools cannot afford.	54	23	23
34. Can be accomplished by any classroom teacher.	69	18	13
35. Is needed to help students achieve state and national standards.	79	18	3
36. Incorporates strategies that can help students (including students with special needs) succeed, academically.	77	23	---
37. Can better meet the needs of students than traditional approaches requiring rote memorization of facts.	79	18	3

Teacher beliefs concerning the effects of change and the implementation of a reform-based curriculum in Section D are recorded in Table 19. Summaries of frequency distributions of the data indicate that 79% of teachers expressed agreement on three of the six items: *32. Promotes life-long learning; 35. Is needed to help students achieve state and national standards and 37.Can better meet the needs of students than traditional approaches requiring rote memorization of facts.*

Responses to the three items also indicated that 18% of teachers were unsure and 3% disagreed with the three statements. Teachers expressed strong agreement concerning the effectiveness of reform-based strategies in helping students with special needs succeed, academically (77%).

In addition to academic offerings, there are a number of practical benefits that may accompany professional development activities. Teachers were asked to record their beliefs concerning these benefits in Section G of the survey. Analysis of the frequency distributions recorded in Table 20. Teachers indicated the highest agreement on items 67 and 68.

Table 20.

Summary of Frequency Distributions Section G. Practical Benefits

Questions Describe your agreement concerning the influence of the following benefits on your choice or attendance of professional development activities.	Teacher Response in Percents 3 Agree	 2 Not Sure	 1 Disagree
66. Receiving graduate credit.	69	8	23
67. Acquisition of free equipment and supplies.	95	2	3
68. Receiving a stipend for participation.	90	5	5
69. Time for learning and reflection that equals or exceeds two weeks.	77	13	10
70. Being allowed to participate as a school team.	80	10	10
71. Follow-up visits and assistance by a site coordinator for one school year.	67	18	15

Ninety-five (95) percent of teachers agreed that acquisition of free equipment and supplies would influence their choice or attendance and 90% agreed that receiving a stipend for participation would influence their choice or attendance.

The theoretical model in Figure 4 was used to depict the independent variables included in sections A-D and G that influenced implementation of RBTS, the dependent variable in section E. Procedures for testing the dependent variables in Section A as predictors were described in answers to research question one. The following procedures were used for testing the variables in Sections B-D and G as predictors of RBTS in Section E. Sections B, C, D and G were subjected to principal component analysis for data reduction as previously described (see Tables 7-10). In Sections B and C there were loadings greater than 0.4 for both components. Except for one item in Section D (Item 33) and one item in Section G (Item 70), items in each of the two sections loaded under a single component. The components from the four sections, B, C, D and G, were saved as composite variables and used in regression analysis. The results of regression analyses are shown in Tables 21- 24.

Section B of the survey was designed to probe teacher perceptions of the influence of Follow-up on implementation of RBTS. The two factors were renamed COLLABOR and HANDEXP for opportunities to collaborate at the school and district levels and hands on experience with materials and supplies, respectively. Simple linear regression was computed to investigate whether the two regression factors COLLABOR and HANDEXP were predictive of the implementation of RBTS. Only one of the factors, HANDEXP was found to be predictive. Results of the regression were as follows: The unstandardized coefficient for HANDEXP was 543; $F (2, 36) = 7.586$ and p was less than .001. The results of HANDEXP versus RBTS were statistically significant because *p* was less than 0.001. In the model summary Table 21 A., R square equals 0.296, which means that 30% of the variance in frequency of use of RBTS was predicted by the factor HANDEXP. The composite variables for Section C. Context were renamed COLLAB and SCDSUP for opportunities for collaboration and school and district support, respectively. These composite variables were subjected to regression analysis to determine if contextual factors were predictive of teachers' levels of implementation of research-based teaching strategies (RBTS)

Table 21

Linear Regression Analysis Section B. Follow-up vs. Section E Implementation of RBTS

A. Model Summary

Model	R	R^2	Adj. R^2	SEE	Change Statistics: R^2 Change	F Change	df1	df2	Sig. F Change
1	.55	.30	.26	0.86	.30	7.59	2	36	.002**

Note. Predictors (Constant) HANDEXP and COLLABOR Dependent variable: RBTS;
*Significant at p < .01.

B. ANOVA

Model 1	Σ of 2s	df	F	M^2	*p*
Regression	11.27	2	7.59	5.63	.002**
Residual	26.73	36	-------	0.74	----
Total	38.00	38			

Note. Predictors (Constant), HANDEXP and COLLABOR; Dependent variable RBTS.
**Significant at p < .01

C Coefficients

Model 1	B	SE	β	t	p
(Constant)	2.281E-16	.14	------	0.00	1.000
COLLABOR	-9.074E-0	.15	- .09	-0.62	.54
HANDEXP	0 .54	.14	.54	3.852	.000***

Note**.** Dependent variable: RBTS. Predictors: COLLABOR and HANDEXP. ***Significant at p < .001.

The results of the analysis are recorded in Table 22. Both factors, SCDSUP and COLLAB, were found to be significant. The unstandardized regression coefficient (B) for predicting implementation of RBTS based on teacher perceptions of contextual factors was .30 and .37 respectively. The standardized coefficient (β) was .30 for SCDSUP and .37 for COLLAB. The significance levels were p = .04 and p =.01, respectively; degrees of freedom for the F test is 2 for the numerator and 36 for the denominator (Residual) and F = 5.341.

Table 22

Regression Analysis Section B. Follow-up vs. Section E. Implementation of RBTS

A			Model Summary						
					Change Statistics				
Model	R	R^2	Adj. R^2	SEE	R^2 Change	F Change	df1	df2	Sig. F Change
1	.48	.23	.19	.90	.229	5.341	2	36	.009*

Note. Predictors (Constant) COLLAB REGR and SCDSUP. Dependent variable RBTS.

Model 1	Σ of 2s	df	F	M^2	*p*
Regression	8.70	2	5.341	4.35	.009*
Residual	29.31	36	-------	0.81	-----
Total	38.00	38			

Note. Predictors (Constant), COLLAB and SCDSUP. Dependent variable RBTS. *Significant at p < .01

C		Coefficients			
Variables	B	SE	β	t	*p*
(Constant)	817E-17	.14	------	0.00	1.000
SCDSUP	.30	.15	.30	2.07	.04*
COLLAB	.37	.15	.37	2.53	.02*

Note. Dependent variable: RBTS. Predictor variables SCDSUP and COLLAB significant at *$p < .05$

Hence, the regression predicting levels of teacher implementation of RBTS from teacher perceptions of the influence of contextual factors on implementation was statistically significant for both factors accounting for 30% and 37% of the variance, respectively.

Table 23

Linear Regression Analysis Section D (BELREF) vs. Section E. Implementation of RBTS

A			Model Summary						
Model	R	R^2	Adj. R^2	SEE	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	.41	.17	.15	.92	0.17	7.67	1	37	.009[a]

Note. Predictors: (Constant), BELREF.

B		ANOVA			
Model 1	$\Sigma^{\text{of 2s}}$	df	M^2	F	*p*
Regression	6.489	1	6.49	7.619	.009 *
Residual	31.511	37	0.85		
Total	38.000	38			

Note. Dependent Variable: RBTS. Predictors: (Constant), BELREF
* Significant at p < *.01*

C			Coefficients		
Model 1	B	SE	*β*	t	*p*
(Constant)	3.446E-17	.15	-------	0.00	1.000
BELREF	0.413	.15	.41	2.76	.009 *

Note. Dependent Variable: RBTS. Predictor variable BELREF. *Significant at *p < .01*

The composite variable for Section D, *Implementation of a reform-based curriculum,* was renamed BELREF for belief in reform. The composite variable was also subjected to regression analysis to determine whether teacher beliefs concerning the implementation of a reform-based curriculum were predictive of teachers' levels of implementation of RBTS.

The results of regression analysis of Section G versus Section E. RBTS are recorded in Table 24. The composite variable termed PRACBEN was subjected to linear regression analysis to investigate whether teacher perceptions of the practical benefits most likely to influence their decisions to attend professional development were predictive of their implementation of research-based teaching strategies (RBTS).

Table 24

Linear *Regression Analysis Section G (PRACBENE) versus Section E. Implementation of RBTS*

A Model Summary									
					Change Statistics				
Model	R	R^2	Adjusted R^2	SEE	R^2 Change	F Change	df1	df2	Sig. F Change
1	.43	.19	.17	0.91	0.19	8.52	1	37	.006*

Note. Predictors**:** (Constant), PRACBENE. *Significant at *p* < .01

B ANOVA					
Model	Σ of 2s	df	M^2	F	*p*
1					
Regression	7.11	1	7.11	8.52	.006*
Residual	30.89	37	0.84		
Total	38.00	38			

Note. Predictors: (Constant), PRACBENE. Dependent Variable: RBTS.*Significant at *p* < .01.

C Coefficients					
Model 1	B	SE	*β*	t	*p*
(Constant)	3.83E-17	.15		0.00	1.00
PRACBEN	0.48	.16	.43	2.92	0.006*

Note. Dependent variable: RBTS. *Significant at *p* <.01

The unstandardized regression coefficient (B) for predicting implementation of RBTS is .48 from practical benefits that influence teachers' choices concerning whether or not to participate in professional development activities and the standardized coefficient is .43.   The significance level (Sig.) or **p* is .006 and the degrees of freedom for the F test are 1 for the numerator (Regression) and 37 for the denominator (Residual).   Therefore the regression model predicting levels of implementation of RBTS from teacher reports of benefits that influence their decisions to participate in professional development activities is statistically significant, that is $p < 0.05$. The findings for factor analysis of Sections B - D and G are supportive of the theoretical model in Figure 4. The model was modified to reflect the findings as shown in Figure 4a.

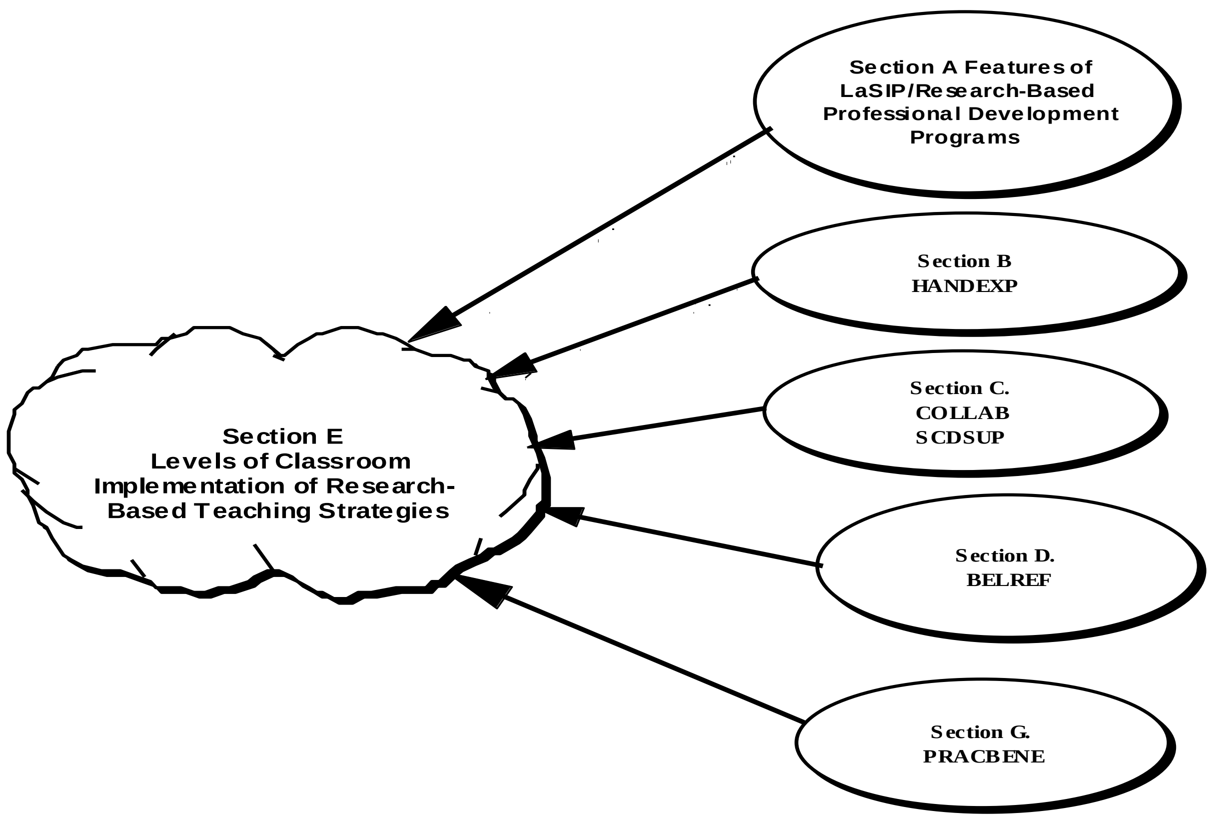

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Figure 4a

Theoretical Model of Factors Impacting Teachers' Levels of Classroom Implementation of RBTS (Revised)

Research Question # 5 What do teachers perceive as barriers to selecting and implementing reform-based changes in curriculum, assessment and, instruction in the classroom?

Teacher reports of barriers to implementation were not easily quantifiable by analyses of Sections B, C, D and G of the survey. However, responses to questions 23 and 30 of Section C seemed to indicate that though having common planning time is desirable to 69% of respondents only 45% of respondents indicated that they have received increased time for planning. More in-depth analyses of barriers to implementation were provided in the analyses of qualitative data in answers to questions in Section H and in transcripts for personal interviews and focus group discussions.

Qualitative Data Analyses and Correlation of Qualitative and Quantitative Data

Qualitative data included in the study were the result of analyses of three individual interviews, two focus group discussions and respondents answers to questions 72-76 in Section H of the survey, "*Teacher Attitudes Toward Change and Classroom Implementation of Research-Based Strategies".* A summary of the rate of responses to the short-answer questions by LaSIP participants can be found in Table 25.

Table 25

Rate of LaSIP Participant Responses to Open-ended Questions

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional development	Question 73 Two to four week content-based summer programs	Question 74 College methods course(s)	Question 75 Attendance of professional conferences	Question 76 Mentoring and/or coaching
		Results		
n= 39	Answered all Questions Fully	Answered 3 - 4 of the Questions	Answered 1-2 of the Questions	Did Not Respond
Number of Cases	16	3	4	16
Percentage	41	8	10	41

Analysis of the five questions in Section H indicated that approximately 59 % of the LaSIP participants responded to the open-ended questions in Section H of the survey by fully answering all of the questions or by providing a partial response to from 1-4 of the questions. Forty-one percent of the respondents did not provide any answers.

Emergent Themes and Codes from Survey: Open-ended Questions

Some of the same themes noted in listening to, transcribing and coding transcripts from individual and focus group interviews emerged to a lesser extent in the review of teachers' answers to questions 72-76 in Section H of the survey. Included among the themes and related quotes were:

72. Job-embedded professional development _____

a. Needed to avoid taking away time from laboratory preparation and family. *(BENEPD)*

b. Allows time to reflect on procedures and practices and learning from each other. *(TTT)*

c. Updates the latest education practices and teaching strategies without leaving the classroom *(JOBEMBPD)*

d. Improves professional growth if it is related to the content area and allows for team participation (*TEAMPART)*

73. Enrolling in two to four-week content-based programs _______

a. Can never go; enrollment is not practical for parents; enrolled in on-line course instead *(BARRTOIMPLCHANGE)*

b. Helpful, but too much information to retain for time available. *(BARRTOIMPLCHANGE)*

c. Provides opportunities to observe other teachers teaching (*TTT)*

d. Increases content knowledge *(BENEPD)*

e. Previously attended program still provides useful ideas, worksheets and projects *(BENEPD)*

f. Works well for me; offers new strategies and ways of thinking *(BENEPD)*

g. Provides opportunities for networking *(BENEPD)*

h. Good, if implementation and assessment goals are clear. *(BENEPD)*

i. 2-4 weeks too short to reach learning goal ***(**LONGTERMPD)*

74. College methods courses ______

a. Provide instruction on teaching HOTS *(IMPLRBTS)*

b. Require more implementation, but college credit is good **(***PRACBEN)*

c. Allow opportunities to research new information. *(BENEPD)*

d. Provide instruction on how to use pedagogical content knowledge *(PROCONT)*

e. New teachers are high tech savvy; I'm too old to learn anything new. *(SATISSTATQUO)*

f. Science teachers (*IMPLHANDSON)*

g. Very little benefits; no chance to use the sometimes unreal methods *(INSUFTRAIN)*

h. Do not like online courses; professor not available.

i. Like PBS online courses *(NEWFORMSPD)*

j. Standards-based content and teaching strategies are stressed more now than in the "60s

k. Not as helpful as on-site training; does provide background information.

l. Only if courses are based on teaching needs *(NEEDSBASPD)*

m. Undergrad methods courses do not hold a candle to LaSIP courses *(IDEALPD)*

75. Attending professional conferences _____

a. Allow exposure to multiple teaching tools and strategies *(BENEPD)*

b. Some conferences are beneficial; but do not enhance professional growth

c. Great opportunity to get new ideas, network, problem solve, listen to inspirational speakers and view the newest products and services *(BENEPD)*

d. Enjoy them when I can get off from school (*NOTIMEFORPD)*

e. Some are useful; other are not

f. Offer teachers and administrators opportunities to interact with other educators from around the country/world *(NETWORKING)*

g. Attending the NSTA and LSTA conferences beneficial, but follow-up and feedback are limited. **(***NEEDMOREFOLLOWUP)*

h. Afford teachers opportunities to experience new teaching techniques that can be used immediately in the classroom *(IDEALPD)*

i. Chance to network, get new, innovative ideas in science *(BENEPD)*

j. Too few conferences offer opportunities for high school math teachers

k. Prefer it if students rather than teachers were given conference opportunities

76. Mentoring and coaching **_____**

a. Opens lines of communication between students and teachers; Need more.

b. One- on- one attention provides great opportunities for feedback from an experienced professional. *(IMPFEEDBACK)*

c. Provides needed support . (COLLSUP)

d. Chance to share new ideas; enhance lessons. *(COLLSUP)*

e. Instant feedback; improves methods. (IDEALPD***)***

f. Helpful for new teachers.

g. On-site modeling is helpful. *(MODLIN)*

h. Greatly needed by classroom teachers.

i. Valuable to new teachers; keep all teachers abreast of standards-based teaching.

j. Chance to share, model and encourage development of professional excellence. (*COLLAB)*

k. Great! Modeling is awesome; should provide feedback when mentor is observing the teacher *(MODLINANDFEED)*

l. Promotes professional growth *(BENEPD)*

m. Receiving one on one is helpful from someone trained in best practices *(IDEALPD)*

As seen in Table 26 analysis of qualitative data resulted in codes that overlapped. Codes represent themes backed by quotations from the various data sources. The common coding supported easier analysis and integration of findings from interviews, focus group discussions and short answer questions. Additionally, composite variables from factor analysis offered correlations with codes within the qualitative sources. Both instances supported the overall integrated, mixed method design of the study.

The themes that emerged from analysis of the interviews and focus group transcripts and from the responses to open-ended questions on the survey were supportive of findings from the quantitative analyses of survey data. Moreover, results of regression analyses indicated that features of the LASIP, the nature of follow –up, the types of support received at both the school and district levels and the practical benefits offered in professional development programs were predictive of the frequency of implementation of research based teaching strategies.

Results: Presentation and Analysis of Qualitative Data

Research Question #1 (QUAL). Research question # 1 was designed to ascertain, which reform-based program components are perceived by science teachers as being most important in improving their professional growth and were most likely to influence their selection and implementation of research-based teaching strategies in the classroom. The quantitative data from the survey was statistically analyzed and found to be supported by qualitative data from transcripts of the personal interviews, focus group discussions and responses to the short answer questions in the survey. Seventy-nine percent (79%) of teachers responded positively to statements concerning programmatic features contained in Section A of the survey. Similar features like having sufficient time for acquiring pedagogical content knowledge to implement the concepts and strategies in a classroom setting are also perceived as being important to the interviewees in the study.

While describing the implementation of job-embedded professional development *(JOBEMBPD)* at her school, KA points out the types of activities that teachers were engaged in during the session:

> "So we have a *literacy strategy* in every in-service. We also have an activity related to *differentiated instruction*. They are big this year about us focusing on meeting the learning styles of the students. Last Wednesday was our initial PD and we had an activity where the different teachers identified their learning styles. As a group, we came to a consensus of what that learner's style entailed. For instance, I was with the *naturalists* so as a group, we came up with characteristics of that particular *learning style*. Then all the groups came back together and presented their information. That activity helped us understand how we are to address the different learning styles in our classrooms."

The pedagogical content knowledge referred to in research question number 1 of the survey characterizes effective professional development. The concept refers to the type of knowledge needed to successfully transfer learning to the classroom. Question 10 of the survey ascertained teacher perceptions of the attention given to learning styles and multiple intelligences that were useful in classroom instruction. According to one participant, ‘’ That activity helped us understand how we are to address the different learning styles in our classrooms."

The coding of the transcripts via ATLAS.ti was summarized in the displays that follow to help the reader visualize the correlations between the two data strands interwoven throughout the study. A comparative study of the coding from transcripts of a personal interview, a focus group discussion and the five open- ended questions are shown in Table 23. Table 24 was used to summarize the codes from personal interview transcripts. Coding from focus group transcripts are recorded in Table 25 Chunks of data were re-examined resulting in code clusters that were often represented the same idea or theme. For example, closer examination of the quotations revealed that barriers to change (*BARRTOIMPLCHANGE)* include things like satisfaction with the status quo (*SATISSTATQUO)***,** insufficient equipment *(INSUFEQUIP)* and insufficient training *(INSUFTRAIN).* The displays were also useful in helping to identify recurring themes within transcripts. Printouts from Atlas.ti included counts of the number of times a particular code was used in the transcript. The findings were interpreted as measures of the perceived importance of the idea to participants. These qualitative findings were correlated with data obtained by analysis of the quantitative data from the survey and found to be supportive in most instances. Specific examples of these correlations are explained in the analyses and displays that follow.

Perceptions of the benefits of professional development *(BENEPD)* were, on initial examination, identified in 4 out of 5 of the transcripts. This prompted a re-examination of the transcript for Focus Group #1. The result was to double code a paragraph describing one participant's most memorable professional development experience *(MOSMEMPD),*"Teach Like a Champion" to include a benefit of professional *(BENEPD),* "I could take it right back to the classroom." It included a lot on classroom management and I could see a lot better reaction from my students." She also indicated that this was a weekend workshop for which she had volunteered.

Table 26.

Comparative List of Coding for Individual Interview Open-ended Questions and Focus Group 1

KA Individual Interview	Short Answer Questions	Focus Group 1
ADMTEACOMM/	BARRTOIMPLCHANGE	BENEPD
ATTENCONF	BENEPD	EONSA
BENEPD	COLLSUP	EXPOSNEWPROG
EONSA	IDEALPD	IDEALPD
EXPOSNEWPROG	IMPLFEEDBACK	INCHANDSON
FEAROFCHANGE	IMPLHANDSON	INSUFEQUIP
IDEALPD	INSUFTRAIN	INSUFTRAIN
INSUFEQUIP	LONGTERMPD	ISOLATION
INSUFTRAIN	MODLIN	JOBEMBPD
JOBEMBPD	NEEDFEEDBACK	MOSMEMPD
LONGTERMPD	NEEDSBASPD	MWOTCHRS
NOADMSUP	PRACBENE	NOADMSUP
NOADMTEACOMM	PROCCONT	NOFOLLWUP
PDLACKFOLLOW	SATISSTATQUO	OSFA
PROJECTFOLLOWUP	TEAMPART	OUTDATDINFO
SATISSTATQUO	TTT	PDUNPLAN
TCHRATT		SOS
TCHRINPUT		UNTIMELYPD
TEAMPART		TCHRPRES
TTT		TTT
WALKTHRUS		

.

Table 27.

Comparative List of Codes for Personal Interviews

VL	KA	PJ
ADMSUP	ADMTEACOMM	BENEPD
ATTENDCONF	ATTENDCONF	EONSA
BARRTOIMPLCHANGE	BENEPD	EONTEACH
BENEPD	EONSA	IMPACTONIMPLPD
DISTSUP	EXPOSNEWPROG	IMPLDIP
EXPOSNEWPROG	FEAROFCHANGE	LACKSCHOOLSUP
IDEALPD	IDEALPD	LONGTERMPD
IMPACTONIMPLPD	INSUFEQUIP	MANDATORPD
IMPLRBTS	INSUFTRAIN	MOREMODLIN
INSUFTRAIN	JOBEMBPD	MORETIMEPD
JOBEMBPD	LONGTERMPD	OSNEWPROG
LONGTERMPD	NOADMSUP	NOFOLLOWUP
MODLIN	NOADMTEACOMM	REMEDIMPLDIP
MOSMEMPD	PDLACKFOLLOW	TCHRATT/ MINDSET
NOHANDSON	PROJECTFOLLOWUP	
OPENTOCHANGE	SATISSTATQUO	
REMEDIMPLDIP	TCHRATT	
ROLESFOLLOWUP	TCHRINPUT	
SATISSTATQUO	TEAMPART	
TCHRATT	TTT	
TCHRINPUT	WALKTHRUS	
TTT		
WALKTHRUS		

As seen in Table 29, the coded transcripts provided easily identifiable sub-themes and quotations that supported the quantitative findings in answer to Research Question # 1, which included teachers' perceptions of features of the LaSIP recorded in Section A of the survey. LaSIP programs lasts two weeks or more. Some participants enroll in LaSIP programs that extend over several years. One such participant presently serves as a Science and Math Coordinator for a rural parish and describes how she uses the knowledge and skills gained from participation in a LaSIP math-science integration project to do her present job.

Table 28

Comparison of Codes for Focus Groups 1 and 2

Codes for Focus Group 1 (3 - members)	Codes for Focus Group 2 (4 - Members)
EONSA	ADMSUP
EXPOSNEWPROG	ATTENDCONF
HIGHTURNOVERTFA	BARRTOIMPLCHANGE
IDEALPD	BENEPD
INCHANDSON	EXPOSNEWPROG
INSUFEQUIP	FEEDBACK
INSUFTRAIN	IDEALPD
ISOLATION	IMPLRBTS
MWOTCHRS	JOBEMBPD
NOADMSUP	LACKTCHRINPUT
NOFOLLWUP	LONGTERMPD
LACKTCHRINPUT	MANDATORPD
OUTDATDINFO	MODLIN
OSFA	MOSMEMPD
PDUNPLAN	MWOTCHRS
SOS	NOADMSUP
TCHRPRES	OPENTOCHANGE
TTT	TCHROVERLOAD
UNTIMELYPD	TTT
VISITOTHRSCHOOLS	WORSTEXPPD

Another participant is a science teacher and Department Chair in an urban parish of the state. Project MISE as described by this participant is a two-year project and she has re-enlisted in the project for a second time. Both participants reported benefits of participating in long-term professional development activities, *(BENEPD/LONGTERMPD)*, a feature that was characteristic of the LaSIP projects. The quotations from these participants were supportive of the idea that time is needed to gain the in-depth knowledge necessary for classroom implementation.

Table 29

Features of Professional Development Programs That Influence Implementation

Codes	Themes from Section A	Supporting Data
LONGTERM PD/ BENEPD	Time to Acquire Pedagogical Content Knowledge	"The project that I was involved in with LaSIP was a math and science integration project. So all the stuff I learned there with the calculators and the probes, I am able to implement in both math and science. ….You know technology is one of the most engaging tools that we have for all teachers…..There is very little that I can remember that I am not actually using all the time." *PI VL 2:5*
	Time to Practice RBTS	"It is called Project MISE (Modeling Inquiry in Science Education)."…. There is a 2-year commitment with this workshop. This is my second time in the workshop." *KA PI 1:6.*
MODLIN FEEDBACK	Modeling Teaching Strategies	"She did a lot of modeling of how to use the strategies versus sitting in the conference room telling us how to use the strategies…" *FG #2 3-5* "All the feedback is what really helped." *FG # 2 3:22*
BENEPD	Emphasis on Science as Inquiry	"I think the things that LaSIP taught me the most was not to give students the information up front…. To always come back with a question and let students do the thinking." CF *FG# 2 3:27*
IMPLRBTS EONSA	Practicing RBTS/ Attention to Learning Styles	"It is all about hands on, modeling, and just ongoing activities and ongoing checking to see if kids understand. It is no longer just a lot of book work; the kids are up and ongoing. It is informal assessment and not just a test at the end of a unit and so forth. So you have assessment throughout the lesson and at the same time you actually have the kids up and moving around and doing things that are hitting every learning style". *KA PI 1:16*

Research Question #3 (QUAL). Research question #3 focused on the effect of implementation of research-based teaching strategies (RBTS) on student achievement.

Direct reference to the effect of RBTS on student achievement (EONSA) did not figure prominently in the transcripts, although the effect on student achievement was clearly implied in many of the quotes.

More direct reference to the effect of implementation of RBTS on student achievement can be seen in Table 29 (*KA, PI 1:16),* and in the quotes from teachers in (focus group #1), in response to a question concerning the frequency of inclusion of hands-on experiences for students: "T**-----:** Every day. I try to do activities every day. Large scale or small scale… but every day."; "A**------:** I try to do activities as time and equipment allows. I am trying to put more activities into what I'm doing."

Teaching science as inquiry is a prominent theme in the *National Science Education Standards (NRC, 1996)* and in th*e Next Generation Science Standards (Achieve, 2013).* Quotations from CF in Focus Group #2 indicate that teaching science in this manner requires a shift in thinking about how students learn. Adapting this constructive approach to teaching requires a philosophical change as well as a change in technique. As CF explains: "I think the things that LaSIP taught me the most was not to give students the information up front…. To always come back with a question and let students do the thinking."

Research Question #4 (QUAL. The professional growth of teachers is influenced by the context in which he or she practices. The immediate context for professional learning is the classroom. Yet, what goes on in the classroom is strongly influenced by the school, community and societal culture in which the teacher works and the school is situated.

Table 30 is a display of teacher perceptions of various kinds (WHAT) and contexts (WHERE) of professional development with supporting data from individual interviews and

Table 30.

Importance of Context in Implementation of Professional Development

WHAT	WHERE	SUPPORTING DATA
Job-Embedded Professional Development	Classroom/School	"They came in and built that into the school day. 4 Blocks is the literacy program that we use. They always come to the school for that one." (AV, FG 2) "…….. They don't stay after school. Even if you pay them, sometimes it is really difficult. They have kids and places to go and a lot of them have other jobs and carpool or they are tired. It is hard to get them to stay after school. It is really hard." (VL, PI)
District-Wide / Mandatory Professional Development	Central Location in the District	"Once a month we met in ……. for the district PLC and they would give us our unit test scores. We were not allowed to see the kids' tests; we were only given the scores. We discussed the problems with the tests." (CF, FG2,) "One year they had a guy up there telling us everything that we already knew and what we already had been doing. It was like we were in Education 101 class or something. It was a waste of time. I do not know where they find the speakers for these events, but Oh My God, they need to find better motivational speakers". (TamH, F G 2)
Attending Conferences	Parish/Statewide/ National	"The school improvement team usually pays for two department members to go to the National Conference for their discipline. So I was fortunate enough to be picked to go to our National Science Teachers Convention that was in New Orleans. I learned a lot of techniques and strategies that I could take back to the classroom or share with my colleagues and so forth." (KA, PI)
Exposure to New Programs	Schools/Colleges and Universities/Online	"PatG pointed out the Accelerated Reader training with K—J---. She came in and taught us how to set our goals for our kids and all because that is something that we needed." (AV, FG2) "I participated in the accelerated math training and that was done outside of the school." **(CF,) FG2**

focus groups transcripts. Though Sections B-D and G of the survey provided quantifiable answers to Research Question 4, Table 30 displays quotations from interviews that provide some in depth answers to questions raised in the survey. For example, according to VL after-school job-embedded professional development though desirable, is not always feasible. She noted, "They don't stay after school. Even if you pay them, sometimes it is really difficult." On the other hand AV seems pleased that 4 Blocks training occurs during the school day, that is, it is job-embedded. Even when teachers attended the district-wide, centrally located activities the experiences seemed to be unsatisfactory. According to Tam H, "One year they had a guy up there telling us everything that we already knew and what we already had been doing. It was like we were in Education 101 class or something. It was a waste of time."

KA, however, reacted positively to being able to attend the NSTA Convention, noting that, "I learned a lot of techniques and strategies that I could take back to the classroom or share with my colleagues and so forth." Participant exposure to new programs also figured prominently in the analysis of the transcripts. Accelerated Math and Accelerated Reading are mentioned in Table 29, other programs included the Jason Project, LaSIP, Read 180, Kurtweil and MISE.

Research Question 5 (QUAL). Instituting change and overcoming barriers to professional development are often problematic. Research Question 5 provided the basis for analyzing teacher perceptions of these problems. Teacher perceptions of barriers to professional development were expressed in various ways and appeared in all of the transcripts and in the coding of the open-ended questions from the survey. Table 30 is a summary of the codes and most prominent themes that emerged. Reports created in ATLAS.ti included summaries of codes for each of the transcripts. This made content analysis and coding simpler.

Table 30 was created to show some of the perceptions of teachers concerning barriers to implementing change. Analysis of quotations linked to the coding provided additional corroboration of the quantitative data in answer to Research Question # 5. The total number of quotes from the transcript of Focus Group 1 was 52. Barriers to implementation references made up 27 of the 52 quotes or 52%. The total number of quotes from the transcript of Focus Group 2 was 65. References describing barriers to implementing change made up 30 of the 65 quotes or 46%. As seen in Table 28, barriers to implementation of changes in teaching practices figured prominently in the discussions. Lack of teacher input figured prominently as a barrier to implementation, listed twice by Focus Group 1 and eight (8) times by Focus Group 2.

Many of the barriers identified by focus group members were repeated in personal interviews as shown in Table 27. Perceived barriers to implementing changes in classroom practices included insufficient training, insufficient equipment, no administrative support, no follow-up and lack of school supplies figured prominently in the three personal interview transcripts.

Analysis of transcripts from personal interviews also included references to teacher attitude and mindset as barriers to implementation of change. For example, when asked, what are some things that you think stand in the way of teachers trying out new ideas in their classrooms? The teacher replied, "Teacher perception of the value and effectiveness of the teaching strategies and whether they can transfer them to the classroom. . . Lack of belief in changing what they have been doing . . . openness . . . receptivity. [Instead teachers should ask . .] What is my approach? How do I make it part of my toolbox? "

Table 31

Codes: *Barriers to Implementation of Change as Perceived by Focus Groups 1 and 2*

Focus Group 1 (3 Members)		Focus Group 2 (4 Members)	
Code	Frequency	Code	Frequency
High Teacher Turnover Due to Teach for America *(HIGHTURNOVERTFA)*	**1**	Barriers to Implementing Change *(BARRTOIMPLCHANGE)*	**15**
Insufficient Equipment (INSUFEQUIP***)***	**4**	Insufficient Training **(***INSUFTRAIN)*	**3**
Insufficient Training *(INSUFTRAIN)*	**3**	Lack of Teacher Input (*LACKTCHRINPUT)*	**8**
Isolation of Teachers *(ISOLATION)*	**3**	No Administrative Support *(NOADMSUP)*	**1**
Lack of Teacher Input *(LACKTCHRINPUT)*	**2**	Teacher Overload *(TCHROVERLOAD)*	**3**
No Follow-up *(NOFOLLOWUP)*	**1**		
Out-Dated Information *(OUTDATDINFO)*	**1**		
One Size Fits All **(***OSFA)*	**3**		
Professional Development Unplanned *(PDUNPLAN)*	**1**		
Same Old Stuff *(SOS)*	**4**		
Untimely Professional Development *(UNTIMELYPD)*	**2**		
No Follow-up *(NOFOLLOWUP)*	**1**		

Although in most instances, data from the quantitative strand was corroborated in analysis of the qualitative strand of data, some differences were noted. For example, analysis of survey results indicated that 67% of LaSIP teachers and 56% of Non-LaSIP teachers reported involving students in hands-on experiences two or more times per week. However, a science and math coordinator and former LaSIP participant stated:

"Oh man, I do not see enough hands-on stuff. It depends totally on the teacher. One teacher will be doing a lot of hands-on stuff and another person will be doing all traditional. I would say the ratio is 50/50 to those who are willing to try hands-on and those who are just going straight from the book and notes and shy away or don't have the energy or motivation to try anything hands-on or lab stuff. It is about 50/50 from what I see."

The transcripts of personal interviews and focus group discussions yielded valuable insight into factors that impact classroom implementation of research-based teaching strategies. This study was by no means an exhaustive analysis of the transcripts, but one thing is clear…changing the mindset of teachers is not easy. It will take well-designed, effective professional development that immerses teachers in a total learning experience. Going forward, with new standards on the horizon, the most successful programs will be those that consider both, teachers' professional needs and their personal beliefs about teaching and learning.

Chapter Four Summary of Findings

Chapter four was used to present statistical analyses of quantitative data collected from a researcher designed instrument, *Survey of Teacher Attitudes Toward Change and Classroom Implementation of Research–Based Strategies* and qualitative analysis of data collected from personal interviews, focus group discussions and five open-ended questions included in the survey. The survey was used as a tool to inquire concerning teacher attitudes toward change, their perceptions of the features of reform-based professional development that they have experienced and the effects of those experiences on the selection and frequency of use of various RBTS in the classroom. There were 39 LaSIP respondents and 27 Non-LaSIP respondents included in the study for a total of 66 participants.

Part I of the survey was used to collect demographic data involving ten parameters. Teachers input data concerning current teaching positions, age, years of teaching, subjects being taught, ethnicity type of school district and years of participating in LaSIP, if any. The 66 respondents included in the study were divided into two groups on the basis of LaSIP participation resulting in 39 LaSIP participants and 27 Non-LaSIP participants. The greatest difference in the two groups was in years of experience. LaSIP teachers averaged 17 years of teaching experience compared to an average of 13 years of experience reported by Non-LaSIP teachers. The gender difference was prominent for both groups, with 95% of LaSIP respondents being female and 85% of Non-LaSIP teachers being female.

Part II of the survey was made up of seven subscales (A-G) based on a review of the literature concerned with the characteristics of effective professional development and teacher implementation of research-based teaching strategies. The 7 subscales were subjected to statistical analysis using SPSS. Both descriptive and inferential statistical data were generated and analyzed. Statistical analyses included frequency distributions, data reduction via principal component analysis, linear regression analysis and independent samples tests. Qualitative data were collected, during personal interviews, focus group discussions and from participant answers to the five open-ended questions in Section H of the survey. The qualitative data were subjected to analysis and coding using ATLAS.ti, a qualitative data analysis software. Both qualitative and quantitative data were used in answering the five research questions.

Cronbach alpha coefficients were used to assess internal consistency of the survey. An alpha reading of 0.7 and above is considered an acceptable measure of internal consistency (Hair et al, 2006). An alpha coefficient greater than 0.70 was obtained for all the subscales.

Raw data from Sections A-G of Part II of the survey were subjected to data reduction via factor analysis. Factor loadings of .4 or higher were retained. Resultant composite variables were renamed and retained for use in linear regression analyses. The results of factor analysis are shown in Tables 4-10. Factor analysis and regression analysis were used in answering research questions 1-5 and in testing the theoretical model in Figure 4.

Section A of the survey listed 11 items pertaining to features of reform-based professional development like LaSIP. Analysis of data to answer research question # 1 was focused on Section A of the survey. On average, seventy-five (75%) of teachers agreed that the programmatic features described in Section A were influential in improving teaching and learning and enhanced use of the experiences in the classroom. A model for implementation of research-based teaching strategies (RBTS) based on Sections A-G of the survey is shown in Figure 4. The model depicted the factors which were predictive of teacher implementation of RBTS. This question was addressed by subjecting the variables in Sections A and E to regression analysis. In the regression equation for Section A, RBTS served as the dependent variable and models using items 1-11 served as independent variables. Results of the analysis are shown in Tables 12 (A, B, and C). Results for the model was significant at p =0 .000. The beta weights presented in Table 12.C suggested that program emphasis on science as inquiry contributed most to teacher perceptions of LaSIP features that influence levels of implementation of RBTS, followed by program emphasis on learning major science concepts and having sufficient time to acquire pedagogical content knowledge to implement the concepts and strategies in the classroom. Similar procedures were used to analyze sections B-D and G of the survey.

Qualitative data from analyses of personal interviews and focus group discussions were supportive of the findings for research question #1. Quotations and coding indicated strong support for features such as *modeling, time to acquire pedagogical content knowledge, attention to learning styles and emphasis on science as inquiry*.

Research question #2 was designed to probe for differences in frequency of use of RBTS by LaSIP versus Non-LaSIP teachers. Although LaSIP teachers reported more frequent use of 6 of 10 of the RBTS the differences were small as seen in Table 13. Non-LaSIP teachers showed a greater propensity to use non-research-based strategies such as lecture and drill and practice.

The results of the t-test indicated no significant difference in mean scores depicting levels of implementation, $p = 0.156$ which was greater than 0.05. However, a review of the correlation matrix comparing LaSIP and Non-LaSIP teachers indicated one exception to this finding was obtained in regard to frequency of use of alternative assessment. LaSIP teachers were more likely to implement alternative assessment strategies than non-LaSIP teachers. The results were confirmed in a t-test that was significant at $p = 0.022$.

Research question # 3 allowed for probing of teacher perceptions of the effect of use of RBTS on student achievement. Overall, 86% of LASIP teachers and 83% of Non-LaSIP teachers reported that student achievement increased as a result of implementing RBTS. Strategies on which there was agreement of 90% or more among LaSIP teachers included use of similarities and differences, involvement of students in hands-on experiences, writing about science and use of higher order thinking skills. The qualitative data revealed few direct references to effect of training experiences on student achievement **(***EONSA)***,** although, there were frequent indirect references to *EONSA*.

Section B. Follow-up, and Section C. Context, Section D. Implementation of a Reform-Based Curriculum and Section G. Practical Benefits of the survey and transcripts of individual interviews and focus group discussions were analyzed to provide answers to research question # 4. Research question # 4 helped to gain insight into teachers' perceptions of the effects of follow- up activities like additional instruction and practice, hands-on experiences with materials and supplies and contextual factors such as administrative support, time to meet with other teachers, collaboration with colleagues and, school and district support of classroom implementation of research-based teaching strategies. Section D of the survey allowed for participants to express their beliefs concerning reform-based changes in curriculum assessment and instruction and Section G was designed to obtain teacher perceptions of the practical benefits that influence their selection and participation in professional development programs or activities.

There were divergent views expressed between survey data and data obtained through interviews and focus group discussions concerning administrative support. Although survey results indicated that 90% of teachers agreed that principals were supportive of their efforts to implement changes in classroom practices, two of the three individual interviewees and teachers in both focus groups indicated there was little or no administrative support. The greatest agreement among participants was on the desire for opportunities for hands-on experiences with materials and supplies (92%) as part of follow-up activities. The least amount of agreement concerned the inclusion of follow-up training for administrators as part of systemic reform with 36% of teachers indicating agreement, 46% indicating not sure and 18% of teachers who disagreed with the statement.

Lack of follow-up was also identified as a problem for two of the three individual interviewees and one of the focus groups. Specifically, lack of follow-up was implicated as a barrier to change by the second focus group.

Teacher perceptions of district and school contextual factors that have an impact on classroom implementation were recorded in Section C of the survey. Teachers indicated more than 50% agreement with 9 of the 11 statements. The two statements on which there was widespread disagreement among participants included Item 29, *overall school climate is conducive to change* and Item 30 which concerned *having additional planning time for implementation*. A majority of participants (64%) perceived school climate as being conducive to implementation, while only 45% of participants agreed that they were given additional time for planning. Qualitative data from personal interviews and focus group discussions confirmed the findings concerning lack of planning time. Teachers made frequent references to having too little time for planning or simply being overwhelmed by the amount of work required to implement changes. Overall, 63% of teachers agreed that contextual factors at the school and district levels influence classroom implementation of research-based teaching strategies.

Research question # 5 was focused on teacher perceptions of *barriers to change* which included *insufficient training*, *insufficient equipment* and t*eacher overload.* Barriers to change also referred to factors such as gaps in the curriculum, not enough time to teach important concepts in depth, too little time for preparation, not enough time for in-depth teacher learning and lack of teacher input into selecting and planning professional development.

As seen in statements by PJ, one of the individual interviewees, other barriers to implementation include teacher attitude and mind set toward change.

Other interviewees echoed the views of PJ, stating that failure to implement is often the result of teacher satisfaction with the status quo.

There were instances of disagreement in findings from qualitative versus quantitative data. For example, survey results indicated that 90 % of LaSIP teachers and 78 % of Non-LaSIP teachers reported involving students in hands-on experiences two or more times a week. However, VL, a science and math coordinator and former LaSIP participant, noted that based on her observations of classroom teachers, “I do not see enough hands-on stuff.” Further she states, “the ratio is 50/50 of those willing to try hands-on and those who are just going straight from the book and notes and shy away or don’t have the energy or motivation to try anything hands-on or lab stuff.”

Chapter Five

Discussion of Findings, Implications for Practice and Recommendations for Further Study

Overview

The purpose of this chapter is to discuss and summarize the major findings following investigation of teacher perceptions of factors that influence classroom implementation of research-based practices. The contents of the chapter include: (1) overview of the purpose, design and methods of the study. (2) discussion of findings and implications for improving practice and (3) recommendations for further study.

This study examined science teachers' perceptions of factors that influenced levels of classroom implementation of research-based teaching strategies following participation in a long-term professional development initiative, the LaSIP. The LaSIP is a systemic change initiative. Organized in 1992, the LaSIP has sought to unite science and mathematics educators of local colleges and universities, local education agencies, school administrators and science and mathematics classroom teachers, in efforts to reform science and mathematics education in Louisiana. Though LaSIP projects vary based on the needs of the areas served, common elements include, focus on standards-based content, involvement of participants in active learning, long-term duration of projects and collective participation. However, a review of the literature reveals few studies of the results of the program, although anecdotal accounts abound (Breckenridge & Goldstein, 1998).

The modified integrated mixed methods design of this study was based on the "integrated mixed methods" design proposed by Castro, Kellison, Boyd & Kopak, (2010, p.342). This design allowed for concurrent collection and integration of both quantitative and qualitative data.

The approach provided insights into teachers' (1) beliefs concerning reform (2) perceptions of follow-up and contextual factors that influence classroom implementation of research-based teaching practices (3) perceptions of the effects of levels of use of the practices on student achievement and (4) perceived barriers to implementation.

As indicated in the conceptual framework, this study concerns both the LaSIP as the venue for professional development and how it fits into the broader picture of effective professional development. Both qualitative and quantitative data collection and analysis was focused on investigating factors that influence teachers' transfer of formal training into classroom practice.

Quantitative data were obtained from participants' answers to questions in the researcher developed, self-reporting survey. The survey focused on characteristics of effective professional development identified in the literature (Aubusson &Webb, 1992; Guskey, 2000; Keys & Bryan, 2001; Keeley, 2005; Desimone, 2009; Wilson, 2013). Quantitative data were analyzed using descriptive and inferential statistics. Items in the seven sections of the survey were subjected to data reduction using principal component analysis and principal axis factoring. Resulting components and factors were saved as composite variables and used in linear regression analysis, except in analysis of research question #1 in which individual items of Section A of the survey were used as variables and subjected to regression analysis. Results of the analyses were supportive of the model as shown in Figure 4a. Qualitative information was obtained from transcripts of participant responses to five open-ended questions in the survey, personal interviews and, focus group discussions. The transcribed interviews and discussions were subjected to qualitative data analysis and coding.

Discussion of Findings

Research Question #1: *Which reform-based program components are perceived by LaSIP science teachers as being most important in improving their professional growth and are most likely to influence their selection and implementation of research-based teaching strategies in the classroom?*

The first research question was used to guide investigation of teachers' perceptions of features of the LaSIP that were most influential in their implementation of changes in practice. Findings were based on analysis of 11 questions in Section A of the survey. The questions in the survey did not allow for in-depth probing, but did provide meaningful information concerning teachers' perceptions of what was effective and what was lacking in the LaSIP program. Emphasis on standards-based teaching and learning in the LaSIP was perceived by ninety percent of participants as having an effect on classroom implementation of research-based practices. Even in a small sample, a finding of near universal agreement can be meaningful to planners and providers of professional development programs or activities. Overall, three-fourths of participants agreed that features of LaSIP were influential in their selection and implementation of research-based practices in the classroom. Findings from the results of regression analysis indicated that a model using 8 of the 11 items in Section A as factors was predictive of teacher perceptions of implementation of research-based practices.

The three factors found to have the greatest influence on implementation of research-based teaching practices were teacher perceptions of (1) *program emphasis on science as inquiry (2) opportunities for learning major science concepts,* and (3) *having sufficient time to acquire pedagogical content knowledge*. These findings converged in teachers perceptions expressed in personal interviews and focus group discussions. Features of professional development like having sufficient time for acquiring pedagogical content knowledge to implement the concepts and strategies in a classroom setting and being immersed in the learning like their students were also perceived as being important to the interviewees in the study. Interviewees also expressed a desire for professional development that includes a broader focus on content that is easily adapted for classroom use. These findings, which reflect teachers' perceptions of effective professional development are echoed in national standards of professional development (Learning Forward, 2011). Findings are also supportive of the fact that the LaSIP focuses on content and tends to fund projects that span two weeks or more thereby making time available for practicing effective teaching strategies.

Research Question # 2. *What are the differences, if any, in the levels of classroom implementation of research-based teaching strategies reported by LaSIP versus non-LaSIP science teachers?*

The second research question was used to compare teacher perceptions of levels of implementation reported by LaSIP and non-LaSIP Teachers. Independent samples t-tests showed no statistical difference between LaSIP and non-LaSIP teachers on perceived frequency of implementation of research-based teaching strategies, except in the use of alternative assessment. LaSIP teachers indicated that they perceived of using alternative assessment more frequently than non-LaSIP teachers. The mean difference was significant at $p = 0.022$. It is also important to note that analyses of frequency distribution indicated LaSIP teachers were *more* likely to implement the ten research-based teaching strategies (RBTS) such as teaching science as inquiry, involving students in hands-on science experiences and, writing about science than non-LaSIP teachers. On the other hand non-LaSIP teachers expressed a greater likelihood of implementing the non-research-based strategies like lecture, drill and practice, and reading aloud from the text. It is possible that in-school sampling blurred the line between the two groups or that non-LaSIP teachers have experienced other forms of professional development. Nevertheless, narrowing the gap in knowledge between LaSIP and non-LaSIP teachers and increasing the extent to which all teachers implement research based teaching strategies is important to the students they teach.

Research Question #3 *Which research-based teaching strategies/classroom practices do LaSIP and non-LaSIP teachers consider most important in improving student achievement?*

Findings based on analysis of responses to survey data indicated that LaSIP and non-LaSIP teachers agreed in their perceptions that implementation of RBTS improved student achievement. More than ninety percent of LaSIP teachers perceived of involving students in hands-on experiences, use of cooperative learning, writing about science and using higher order thinking skills as having the greatest effect on student achievement. Using higher order thinking skills was perceived as increasing student achievement by eighty percent of non-LaSIP teachers. There was less than eighty percent agreement among non-LaSIP teachers concerning perceptions of the influence of other strategies on student achievement. It is noteworthy that the qualitative data revealed few direct references to effect of training experiences on student achievement. This is revealed in a review of analysis and coding of interview and focus group discussion transcripts. However, there were frequent indirect references to effects of practice on student achievement as teachers discussed how they had changed practices and in turn changed the way students learned. The lack of more direct references to effects on student achievement may be due to the fact that often teachers do not see their own learning as being separate from the way they are able to help students learn.

Research Question # 4 *In what ways do teachers indicate that follow-up activities and contextual factors influence implementation of changes in practice and enhance their ability to share with colleagues, knowledge and skills gained from professional development?*

Research Question # 4 was used to investigate teacher perceptions of the connectedness of professional development to school and district influences and the importance of follow up to transfer of professional development experiences into classroom practice. According to teachers in this study the quality of follow-up provided by providers of professional development and contextual aspects of schools and districts are perceived as having an impact on teachers' levels of implementation of changes in practice following participation in professional development activities. Foremost among the factors perceived to have a positive effect on classroom implementation of research-based practices and most desired by participants is support of the principal. However, interviewees indicated that support of the principal and other school personnel are often lacking.

This finding of perceived lack of support was repeated in responses concerning teachers' ability to collaborate with colleagues to improve teaching and assessment skills. Though, eighty percent of participants perceived of collaboration with colleagues as having a positive effect on teaching and assessment skills, the figure drops to sixty-nine percent agreement concerning being afforded common planning periods with other teachers trained to use research-based teaching practices. Only forty-five percent of participants perceived of having additional planning time to implement changes in practice. Additionally, sixty-four percent of participants were either unsure or disagreed with the statement that professional development in research-based practices was made available to principals.

Similar findings concerning involvement of principals in professional development programs emerged from personal interviews and focus group discussions. Additionally, participants indicated a preference for job-embedded professional development that occurs during the school day though such activities are often limited because of time constraints. According to a science supervisor participating in the study, many teachers are unable to or choose not to attend professional development activities after school.

There was substantial agreement among interviewees concerning perceptions of district-wide professional development activities. The activities were described by a majority of interviewees as being their “worst professional development experience”.

Research Question #5. *What do teachers perceive as barriers to selecting and implementing research- based changes in curriculum, assessment and instruction in the classroom?*

Teacher perceptions of barriers to implementation were expressed in various ways pursuant to investigation of Research Question #5. Most of the *barriers to implementation* were described by participants during individual interviews and focus group discussions. As part of participants' responses to direct questions concerning factors that stand in the way of classroom implementation, perceived barriers included fear of change, lack of teacher input in planning, poor attitudes and mindsets of participants and, satisfaction with the status quo. Other perceived barriers such as insufficient training, insufficient equipment and, poorly planned professional development activities emerged as participants described frustration or disappointment with situations at their schools or past experiences with professional development that were less than satisfactory. Insufficient equipment is seen as a limiting factor for science teachers attempting to implement hands-on science experiments and use inquiry–based teaching practices. Obtaining additional supplies was also identified as an incentive for attending professional development activities.

Support for theoretical model in Figure 4 and 4a. The theoretical model concerning teachers' perceptions of (1) features of the LaSIP (2) hands-on experience with curriculum materials and supplies (3) collaboration with colleagues and school and district support (4) belief in reform and (5) practical benefits of participation in the LaSIP were predictive of teachers' perceptions of levels of implementation of research-based teaching strategies.

Implications for Practice

Identifying Teacher Needs. Bruce Alberts, Editor in Chief of *Science* in an editorial on prioritizing science education, writes: "Build education systems that incorporate the advice of outstanding, full-time classroom teachers when formulating education policy" (Alberts, 2013, p. 249). Determining teacher needs from practicing teachers is also a necessary first step in planning effective professional development. Providers cannot assume that all teachers of science have knowledge of or exposure to the standards or the most current literature in their fields and will be able to effectively implement pre-planned programs.

One of the most striking realizations for me was discovering that even though the NSES were issued more than a decade ago there were some science teachers who had not read them or used them to guide practice. Some LaSIP projects recognized the importance of the standards in teachers' professional growth, purchased copies participants and used them in instruction. Participants indicated in response to the survey questions that they too, perceived the importance of the program focus on standards-based teaching and learning.

This study revealed other teacher identified needs which included more hands-on experience with materials and supplies during participation in professional development activities, time for in-depth learning of content and teaching strategies, follow up activities that include time and opportunities to collaborate with colleagues and, the benefits of administrative support to facilitate implementation of research-based practices once they return to the classroom. Meeting teacher needs could make professional development more effective and bridge the gap between theory and practice. (Henderson & Dancy, 2007; Crawford, 2007; Fung & Chow, 2010)

Next Generation Science Standards: Implications for Teaching. Teacher perceptions of the LaSIP emphasis on standard-based teaching and learning takes on added importance, since the Next Generation Science Standards (2013) are under consideration for adoption in many states, and Louisiana has already adopted the Common Core standards in Mathematic and English Language Arts. Implementation of the NGSS will require re-training of teachers and curriculum developers in order to help students meet performance expectations of learning science in a manner that integrates science, technology, engineering and mathematics concepts. (Auman, 2011; Starr & Krajcik, 2013; Falk & Brodsky, 2013; Wilson, 2013).

The new standards in science will require teachers to think in new ways about how science is taught, what is taught and, how science lessons are designed and implemented in the classroom. According to Wilson (2013), "helping current teachers to meet these new standards is a daunting enterprise requiring large scale professional development of high quality that is adaptable across a myriad of contexts." (p.310). Professional development efforts should include familiarizing science teachers with professional readings in their field and content that focuses attention on research-based practices that work. Taking a proactive approach to understanding and using the Next Generation Science Standards (NGSS) to guide practice would be preferable to requiring teachers to implement programs or strategies they know nothing about.

Motivation to learn is the key to implementing research-based teaching strategies in the classroom. Some of the teachers participating in this study, when asked about their professional development experiences, cited participation in several long-term professional development programs in addition to the LaSIP. However, meeting the challenges of the Next Generation Science Standards will be difficult for even the most motivated teachers (Stage, Asturias, Cheuk, Daro & Hampton, 2013). Participants in individual interviews and in the focus groups indicated that they considered “attitude toward change” and “teacher mindset” to be factors that often inhibit teachers from implementing what is offered in professional development activities. The new science standards will be even more of a challenge to teachers who are satisfied with the status quo or resistant to change.

Nevertheless, all teachers of science, regardless of attitude or mindset, are charged with educating today’s youth and helping students meet performance goals as outlined in the Next Generation Science Standards. As revealed in the literature review, a lot is known about the research-based practices that work, but very little is known about the teachers most likely to implement such strategies in the classroom. Therefore, identifying, understanding and reaching out to teachers who are hard-to-reach and resistant to change should also be among the aims of those who provide professional development.

The Change Process. As participants indicated in this study, change is not easy. According to Fullan (1991; 2004), the change process involves several phases which include initiation, implementation and institutionalization (Fullan, 2001; 2004) A major aim of large scale professional development programs like the LaSIP is to support institutionalization of change. If such an aim is realized, research-based practices such as use of constructivist models of teaching and learning in science or establishing profession learning communities in schools become established norms.

Some researchers have indicated that transfer of an innovation from training to successful implementation in the classroom requires 25 episodes of practice, (Showers, Joyce & Bennett, 1987). Effectiveness of frequency of use of research-based teaching practices in improving classroom implementation has been confirmed in other studies. A study by Lumpe, Czerniak, Haney and Beltyukova (2012) found a positive relationship between teacher beliefs concerning their effectiveness in teaching science and their participation in a long-term science professional development program. This study focused on perceptions of teachers in the LaSIP, a long-term professional development program, aimed at reforming teaching practices in science and mathematics in order to improve student achievement. Findings in this study were supportive of the findings by Lumpe et al., (2012). However, few programs provide the level of involvement in practice suggested for successful implementation of training into classroom practice. Therefore, institutionalization of change seems only a remote possibility (Payne, 2008).

Participants in this study perceived of opportunities to collaborate with colleagues and ability to share new ideas with teachers at other schools as having a positive impact on implementation, but indicated that such opportunities are often lacking. Continued isolation of teachers will do little to alleviate this problem. Therefore, providers of professional development at all levels should embrace collaboration as a viable means of promoting institutionalization of changes in practice.

Focusing on relevant content. According to Loucks-Horsley, *et al.* (1998), "it is difficult, if not impossible to teach in ways in which one has not learned." (p. 1). Teachers want to be taught in the same manner as they are expected to teach. As one participant stated, "they [providers] should allow time for us to be immersed in the learning, in the same way as our students." Teachers also expressed the need for a broader focus on content that is easily adapted for classroom use. The closer the nature of the content is to what is being taught in the classroom, the more likely the teacher is to make the transfer of the new material into practice (Lincoln & Guba, 1985; Supovitz, 2000; Wilson 2013).

Teaching science as inquiry as envisioned in the Next Generation Science Standards is not routine in most science classrooms (Von Secker, 2002). To reach the goals set forth in the standards will require considerable investment in specialized curriculum materials and tools that facilitate use of technology. Implementation of the standards will also require considerable help for teachers and student in using those materials. Wilson (2013), notes that though there is a growing body of research on the characteristics of effective professional development, the experimental base is not level.

Professional development providers must be familiar with the latest research and able to identify specific research-based practices and content that teachers can master and transfer to the classroom. As noted in this study, teachers expressed needs to be taught content that is relevant to classroom practice, time to practice new skills on multiple occasions and, time to reflect on their learning.

Role of Principals in the Implementation Process. Principals are the educational leaders of the school and therefore, have a major role to play in the success of teachers in the classroom. Among the findings was that LaSIP teachers indicated that LaSIP projects in general did not include training in reform-based practices for administrators. Directors of LaSIP were aware of problems associated with this aspect of the program and made efforts to correct it through its leadership institutes for principals and other administrators (Breckenridge and Goldstein, 1998).

According to Guskey and Sparks (2002) “while administrative support may not be a requirement for improved practices, the lack of support appears to diminish the likelihood of implementation and continuation,” (p. 6). Professional development that includes meaningful involvement of principals and other administrators creates a school climate that enhances teachers’ chances of successfully implementing changes in classroom practice. Based on perceptions of teachers in this study, efforts to ascertain the professional development needs of principals are warranted when planning professional development for teachers.

Hands-On Science Teaching Requires Added Resources. An art teacher turned librarian once told me that the reason for the switch was having too few art supplies to do an effective job. Science teachers often find themselves in need of supplies as they strive to provide hands-on experiences for their students. More than ninety percent of teachers agreed that acquisition of free equipment and supplies would influence their choice and attendance of professional development activities. To its credit, the LASIP provides some funding for teaching supplies and require districts to sign commitments to provide matching funds. Since there is no way to enforce this requirement without hurting teachers through denied access to the program, this is an area that deserves the attention and improved cooperation of local administrative personnel and LaSIP officials.

Conclusions and Recommendations for Further Study

The purposive sampling done in this study can only scratch the surface of the far-reaching effects of a program that has lasted for decades. Included in the paragraphs below are some recommendations for further study that may address some teacher needs and add to the database on professional development.

1. Thousands of teachers have participated in LaSIP projects and some projects are on-going. Projects varied in terms of content focus and grade levels. I recommend use of a wider sample size that focuses on specific years of teacher participation in the LaSIP and the nature of project offerings during specific time periods. Additional data mining concerning the findings for the proposed model in Figure 4a based on follow-up interviews and classroom observations would also improve the overall generalization of the findings. Studies using this approach could also provide useful information on the

efficacy of various project models and the time frame needed for institutionalization of changes in practice.

2. Although all of the LaSIP participants expressed wide-spread use of research-based teaching strategies (RBTS) in the classroom, the t-test revealed no statistical difference in perceived frequency of use of RBTS by LaSIP versus non-LaSIP teachers. The interviews of the LaSIP teacher now serving as a science and mathematics coordinator and a LaSIP teacher who serves as a department chair indicated RBTS such as hands on experiences and teaching science as inquiry were not being implemented in the classes they observed.

   I recommend designing follow-up studies to include classroom observations of specific strategies modeled by providers and experienced first-hand by teachers during professional development. Further, such studies should examine effects of use of research-based practices on student outcomes.

3. If used in additional studies, I recommend the survey instrument used in this study be modified to include other research–based strategies that are known to positively affect science teaching and learning. Research on effective teaching strategies continues to be evaluated and improved. Instrumentation should keep pace with these developments. Much of the research on research-based teaching strategies by Marzano, Pickering and Pollock (2000) was completed after the inception of the LASIP. The ones used in the survey for this study were among the strategies used in the LaSIP and also identified in other research documents like the NSES. Updating the survey instrument to reflect the new research findings seems logical for future studies.

4. Studies that focus on the needs of principals as educational leaders in educational reform seems warranted based on participant responses in this study. Such studies could focus on specific administrative needs. The studies could seek administrative input in relation to changes in school policies that facilitate successful implementation of research-based practices at the classroom level. Studies should also emphasize collaboration among providers, administrators and teachers in facilitating integration of professional development into the overall learning culture of the school.

Finally, every researcher strives for complete objectivity in reporting results of a study. Yet, no matter how objective one desires to be when attempting a study like this, there are inherent life experiences that tend to color one's world view. Mine is probably tinted by the many hours I have spent observing, assisting, and mentoring some of the most talented teachers in the science teaching profession, and some of the neediest or lacking in skills. Both are equally important and in many instances work just as hard trying to educate young people. If there is anything that will be helpful to teachers of either group that can be derived from this study, the time and effort will have been well-spent.

Summary of the Study

This study used an integrated- mixed method design to investigate the factors that impact teachers' implementation of research-based teaching strategies following participation in a long-term, reform-based professional development program. A researcher-developed survey was used to collect and analyze quantitative, (QUAN) data and qualitative data (qual) from five open-ended questions. Qualitative (QUAL) data was collected via personal interviews and focus group discussions and analyzed using Atlas.ti, qualitative data analysis software.

The LaSIP and non-LaSIP teachers who participated in this study (n = 66) listed a variety of professional development experiences. Examples included workshops, online courses, attendance at conferences, two week summer institutes and long term professional development that lasted a year or two. Except for district-wide workshops, (that some participants listed as their worst professional development experience), most of the experiences were due to voluntary participation. This is a testament to the belief that many classroom teachers are desirous and supportive of professional development that is effective in improving teaching and learning.

According to NCLB (2002), high quality professional development should be sustained over time, intensive and focused on the content that the teacher can implement in the classroom. Additionally, it should be coherent, that is, consistent with teachers' knowledge and beliefs, (Keys & Bryan, 2001; Keeley, 2005 and Mizell, 2008) and aligned with state and local academic curriculum standards and assessments, (NCLB, 2002; ARRA, 2009; Desimone, *et al.*, 2009). Questions in the survey and in interview guides used in the study allowed participants to express their perceptions of past experiences and their beliefs and ideas concerning what they consider ideal professional development. Nevertheless, the limitations of self-reporting instruments should be kept in mind when viewing the results of this study. It is not unreasonable to think that in some cases, respondents report what they think are good practices in education whether or not they are actually implementing the practices in their classrooms.

The reforms proposed in the National Science Education Standards are incompatible with textbook-centered curricula and outdated recitation style teaching strategies. Additionally, the findings in some studies indicate that implementation of research-based teaching strategies runs contrary to teachers' present practices, (Tobin, 1993; Yore, 2001; Smith, 2007; Thompson, 2009; Wilson, 2013). Use of standards-based approaches often represent a substantial departure from teachers' prior experiences and established beliefs about how students learn and may have influenced answers to some of the questions posed in this study.

According to Guskey (1997), isolating the effects of any one innovation on teacher growth and development is fraught with difficulties no matter the research design. Results of an independent samples t-test in investigation of research question #2 indicated that frequency of implementation of research-based teaching strategies was not significantly different for LaSIP versus non-LaSIP teachers. It is important to note, however, that analysis of frequency distribution tables indicated that LaSIP teachers used RBTS more frequently than non-LaSIP teachers and were less likely to use non-RBTS than non-LaSIP teachers.

Other research questions investigated in the study provided findings that were consistent with the conceptual framework and proposed model predicting implementation of research-based teaching strategies based on factors identified for Sections A-D and G of the survey. The Model in Figure 4 was modified to reflect the results of the analyses (see Figure 4a).

Change is not easy. One of the most powerful tools for change in education is the professional learning of teachers and the ability to put the learning into practice in the classroom. This study provided a snapshot into the desires and challenges that face providers and teaching professionals who seek to improve learning in science classrooms. New national science and mathematics standards are being adopted that are based on the latest research concerning teaching and learning. Each round of standards places higher demands on a dwindling and aging teacher workforce. In light of these daunting realities, professional development focused on implementation of research-based practices takes on added urgency.

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Appendix A

Survey of Teacher Attitudes Toward Change and Classroom Implementation of Research–Based Strategies

Demographic Information

1. Current Position (Check one.) _____Classroom Teacher _____ Administrator _____Other
2. Years of Teaching Experience __________ 3. Area(s) of Certification ________________
4. Grade or Subject Now Teaching a.______________ No Longer Teaching b. __________
5. Indicate each year that you participated in a Louisiana Systemic Initiatives Program (LASIP) that lasted two weeks or longer: ____1992 ____1993_____1994 ____1995 ____1996 ____1997 ____1998 ____ 1999____2000____ other
6. Age _______ 7. Gender (check one) ___________Male _________ Female
8. Ethnicity: _______ Afro-American _______Caucasian _____Hispanic ________ Other
9. School District: __________ Urban ____________ Suburban ___________ Rural

Directions:

Factors described in the following pages have been found to contribute to the success or failure of implementing research-based teaching strategies in the classroom. Many of the strategies and program features were part of your experience as participants in Louisiana Systemic Initiatives Programs. Read each statement, carefully.

Statements in sections A-D and Section G are followed by these responses:

5 = Strongly Agree; 4 = Agree; 3 = Not sure; 2 = Disagree; 1 = Strongly Disagree.

Statements in Section E are followed by these responses:
5 = Always; 4 = 3-4 weekly; 3 = Twice weekly; 2 = Once a week; 1 = Never

Statements in Section F are followed by these responses:
5 = Increased tremendously; 4 = Increased moderately; 3 = Increased very little;
2 = Remained unchanged; 1 = Decreased.

Circle the number of the response that best describes your opinion of each statement.

A. Features of the Louisiana Systemic Initiatives Programs and other Features of Reform-based Professional Development Programs					
Features of professional development experiences that were most influential in improving teaching and learning and contributed to use of the training experiences in the classroom included:	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
1. Sufficient time for acquiring the pedagogical content knowledge to implement the concepts and strategies in a classroom setting.	**5**	**4**	**3**	**2**	**1**
2. Emphasis on standards-based teaching and learning.	**5**	**4**	**3**	**2**	**1**
3. Time for reflection and writing about teaching and learning experiences.	**5**	**4**	**3**	**2**	**1**
4. Activities that emphasized the use of science process skills.	**5**	**4**	**3**	**2**	**1**
5. Instruction in alternative assessment that included models of authentic, real–life experiences.	**5**	**4**	**3**	**2**	**1**
6. Modeling of teaching and questioning strategies during micro-teaching activities.	**5**	**4**	**3**	**2**	**1**
7. Emphasis on learning major science concepts.	**5**	**4**	**3**	**2**	**1**
8. Time to practice research-based teaching strategies.	**5**	**4**	**3**	**2**	**1**
9. Opportunities to learn through a variety of methods including feedback from peers and group problem-solving	**5**	**4**	**3**	**2**	**1**
10. Attention to learning styles and multiple intelligences that were useful in classroom instruction.	**5**	**4**	**3**	**2**	**1**

B. Follow-Up Activities					
My professional development experien included follow-up activities that provided opportunities for:	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
12. Additional instruction and practice.	5	4	3	2	1
13. Sharing of resources and expertise with colleagues and fellow participa	5	4	3	2	1
14. Exchange of ideas through visitation participants' classrooms.	5	4	3	2	1
15. Presentation and sharing the results of research with colleagues.	5	4	3	2	1
16. Acquisition of resources for classroo instruction.	5	4	3	2	1
17 Site visits by course teachers or prog coordinators and staff.	5	4	3	2	1
18. Hands on experiences with materials and supplies.	5	4	3	2	1
19. Training for administrators in systen educational reform.	5	4	3	2	1
20. Active support from the principal in implementing new instructional strategies in the classroom.	5	4	3	2	1
21. Discussions with other teachers in th school district about successful standards-based teaching strategies facilitates implementation of new teaching and learning.	5	4	3	2	1

C. Context

School and district factors that impact classroom implementation of research-based teaching strategies include:	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
22 Collaboration with colleagues in the school and district to improve teaching and assessment skills.	5	4	3	2	1
23. Providing common planning time with other teachers trained to use research-based teaching strategies facilitates implementation of professional development experiences.	5	4	3	2	1
24. The principal is supportive of efforts to implement new standards -based teaching strategies.	5	4	3	2	1
25. Parents that understand and support use of new teaching strategies and alternative assessment methods.	5	4	3	2	1
26. The school provides ongoing technical support for reform-based teaching and learning.	5	4	3	2	1
27. The school and district provide ongoing financial support for implementation of research- based teaching and learning.	5	4	3	2	1
28.The district has adopted a standards-based curriculum that encourages teacher participation in job-embedded professional development.	5	4	3	2	1
29. Overall school climate at my school is not conducive to implementation of reform-based teaching practices.	5	4	3	2	1
30.. Increased time for planning has helped me to implement reform-based teaching and learning in the classroom.	5	4	3	2	1
31..Ongoing technical support offered by the district supports implementation of reform-based curricula.	5	4	3	2	1

D. Implementation of a Reform-based Curriculum					
Indicate your beliefs concerning implementation of a reform-based curriculum in your classroom by circling the number in the correct space. A reform-based curriculum:	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
32. Promotes life-long learning.	**5**	**4**	**3**	**2**	**1**
33. Requires equipment, supplies and technological resources that most schools cannot afford.	**5**	**4**	**3**	**2**	**1**
34. Can be accomplished by any classroom teacher.	**5**	**4**	**3**	**2**	**1**
35. Is needed to help students achieve state and national standards.	**5**	**4**	**3**	**2**	**1**
36. Incorporates strategies that can help students (including students with special needs) succeed, academically.	**5**	**4**	**3**	**2**	**1**
37. Can better meet the needs of students than traditional approaches requiring rote memorization of facts.	**5**	**4**	**3**	**2**	**1**

E. Implementation of Research-based Teaching Strategies

Indicate the frequency of implementing the following instructional strategies in the classes you teach...	**Always**	**3-4 times weekly**	**Twice-weekly**	**Once a week**	**Never**
38. Identifying similarities and differences.	**5**	**4**	**3**	**2**	**1**
39. Teaching science as inquiry.	**5**	**4**	**3**	**2**	**1**
40. Lecture and /or lecture demonstration.	**5**	**4**	**3**	**2**	**1**
41. Hands-on science experiments	**5**	**4**	**3**	**2**	**1**
42. Thinking maps and other graphic organizers.	**5**	**4**	**3**	**2**	**1**
43. Cooperative learning.	**5**	**4**	**3**	**2**	**1**
44. Drill and Practice	**5**	**4**	**3**	**2**	**1**
45.. Alternative assessments such as portfolios and exhibits.	**5**	**4**	**3**	**2**	**1**
46. Reading aloud from the textbook.	**5**	**4**	**3**	**2**	**1**
47. Reflective logs and journals.	**5**	**4**	**3**	**2**	**1**
48. Long term science investigations	**5**	**4**	**3**	**2**	**1**
49. Writing about science.	**5**	**4**	**3**	**2**	**1**
50 Worksheets.	**5**	**4**	**3**	**2**	**1**
51. Use of higher order thinking skills.	**5**	**4**	**3**	**2**	**1**

F. Student achievement

Place a circle around the number beneath the word or phrase that best describes how use of the following strategies has affected student achievement in your classes.	Increased tremendously	Increased moderately	Increased very little	Was Unchanged	Decreased
52. Identifying similarities and differences.	5	4	3	2	1
53. Teaching science as inquiry.	5	4	3	2	1
54. Lectures and /or lecture-demonstrations.	5	4	3	2	1
55. Hands-on science experiments	5	4	3	2	1
56. Thinking maps and other graphic organizers.	5	4	3	2	1
57. Cooperative learning.	5	4	3	2	1
58. Drill and practice.	5	4	3	2	1
59. Alternative assessments such as portfolios and exhibits.	5	4	3	2	1
60. Reading aloud from the textbook.	5	4	3	2	1
61. Reflective logs and journals.	5	4	3	2	1
62. Long term science investigations or class projects	5	4	3	2	1
63. Writing as a tool to increase comprehension and thinking	5	4	3	2	1
64. Worksheets	5	4	3	2	1
65. Focus on higher order thinking s	5	4	3	2	1

G. Practical Benefits

Place a circle around the number beneath the word or phrase that best describes the practical benefits of professional development programs that influence your choice and attendance.	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
66. Receiving graduate credit	5	4	3	2	1
67. Acquisition of free equipment and supplies.	5	4	3	2	1
68. Receiving a stipend for participation.	5	4	3	2	1
69. Time for learning and reflection that equals or exceeds two weeks.	5	4	3	2	1
70. Being allowed to participate as a member of a school team.	5	4	3	2	1
71. Follow-up visits and assistance by a site coordinator for one school year.	5	4	3	2	1

H. Briefly describe the benefits of the following in improving your professional growth:

72. Job-embedded professional development……..

73. Two to four week content-based summer programs ……

74. College methods course(s) ……

75. Attendance of professional conferences ………

76. Mentoring and/or coaching …………

Comments/Suggestions:

Appendix B
Transcript of Open-ended Questions from the Survey

Briefly describe the benefits of the following in improving your professional growth: Question 72 Job-embedded professional development	Question 73 Two to four week content-based summer programs	Question 74 College methods course(s)	Question 75 Attendance of professional conferences	Question 76 Mentoring and/or coaching
Case 1.			Being exposed to multiple teaching tools and strategies	Having someone who is trained in "best practice" strategies available to work one-on-one with me has proven very helpful.
Case 3. Improved professional growth by allowing professional development during normal course of workday.	These were the most beneficial because they provided great ideas and activities to use in classrooms.	The methods courses I took for my undergraduate degree did not hold a candle to the LASIP courses.	Although some conferences are beneficial, I don't feel that they enhance professional growth all that well.	Help teachers to grow professionally.
Case 4- This is beneficial if the topic directly relates to content area and members of our team also participate so sharing and aligning plans occurs.	Provides time to learn. Apply in some format and get questions answered before leaving.	Only if the courses accurately portray teaching needs.	Great opportunity to get new ideas, network and problem solve; hear inspirational speakers, view newest products and services.	Allows the seasoned teacher to attend to their own learning and to provide a distanced perspective on educational issues and ideas.
Case 6- Not sure what this is.	Continues my learning and refreshes my mind.	Some- depends on the application.	/Enjoy when I can get off from school.	

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional development	**Question 73 Two to four week content-based summer programs**	**Question 74 College methods course(s)**	**Question 75 Attendance of professional conferences**	**Question 76 Mentoring and/or coaching**
Case7- Great it gives the opportunity for professional growth during regular school hours	It is good as long as there is follow up during the year.	I didn't find it as helpful as onsite training- it did give me a background.	Some can be very rewarding others were not useful at all.	This is great. Seeing something modeled is awesome but it needs to include the mentor observing the teacher and giving feedback.
Case 8- It does not take time needed for lab set up, lab take down, family.				
Case 10- These activities allow time to reflect on procedures and practices that are helpful as we teach and learn from other teachers and administrators.	These programs help focus teachers on specific information they need to do a better job and offer opportunities for new lessons that matter in an interesting way for that reason.	At Southern University in the 60's when I worked on my BA courses did not emphasize standard based teaching or hands on teaching. In 2000 when I got my masters at Xavier University in New Orleans the content and strategies were stressed more	Professional conferences offer teachers and administrators an opportunity to talk and listen to each other from other areas of this country/world. The sharing and development of new strategies that are proven to be successful are exposed and …	Content coaching and mentoring are valuable to new teachers and help keep all teachers in tune with standard based teaching. They share, model and encourage development of professional excellence and ways to

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional development	**Question 73 Two to four week content-based summer programs**	**Question 74 College methods course(s)**	**Question 75 Attendance of professional conferences**	**Question 76 Mentoring and/or coaching**
Case 11- I'm a master teacher at a TAP school, it is an ideal situation for classroom teachers.	Not always practical time of year for teachers with children at home. I personally have utilized these online or by district.	I've used several online courses with PBS and other universities.	Very beneficial to attend NSTA, LSTA conferences but limited follow up or feedback provided.	Needed greatly by the classroom teacher. This is my current position/ job description. I coach classroom teachers.
Case 12- is the most beneficial professional development offered. It provides me the opportunity to use the new strategy to aid students.	I find the summer programs challenging because of the time frame to implement the new strategy.	Is Okay. It allows time to go to the classroom and try out teaching strategies learned.	Providing the conference is good very helpful because there is immediate use of new teaching techniques.	Helpful because of the modeling on site in the classroom.
Case 14- Collaboration		New Perspective	Networking, New Ideas	New Ideas

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional development	**Question 73 Two to four week content-based summer programs**	**Question 74 College methods course(s)**	**Question 75 Attendance of professional conferences**	**Question 76 Mentoring and/or coaching**
Case 16- Professional development has been very useful because I try to implement something from each training in order to become more effective.	The summer programs are helpful but sometimes too much information to retain for that length of time.	On-line course, I don't care much about because if you have problems there is no accessible professor to help you.	I really like professional conferences because you are able to share ideas across the state with other colleagues.	I felt that for new teachers, this would be helpful.
Case 17- LaSIP Math/ Loyola Attended two summers- one as assistant. Super!	Confretude - U. of Connecticut (The best educational program. I had ever experienced.		Attended many during my time as a 1E; allowed for great practices to be developed at the school.	With LaSIP and after several summer trainings.
Case 21- Would make the time spent seem more meaningful	Allowed me to see how others use the materials.	Very little benefits because you don't get a chance to use the methods and some seem unreal.	Most Conferences do not prepare for high school math teachers.	This would allow me to have someone to give instant feedback and help to improve my methods.
Case 23- Improves teaching and learning in the classroom.	Become knowledgeable about the content.	Provides hands-on activities for the science teacher.	Enables teachers to learn about "what's new" in science	Provides teachers with support to enhance their lessons.

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional development	**Question 73 Two to four week content-based summer programs**	**Question 74 College methods course(s)**	**Question 75 Attendance of professional conferences**	**Question 76 Mentoring and/or coaching**
Case 24- Programs have changed over the years, “new improved”, but we keep coming back to basics.	That program we did at Livonia High School on science projects was good. I still use ideas, worksheets, and projects we did.	I’m too old for that- new, young teachers are high tech savvy- that’s good.	You guys think “conferences” sounds good, but I’d rather you all take the kids somewhere where the kids can see, feel, and touch, sit on, and ride something.	I’m here every day- kids come to class with many problems, daily/nightly. - not some video unit all of them sitting there smiling.
Case-25 Keeps me up-to-date on the latest education practices and teaching strategies.	Good idea- good time for me	Prepares somewhat the new teacher. They can enter the classroom with the basics of instruction.	Necessary in that new and innovative ideas are introduced.	This is very important. Good ideas need to be shared.
Case-26 Refreshing	Teaches new strategies and ways of thinking.	Teaches me ways To implement pedagogical content knowledge learned to students.	Allows me to stay abreast of new ideas.	Provides needed support.

Briefly describe the benefits of the following in improving your professional growth:				
Question 72 Job-embedded professional Development	**Question 73 Two to four week content-based summer programs**	**Question 74 College methods course(s)**	**Question 75 Attendance of professional conferences**	**Question 76 Mentoring and/or coaching**
Case 30- I would learn new techniques and strategies without leaving my class.	Network with others to learn new techniques and ideas.	Will help me to learn to research new and emerging information to help in my teaching.	Numerous benefits.	Numerous benefits.
Case 31- Very beneficial.	Case 31-N/A	Case 31- N/A	Case 31- Wish they would have more conferences.	Case 31- Very helpful and rewarding.
Case 32- This is a great time-saver.	Case-32- This is good if the implementation and assessment is clear.	Case 32- The college credit is great, it requires more work on the implementation side.	Case 32- These are almost always helpful.	Case 32- I think that one-on-one attention is probably the most effective because of the opportunity for feedback from an experienced professional.
Case 33	Case 33- Can never go.	Case 33-	Case 33- Love them.	Case 33- Need more.
Case 35- A lot as long as it's meaningful.	Case 35- N/A	Case 35-N/A	Case 35- N/A	Case 35-It helps me in addition to the individual.
Case 38-The professional development courses have enabled me to reach higher heights in my teaching.	Case 38- I feel that the weeks are too short and does not allow one to achieve their goals.	Case 38- Enhance one's learning ability on how to attain high order thinking among students.	Case 38- Conferences have enabled me to bring the information back to the class and implement it.	Case 38-This gives teachers and students the ability to communicate and learn real life experiences.

Appendix C
Individual Interview Guide

Dissertation Research
Interviewer = NF

Interviewee = ________________________________

NF: Thank you so much for consenting to participate in this study. I would like to go over the consent form with you before we start our interview. Would you like to read over the form before we begin?

NF: Do you have any questions before we go on?

Our discussion will be taped in order to transcribe it later. I will start the tape now. Thank you again for agreeing to participate in this study and for signing the consent form. Your participation in this interview is strictly voluntary. You may terminate the interview at any time. If I ask any questions, that you do not feel comfortable answering you may simply pass on the question or indicate verbally that you do not wish to answer. You may stop the interview at any time. I can pause in the taping whenever you need to take a break. Do you have any questions before we begin?

NF: I am going to give you a brief summary of the focus of the study. The question that I am focusing on in this study is: What are teachers' perceptions of the effects of professional development experiences on implementation of research-based teaching practices? ……In what ways do you feel professional development experiences influence classroom practices? Many districts require teachers to participate in teacher in-services or professional development activities as a means of improving classroom instruction or student learning or just improving their own learning. A lot of teachers take part in these activities throughout their careers. I am very much interested in your perceptions as to what determines whether or not these experiences are actually transferred into classroom practice.

NF: I understand that you have a new job this year. I am going to start at a very general point …and ask you to tell me a little about what you are doing now. Tell me what a day in the last week was like …Pick any day you'd like.

MS:

NF: I see you've been teaching for ________ years, tell me about some of the kinds of professional development activities that you have participated in during your teaching career? How would you say your participation in these professional development activities helped you to grow professionally? ….. How do you think your participation in the __________ professional development program(s) benefited your students?

MS

NF: Would you say that most of these activities were one day workshops or of longer duration?

MS

NF: How would you compare the benefits of having two weeks or more in professional development activities such as in summer institutes as opposed to the shorter activities after school or to those activities embedded within the school day? What do you think would be the greatest benefit of having more time in such activities?

MS:

NF: Most school Districts offer professional development for teachers during the school year some are offered off-site, others take place at school sites. What kinds of professional development activities are scheduled on a regular basis at your school site? Describe what a typical session is like. Would you like to have time to meet with colleagues during the day to review student work? ……Review student data?

MS:

NF: In what ways would being able to collaborate with other teachers to review student work /data be beneficial to you as a teacher? How would these activities be beneficial to the students you teach?

MS:

NF. As you reflect back on all of your professional development experiences … what is your most memorable experience in professional development? ……. What sticks out in your mind about this professional development experience that makes it different from all the rest?

MS:

NF: What kinds of things are you doing in your classrooms that are direct results of your participation in the professional development activities you have described.

NF: Now based on your own experience, what kinds of things do you feel stand in the way of teachers, who participate in professional development experiences or activities, transferring these practices to the classroom? …..… What are some things that you think stand in the way of teachers trying out new ideas in their classrooms?

MS:

NF: How important do you think teacher beliefs or attitudes and mindset are in determining what new teaching strategies get put into practice in the classroom?

MS:

NF: What kind of input would you like to have in planning your next professional learning experience?

NF: If you could make one change in the professional development offerings at your school, what would it be?

MS:

NF: What other things do you think should be added to professional development offerings to help improve their impact on classroom practices?

MS:

NF: Describe the climate at your school toward change… trying something new that has been proven to work?

MS:

NF: What support structures from district personnel and administrative personnel would you like to have at your school that would make your job easier?

NF: .Does that summarize what we have discussed today? Is there anything you would like to add? Well ---- I want to thank you. You have provided me with a wealth of information.… Again, thank you so much for your time and professional insight**.**

Appendix D.

Personal Interview Transcript of K A

Interviewer = NF
Interviewee = K A ______________________

NF: Thank you so much for consenting to participate in this study. I would like to go over the consent form with you before we start our interview. Would you like to read over the form before we begin?

NF: Do you have any questions before we go on?

Our discussion will be taped in order to transcribe it later. I will start the tape now. Thank you again for agreeing to participate in this study and for signing the consent form. Your participation in this interview is strictly voluntary. You may terminate the interview at any time. If I ask any questions, that you do not feel comfortable answering you may simply pass on the question or indicate verbally that you do not wish to answer. You may stop the interview at any time. I can pause in the taping whenever you need to take a break. Do you have any questions before we begin?

NF: I am going to give you a brief summary of the focus of the study. The question that I am focusing on in this study is: What are teachers' perceptions of the effects of professional development experiences on implementation of research-based teaching strategies? ……In what ways do you feel professional development experiences influence classroom practices? Many districts require teachers to participate in teacher in-services or professional development activities as a means of improving classroom instruction or student learning or just improving their own learning. A lot of teachers take part in these activities throughout their careers. I am very much interested in your perceptions as to what determines whether or not these experiences are actually transferred into classroom practice.

NF: I understand that you have a new job this year. I am going to start at a very general point …and ask you to tell me a little about what you are doing now. Tell me what a day in the last week was like …Pick any day you'd like

KA: First of all I found out that one of the new teachers was quitting and as Department Chair, I found out that I had to pick up the extra slack because it was highly unlikely that we would find a certified Science teacher to replace her. The thing that upset me the most is that #1 the new teacher rejected suggestions that I tried to make to her to help her class progress. She did not want to listen. She always wanted to do what her friends were doing at other schools which did not work for the type of students that we have. I have not had much experience at this school, but I have had 13 years of experience teaching African-American students. I had to stay after school on Friday until the teacher put all her grades in and turned in all of her technology, her paperwork, roll book, and her professional binders. I had to stay there until she actually put all that together and turn it in because there is a requirement that when you leave the school, you have to turn in all the stuff they give you in the beginning.

NF: Do teachers check out through the department chairs?

KA: Yes. I talked to him about the situation and he told me one time that he had observed her class and there was a lot of lecturing going on so he wanted me to go in and observe her class. I did and I agree with him. There was lot of lecturing going on. So after the observation, I told her that we needed to have a post-observation conference where we can discuss what I saw in the class and some changes that could occur that could make her class better. She told me fine, so at lunch that day, she wanted to know what was going on in her class that I saw. I just did not feel like it was appropriate to discuss that at lunch. After that, I kept trying to set up a meeting with her and she always had one thing to do or other thing to do. The principal he has a lot of administrative tasks to do and is always at meetings and so forth. He did not know that she was quitting. She missed Monday and Tuesday and did not follow protocol that says if you are out of school you need to let your department know and e-mail them and let them know you will be out of school Monday and Tuesday to make sure there is some work for the students and that a substitute was secured for the place. So she did not come back until Wednesday and Wednesday we did not know that she was leaving until actually Thursday that is when she told the principal and he told her that she needed to give a 2-week notice. Because even though it did not work out for that school she might want to go somewhere else and teach. But she was adamant about leaving on that Friday. So I have to make sure on Monday that she actually went to HR and put in her 2-week resignation notice. It will not be a 2-week resignation, because Friday was it for her. Because if not, she is holding a spot and we cannot put anybody else in that position.

NF: Then what happens to the kids?

KA: So they are going to fall further and further behind which will not be good for next year when they take the GEE.

NF: So that makes it very frustrating for you?

KA: Right, but at the same time my principal told me to network with other teachers to see if I can find a certified teacher or someone to put in her place so that all the responsibility for students will not fall back on me.

NF: What kind of professional developmental experiences have you had during your time teaching?

KA: I will speak about the present. In East Baton Rouge Parish every Wednesday is designated half the day for the students and the other half of the day is for job professional development and that is when the whole faculty comes together and we have different presentations made by the different departments or maybe an outside entity.
Like the last PD we had, we had the English department discuss different aspects of homework and what was excessive homework and looking at the amount of time that the students in every grade level should have for homework. We always have a literacy presentation because East Baton Rouge Parish and the state of Louisiana are very big on literacy and numeracy. So we have a literacy strategy every in-service. We also have an activity related to differentiated instruction. They are big this year about us focusing on meeting the learning styles of the students. Last Wednesday was our initial PD and we had an activity where the different teachers identified their learning style. As a group, we came to a consensus of what that learner's style entailed. For instance, I was with the naturalist so as a group, we came up with characteristics of that particular learning style. Then all the groups came back together and presented their

information. That activity helped us understand how we are to address the different learning styles in our classrooms.

NF: Are these in-services mandatory activities for every school?

KA: Yes mandatory in East Baton Rouge Parish. They do not have the same topics. Every school should have literacy, but the other stuff depends on what school you go to and what the principal I guess sees fit as a need in your school.

NF: Now do the teachers determine at their particular school what it is you focus on and _what you need?

KA: I think the focus comes from the school improvement team They identified weaknesses when they were writing the school improvement plan. Everything that we have focused on in the half day PD is what the school improvement team identified as a weakness. Our principals also do walk-through every day with a palm pilot and they come into your classroom and sit about 10 to 15 minutes. They are informal and they make notes and so forth concerning information about what was seen when he was in your class. He then punches in the stuff on what is called DASH (observation instrument) and the information goes straight to the School Board. I guess the School Board gets a handle on what is going on at the different schools.

NF: Is it based on what they see in the classroom?

KA: Yes. As a matter of fact, school has been in session a month and 6 weeks and we have had 167 walk-throughs.

NF: How much feedback do you get from these walk-throughs?

KA: When we have our PD, the principal comes and talks about what he observed in a general sense and what he thinks we need to focus on and what we need to work on. I think, if it is just something specifically to your class, he typically sends you an email and says that he needs to meet with you.

NF: Will he meet with the person?)

KA: Yes, he will meet with you personally.

NF: Do you find it is highly beneficial?

KA: Well, I think the walk-throughs are beneficial because #1 it keeps the teachers on their toes and keeps them doing what they should be doing every day. If walk-throughs were infrequent, then you would not get a snapshot of what is going on in your school. Then you know once the kids take the GEE or take the I-LEAP or so forth, you have no idea why either scores did not go up like they should have or that scores went down. So you have some data to base your decision on from those walk-throughs.

NF: Now you mentioned the Entergy job-related professional developmental experiences, have you had other experiences with professional development at your job?
KA: Last year, was my first year at the school. The school improvement team usually pays for two department members to go to the National Conference for their discipline. So I was fortunate enough to be picked to go to our National Science Teachers Convention that was in New Orleans. I learned a lot of techniques and strategies that I could take back to the classroom or share with my colleagues and so forth. Our district has technology classes that you can sign up for on an individual basis. There are other workshops and stuff that the administrative team chooses people to go to. When they come back, they present it to the whole faculty. On September 21st, I am going to a workshop on using the Active Board in the classroom. Our principal actually loves technology and loves for it to be integrated in instruction. So our school is one of the schools that have Active Boards in all the core classrooms, as well as, some of the elective classrooms. One of the things that he wants us to do is to integrate technology in our lesson each and every day. A lot of the teacher's do not use the Active Board, but they have been offered in-services. I don't know, if they took it upon themselves to go. Our principal lets us know through e-mail that there are workshops on the Active Board and workshops on websites and so forth that he thinks we would benefit from. I do not know if a lot of teachers go to the workshops. This workshop that I am going to on Monday is for departmental chairs. We are going to learn how to use the Active Board in detail. Then we must come back to our departmental meetings and share with the other people that are in the department.

NF: Have you participated in any professional development activities that lasted, let's say 2 to 3 weeks at a time?

KA: Yes. It is called Project MISE (Modeling Inquiry in Science Education). It is a program at Southern University that is a partnership between Southern University, LIGO and LAGEARUP. There is a 2-year commitment with this workshop. This is my second time in the workshop. The role I have in the workshop now is lead teacher. I actually found 2 teachers, 1 Algebra I math teacher, and 1 physical science teacher to be my partners in the workshop. I am a lead teacher and we divide it up into Cohorts 1 and Cohorts 2. I am Cohort 2, because I am a lead teacher. What I actually will be doing is working with these two teachers to integrate the activities that we learned this summer at Southern and also create mini models that help explain different concepts like waves, magnetism, and stuff like that. So I actually go in the class and help them design and incorporate the modules in the class. I also help them to design lessons that model the 5E's

NF: Do you mean the 5 E's lesson format?

KA: Yes, it is a lesson format. I actually get a chance to (I guess) take on a leadership role. I actually will be going in and observing the teachers and providing some feedback to help them change what they have been doing in class. Hopefully, our scores on the I-LEAP and GEE will go up Also, I hope the children who take science will take an active interest in science become more engaged in learning science by using that particular program. The second project I have is a workshop which is called Renewable Energy Education and Curriculum Development. It is a partnership with Southern University, US Department of Energy and the other partner I can't remember, but it has something to do with the National Energy people. In that workshop, we are looking at all the different ways that we are now using energy, looking at alternative ways to use energy and looking at what our President's focus is on now by going Green. Matter of fact, one of the things that we are learning is that, (actually they would have paid for us to get our license to design solar panels for houses. The thing is that we want to use alternative energy sources and we are learning a lot about using alternative energy sources to provide electricity.

NF: Did you say the program is sponsored by the federal government?

KA: Right, it is a government sponsored program. It is a program that the Physics Department at Southern wrote a grant and they got the funding.

NF: Ok so, have you participated in the Louisiana Systemic Initiatives Program?

KA: That is LaSIP?

NF: Yes.

KA: Actually, this program Project MISE is part of the LaSIP and LaGEARUP because we have been having people from LaSIP there to help us with different activities. Prior to that, I was in a MSP program, a Math/Science Partnership, and that was a LaSIP funded program as well.

NF: What is different about it? Is it having a lot of time like you have with the programs lasting over several years rather than a one-time workshop here or there that you might participate in for a day or two? Are they different and is one more beneficial than the other?)

KA: Okay... I was in a program last year at Southern University that was a partnership between the Physics Department, Chemistry Department and Mathematics Department and we were focusing on integrating math and science concepts like velocity, electricity, and so forth. Now the ideas and information given was good, but it was only a 5-day program. We rushed through the concept, but then at the end there was no support. What if I did not understand a concept enough to teach it to my students? There was nobody for me to fall back on and get some help.

NF: So support is important?

KA: Yes, support is important. Like with this MISE Project …like I said this is my second time in it. The first time, I was just a participant and the second time lead teacher. The one good thing about it is that we have these workshops where we go in and they teach us different activities and so forth. But we can also call on the coordinators or the project directors to come and help us with concepts. The project directors not only come and observe and see if we are actually implementing the information from the workshop but they will actually come and team teach what they call pre-service teachers to come and help us in our class if we need help.

NF: So you think that the support is important.

KA: Definitely.

NF: Do you think that the follow-up, (f you go back over all the activities that you have had) … Do you think that follow-up is crucial to putting whatever you learn (and you have been through a lot of activities) into practice? I am speaking of the support you get after the project is completed?
KA: Definitely. I think that we can learn a whole lot of concepts and we can listen to them just like in the half day PD that we have. We can learn a whole bunch of techniques and strategies in the class. I might have a good idea of what it is about while I am sitting in that PD or while I am sitting in the Saturday workshop, but then when I get back to my class, I may have no idea how to implement it in my class. So if I have some support and somebody to help me, I think I would have a better chance of actually doing what I am supposed to and helping my students at the same time. Doing what I am supposed to be doing, or doing what the district told me that I need to do, the ultimate goal is to help my students. I think support is necessary and is crucial. A lot of teachers fear change. They go to a workshop like the Active Board workshop and they may learn all this information about the Active Board when they are in there. But, like I said, it is a different story when you go back to the classroom and start implementing it.

NF: And if you have no support it is even less likely to happen.

KA: Then I am less likely implement it or I'll just put it on the back burner just like everything else.

NF: What kinds of things do you think that you do differently as a result of your professional development?)

KA: I think that when I first started teaching and had not taken any education classes and coming straight from college, my primary mode of teaching then was lecturing because that is all I knew. But after going through a lot of these workshops, it is all about hands on, modeling, and just ongoing activities and ongoing checking to see if kids understand. It is no longer just a lot of book work and the kids are up and ongoing. It is informal assessment and not just a test at the end of a unit and so forth. So you have assessment throughout the lesson and at the same time you actually have the kids up and moving around and doing things which is hitting every learning style. There's a saying that kids learn best by doing. So they're actually doing . . . they are actually participating and they are learning. They are not just sitting there taking notes. When they are just taking notes they just taking notes and writing them down and 9 out of 10 times, they do not know what I am telling them and they are not going to go back and open the binder to look at the notes.

NF: So you help them to experience learning rather than just lecture. Is that one of the things you took away from you professional development?

KA: Right. Another thing is to integrate technology in the class because our kids are technology savvy and they like
technology. We cannot use cell phones in instruction, because so many kids do the wrong thing. But if you could integrate the cell phone and we could use it to do blogging and stuff like that, the kids would actually become more motivated and more engaged in the lesson. The ultimate goal is to teach the children so we have to put in place what they like.

NF: In other words, we need to make it relevant.
KA: Yes, we have to make it relevant to their lives.

NF: So you are saying that professional development is beneficial to you, and to your students who now feel more engaged in the lesson.

KA: It is beneficial to me because #1, not only have I increased my knowledge base, I have met other people who allows me to network with a lot of people. If there is a concept I do not understand, I have some resources other than a textbook to go to and try to find out information. . . . How did you teach this concept? Maybe you have an activity that would help me to teach this concept. . . . My kids did not understand a concept so what did you do and how did you teach this concept and how did you assess the students?

NF: So networking gives you that support.

NF: Here is something that has always interested me. You attend these workshops and you are really motivated. You go back to your school with a lot of energy. Then when you get back to school, the same people that were with you in class, perhaps are not so motivated and not so energetic. What do you think accounts for this?

KA: Well a lot people are still afraid to change. I understand that so much better now after reading some books like "Who Moved My Cheese" and this book called the "Fish Philosophy". Most of the reasons that many teachers do not go back and put in place the stuff that they learn in workshops, they are afraid of change and it is too much planning and too much …

NF: It takes too much time?

KA: Yes it is too much planning. I hear teachers who think they are already doing that.

NF: Has it been your experience that they say they doing it but they are not?

KA: Yes! Actually, they are not doing that. At the end of the half day PD, they were talking about how the principal said we needed to do Differential Instruction and I heard some in my department say, "well we already do that". I have been in their classes. I know that they are not doing it.

NF: So what they say they are doing and what they are actually doing is not always the same?

KA: It is not the same.

NF: Based on your own experience, what kind of things do you think stand in the way of teachers who go through these experiences and they go to the same things you have been through and yet when they get back they do not put them into practice?
KA: Attitude. Yes, teacher attitude.

NF: Just attitude?

KA: It is a lot of stuff, but I know attitude in one of them.
NF: Give me an example.

KA: Some people just go to workshops because they are made to do so. If I do not have a vested interest in using what I learned at the workshop and do not have a vested interest in going, it is not doing me any good. Some people actually go to workshops because the principal says they need to go to a workshop. They go with the attitude that, if I do not want to go then I am not coming back and doing anything with it.

NF: Do you mean, even if they go, they are not going to use it?

KA: There are some teachers that are like that. They sit there and complain the whole time they are in the PD. Why am I here and so forth?

NF: Based on what you see and what you experience you know this someone who is not going to fully implement.

KA: Right. Then some people, if it is a workshop where you get monetary rewards, then a lot of them are there for monetary rewards not for actual learning the content.

NF: Do you think it would help, if teachers had more input into planning the workshop?

KA: Maybe. One thing I've learned is that teachers must have <u>buy-in</u>. If they have a vested interest in what they are learning they are going to buy into it. They are going to buy into using it. It is just like when we were talking about using <u>brain based</u> strategies at the school. If the teachers can give their input then they will be more likely to buy into what you are actually asking them to do. Do not just send them there because you have to send somebody to the workshop. I like every opportunity to go to a workshop because it helps me professionally and personally. But everybody is not like me. I hear teachers say they are not going to a workshop after school, since they are not getting paid or they do not do workshops on Saturday and stuff like that. But you see for me, it does not bother me, because I am still in that mode that I want to learn. Not everyone is like me.

NF: It would help, (you said), if teachers had more input before the workshop?

KA: Right.

NF: How important do you think it is to have other teachers from you department and your school participating with you during professional development?

KA: I think that if you have more than one teacher at a workshop, everybody learns from a different perspective. Maybe you did not pick up this concept at the workshop and you just did not say so. Hopefully, somebody from the school that is at the workshop can clarify misconceptions and are able to master the technique and can help other colleagues.
NF: So, Do you think that having a team participate would be beneficial?

KA: Oh definitely! Then all the responsibility will not fall on you. A lot of times when you go to these workshop, the principal expects you to come back and do a presentation. Some people do not like to do presentations, but if I have my colleague there to support me then I will be more likely to want to share the information with the people at my school.

NF: If you could add just 2 things that would be most beneficial to science teaching or to any professional development program? What kinds of things would you add?

KA: You asked if I could add 2 things.

NF: What would you add to a professional development program? If you could add anything to the workshops you have attended, even though you liked the workshop, what 2 things would you like to add?)

KA: For the WISE Project workshop, I would add more content strands. The concept we are focusing on is a lot of Physics. That is fine and dandy. . .

NF: That is fine and dandy if you teach Physics?

KA: Right. Or if you teach Physical Science, but if you are like me I was teaching Chemistry. Although, I am going to incorporate the stuff in my class as a discrepant event or whatever. It would benefit me more, if there were more content specifics.

NF: So that is #1, contents specific activities would benefit you more.

KA: Right.

NF: Anything else? What else would you like to see added as a teacher?

KA: I think more teacher input into what the plan of the workshop would be or what we would do at the workshop. Because teachers know best what other teachers like rather than someone from the university who are kind of disconnected from people who teach in middle or high schools every day. So I think it would help to put a teacher or put several teachers in place to help plan the workshop and stuff like that.

NF: Are you satisfied or have you always been satisfied with the kind of support you receive after you have gone to a workshop or done a professional development activity? That includes support you get from administrators, other teachers, or from parents in helping you to implement what you have learned?

KA: No. From the workshops, I am getting more support from the people who design the workshop, but as far as our administrator . . . No. The thing about it is that they want you to do a lot of this stuff, but sometimes it becomes overwhelming. For what they want you to do, I do not have the support that I had at my last school. My former principal was very supportive. I just do not see the same support at my school, now. I see some support, but I do not see the same support. What I see at my school, they send the same teachers to workshops and overburden them.

NF: . . . Not giving them support?
KA: Right, Teachers get burnt out.

NF: Once you go through this workshop with Project WISE, do you have the equipment you need to implement the program?

KA: With Project WISE, they gave us $250 worth of supplies.

NF: Is that matched by your administrator?

KA: No, not at all. I am not on the school improvement team, so I do not know where they are spending the money. Last year, from my understanding, the departmental chair had some money to spend, MOI money, but she did not consult the department concerning what was needed. She bought what she wanted. But now she is not there. She bought a lot of stuff and she spent a lot of money on kits. I do not think that you should spend all your money on kits. I think that you should buy a variety of stuff. She did not ask the input of the people that are going to be using it. I think we might not get the support we need, because our administrative staff is overwhelmed to a point where they cannot provide the support.

NF: Do they have too many other things to do?

KA: They have so many other things like they told me when I was there this summer. I was interviewing a young lady and I was telling her about the different things that we did not have. They were unaware of this, so that means there was a lack of communication between the administrative staff and the teaching staff. Prior to my arriving there, they bought $75,000 worth of science equipment, but I cannot say where it is now. It could have gone home with someone. Not with the administrative staff, but because of the change in the teachers.

NF: Do you mean there is no one that keeps inventory or make sure that things are accounted for?)

KA: This is the first year that the department paid us during the summer to come and take inventory as much as we could. So I am a lot more familiar with what we have at the school now than when I came last year.

NF: Thank you very much for your time and thank you for your input. It is very valuable to me and to other teachers who will get a chance to at least read the analysis of our interview.

Appendix E.

KA Personal Interview Quotations and Codes

Transcript Edited in ATLASTI
Date/Time:2013-03-21 18:49:31

List of Codes
ADMSUP
ADMTEACOMM
ATTENCONF
BENEPD
EONSA
EXPOSNEWPROG
FEAROFCHANGE
IDEALPD
INSUFEQUIP
INSUFTRAIN
JOBEMBPD
LONGTERMPD
NOADMSUP
NOADMTEACOMM
PDLACKFOLLOW
PROJECTFOLLOWUP
SATSTAUSQUO
TCHRATT
TCHRINPUT
TCHRINPUT/IDEALPD
TEAMPART
TTT

All current quotations (35). Quotation-Filter: All

P 1: KA Personal INTERVIEW - 1:1 [Like the last PD we had, we ha...] (28:28) (Super)
Codes:[JOBEMBPD]
No memos

Like the last PD we had, we had the English department discuss different aspects of homework and what was excessive homework and looking at the amount of time that the students in every grade level should have for homework. We always have a literacy presentation because East Baton Rouge Parish and the state of Louisiana are very big on literacy and numeracy. So we have a literacy strategy every in-service. We also have an activity related to differentiated instruction. They are big this year about us focusing on meeting the learning styles of the students. Last Wednesday was our initial PD and we had an activity where the different teachers identified their learning style. As a group, we came to a consensus of what that learner's style entailed. For instance, I was with the naturalist so as a group, we came up with characteristics of that particular learning style. Then all the groups came back together and presented their information. That activity helped us understand how we are to address the different learning styles in our classrooms.

P 1: P 1: KA Personal INTERVIEW - 1:2 [When we have our PD, the princ...] (44:44)   (Super**)**
Codes:[ADMSUP]
No memos

When we have our PD, the principal comes and talks about what he observed in a general sense and what he thinks we need to focus on and what we need to work on. I think, if it is just something specifically to your class, he typically sends you an email and says that he needs to meet with you.

P 1: P 1: KA Personal INTERVIEW - 1:3 [Well, I think the walk-through...] (52:53)   (Supe**r)**
Codes:[ADMSUP]
No memos

Well, I think the walk-throughs are
beneficial because #1 it keeps the teachers on their toes and keeps them doing what they should be doing every day. If walk-throughs were infrequent, then you would not get a snapshot of what is going on in your school.

P 1: P 1: KA Personal INTERVIEW - 1:4 [The school improvement team us...] (57:57)   (Super)
Codes:[ATTENCONF]
No memos

The school improvement team usually pays for two department members to go to the National Conference for their discipline. So I was fortunate enough to be picked to go to our National Science Teachers Convention that was in New Orleans. I learned a lot of techniques and strategies that I could take back to the classroom or share with my colleagues and so forth.

P 1 P 1: KA Personal INTERVIEW -1:5 [Our principal lets us know through...] (57:57)   (Super)
Codes:[ADMTEACOMM]
No memos

Our principal lets us know through e-mail that there are workshops on the Active Board and workshops on websites and so forth that he thinks we would benefit from. I do not know if a lot of teachers go to the workshops. This workshop that I am going to on Monday is for departmental chairs. We are going to learn how to use the Active Board in detail.

P 1 P 1: KA Personal INTERVIEW -1:6 [It is called Project MISE (Mod...] (61:61)   (Super)
Codes:[LONGTERMPD]
No memos

It is called Project MISE (Modeling Inquiry in Science Education). It is a program at Southern University that is a partnership between Southern University, LIGO and LAGEARUP. There is a 2-year commitment with this workshop. This is my second time in the workshop.

P 1 P 1: KA Personal INTERVIEW -1:7 [What I actually will be doing ...] (61:61)   (Super)
Codes:[TTT]
No memos

What I actually will be doing is working with these two teachers to integrate the activities that we learned this summer at Southern and also create mini models that help explain different concepts like waves, magnetism, and stuff like that. So I actually go in the class and help them design and incorporate the modules in the class. I also help them to design lessons that model the 5E's

P 1: P 1: KA Personal INTERVIEW - 1:8 [I actually get a chance to (I ...] (65:65) (Super)
Codes:[EONSA]
No memos

I actually get a chance to (I guess) take on a leadership role. I actually will be going in and observing the teachers and providing some feedback to help them change what they have been doing in class. Hopefully, our scores on the I-LEAP and GEE will go up

P 1: P 1: KA Personal INTERVIEW -1:9 [The second project I have is a...] (65:65) (Super)
Codes:[EXPOSNEWPROG]
No memos

The second project I have is a workshop which is called Renewable Energy Education and Curriculum Development. It is a partnership with Southern University, US Department of Energy and the other partner I can't remember but it has something to do with the National Energy people. In that workshop, we are looking at all the different ways that we are now using energy, looking at alternative ways to use energy and looking at what our President's focus is on now by going Green.

P 1: P 1: KA Personal INTERVIEW - 1:10 [Actually, this program Project...] (77:77) (Super)
Codes:[EXPOSNEWPROG]
No memos

Actually, this program Project MISE is part of the LaSIP and LaGEARUP because we have been having people from LaSIP there to help us with different activities. Prior to that, I was in a MSP program, a Math/Science Partnership, and that was a LaSIP funded program as well.

P 1: P 1: KA Personal INTERVIEW -- 1:11 [Now the ideas and information ...] (81:81) (Super)
Codes:[PDLACKFOLLOW]
No memos

Now the ideas and information given was good, but it was only a 5-day program. We rushed through the concept, but then at the end there was no support. What if I did not understand a concept enough to teach it to my students? There was nobody for me to fall back on and get some help.

P 1: P 1: KA Personal INTERVIEW - 1:12 [support is important. Like wit...] (85:85) (Super)
Codes:[PROJECTFOLLOWUP]
No memos

support is important. Like with this MISE Project …like I said this is my second time in it. The first time, I was just a participant and the second time lead teacher. The one good thing about it is that we have these workshops where we go in and they teach us different activities and so forth. But we can also call on the coordinators or the project directors to come and help us with concepts. The project directors not only come and observe and see if we are actually implementing the information from the workshop but they will actually come and team teach what they call pre-service teachers to come and help us in our class if we need help.

P 1: P 1: KA Personal INTERVIEW -1:13 [We can learn a whole bunch of ...] (92:92) (Super)

Codes:[PROJECTFOLLOWUP]
No memos

We can learn a whole bunch of techniques and strategies in the class. I might have a good idea of what it is about while I am sitting in that PD or while I am sitting in the Saturday workshop, but then when I get back to my class, I may have no idea how to implement it in my class. So if I have some support and somebody to help me, I think I would have a better chance of actually doing what I am supposed to and helping my students at the same time. Doing what I am supposed to be doing, or doing what the district told me that I need to do, the ultimate goal is to help my students. I think support is necessary and is crucial.

P 1: P 1: KA Personal INTERVIEW - 1:14 [A lot of teachers fear change...] (92:92) (Super)
Codes:[FEAROFCHANGE]
No memos

A lot of teachers fear change. They go to a workshop like the Active Board workshop and they may learn all this information about the Active Board when they are in there. But, like I said, it is a different story when you go back to the classroom and start implementing it.

P 1: P 1: KA Personal INTERVIEW -1:15 [I think that when I first star...] (100:100) (Super)
Codes:[INSUFTRAIN]
No memos

I think that when I first started teaching and had not taken any education classes and coming straight from college, my primary mode of teaching then was lecturing because that is all I knew

P 1: P 1: KA Personal INTERVIEW -1:16 [it is all about hands on, mode...] (100:100) (Super)
Codes:[EONSA]
No memos

it is all about hands on, modeling, and just ongoing activities and ongoing checking to see if kids understand. It is no longer just a lot of book work and the kids are up and ongoing. It is informal assessment and not just a test at the end of a unit and so forth. So you have assessment throughout the lesson and at the same time you actually have the kids up and moving around and doing things which is hitting every learning style. There's a saying that kids learn best by doing. So they're actually doing . . . they are actually participating and they are learning. They are not just sitting there taking notes. When they are just taking notes they just taking notes and writing them down and 9 out of 10 times, they do not know what I am telling them and they are not going to go back and open the binder to look at the notes.

P 1: P 1: KA Personal INTERVIEW -1:17 [Another thing is to integrate ...] (104:105) (Super)
Codes:[EONSA]
No memos

Another thing is to integrate technology in the class because our kids are technology savvy and they like technology. We cannot use cell phones in instruction, because so many kids do the wrong thing. But if you could integrate the cell phone and we could use it to do blogging and stuff like that, the kids would actually become more motivated and more engaged in the lesson. The ultimate goal is to teach the children so we have to put in place what they like.

P 1: P 1: KA Personal INTERVIEW -1:18 [Yes, we have to make it relevant...] (109:109) (Super)
Codes:[EONSA]

No memos

Yes, we have to make it relevant to their lives.

P 1: P 1: KA Personal INTERVIEW -1:19 [t is beneficial to me because ...] (113:113) (Super)
Codes:[BENEPD]
No memos

t is beneficial to me because #1, not only have I increased my knowledge base, I have met other people which allows me to network with a lot of people. If there is a concept I do not understand, I have some resources other than a textbook to go to and try to find out information. . . . How did you teach this concept? Maybe you have an activity that would help me to teach this concept. . . . My kids did not understand a concept so what did you do and how did you teach this concept and how did you assess the students?

P 1: P 1: KA Personal INTERVIEW - 1:20 [Well a lot people are still afraid...] (119:119) (Super)
Codes:[FEAROFCHANGE]
No memos

Well a lot people are still afraid to change.

P 1: P 1: KA Personal INTERVIEW - 1:21 [I understand that so much better...] (119:119) (Super)
Codes:[FEAROFCHANGE]
No memos

I understand that so much better now after reading some books like “Who Moved My Cheese” and this book called the “Fish Philosophy”. Most of the reasons that many teachers do not go back and put in place the stuff that they learn in workshops, they are afraid of change and it is too much planning and too much …

P 1: P 1: KA Personal INTERVIEW -1:22 [Actually, they are not doing t...] (127:127) (Super)
Codes:[SATSTAUSQUO]
No memos

Actually, they are not doing that. At the end of the half day PD, they were talking about how the principal said we need to do Differential Instruction and I heard some in my department say, “well we already do that”. I have been in their classes. I know that they are not doing it.

P 1: P 1: KA Personal INTERVIEW - 1:23 [Attitude. Yes, teacher attitude...] (135:135) (Super)
Codes:[TCHRATT]
No memos
Attitude. Yes, teacher attitude.

P 1: P 1: KA Personal INTERVIEW - 1:24 [Some people just go to workshop...] (143:143) (Super)
Codes:[TCHRATT]
No memos
Some people just go to workshops because they are made to do so. If I do not have a vested interest in using what I learned at the workshop and do not have a vested interest in going, it is not doing me any good. Some people actually go to workshops because the principal says they need to go to a workshop. They go with the attitude that, if I do not want to go then I am not coming back and doing anything with it.

P 1: P 1: KA Personal INTERVIEW -1:25 [Then some people, if it is a w...] (151:151) (Super)

Codes:[TCHRATT]
No memos

Then some people, if it is a workshop where you get monetary rewards, then a lot of them are there for monetary rewards not for actual learning the content.

P 1: P 1: KA Personal INTERVIEW -1:26 [One thing I've learned is that...] (155:155) (Super)
Codes:[TCHRINPUT]
No memos

One thing I've learned is that teachers must have <u>buy-in</u>. If they have a vested interest in what they are learning they are going to buy into it. They are going to buy into using it. It is just like when we were talking about using <u>brain based</u> strategies at the school. If the teachers can give their input then they will be more likely to buy into what you are actually asking them to do.

P 1: P 1: KA Personal INTERVIEW -1:27 [I think that if you have more ...] (163:163) (Super)
Codes:[TEAMPART]
No memos

I think that if you have more than one teacher at a workshop, everybody learns from a different perspective. Maybe you did not pick up this concept at the workshop and you just did not say so. Hopefully, somebody from the school that is at the workshop can clarify misconceptions and are able to master the technique and can help other colleagues.

P 1: P 1: KA Personal INTERVIEW -1:28 [A lot of times when you go to ...] (166:166) (Super)
Codes:[TEAMPART]
No memos

A lot of times when you go to these workshop, the principal expects you to come back and do a presentation. Some people do not like to do presentations, but if I have my colleague there to support me then I will be more likely to want to share the information with the people at my

P 1: P 1: KA Personal INTERVIEW -1:29 [would add more content strands...] (174:176) (Super)
Codes:[IDEALPD]
No memos

would add more content strands. The concept we are focusing on is a lot of Physics. That is fine and dandy. . .

NF: That is fine and dandy if you teach Physics?

P 1: P 1: KA Personal INTERVIEW -1:30 [Although, I am going to incorp...] (178:178) (Super)
Codes:[IDEALPD]
No memos

Although, I am going to incorporate the stuff in my class as a discrepant event or whatever. It would benefit me more, if there were more content specifics.

P 1: P 1: KA Personal INTERVIEW - 1:31 [more teacher input into what t...] (186:186) (Super)
Codes:[TCHRINPUT/IDEALPD]
No memos

more teacher input into what the plan of the workshop would be or what we would do at the workshop. Because teachers know best what other teachers like rather than someone from the university who are kind of disconnected from people who teach in middle or high schools every day. So I think it would help to put a teacher or put several teachers in place to help plan the workshop and stuff like that.

P 1: P 1: KA Personal INTERVIEW - 1:32 [No. The thing about it is that...] (190:190) (Super)
Codes:[NOADMSUP]
No memos

No. The thing about it is that they want you to do a lot of this stuff, but sometimes it becomes overwhelming. For what they want you to do, I do not have the support that I had at my last school. My former principal was very supportive. I just do not see the same support at my school now. I see some support, but I do not see the same support. What I see at my school, they send the same teachers to workshops and overburden them.

P 1: P 1: KA Personal INTERVIEW -1:33 [With Project WISE, they gave u...] (198:198) (Super)
Codes:[BENEPD]
No memos

With Project WISE, they gave us $250 worth of supplies.

P 1: P 1: KA Personal INTERVIEW -1:34 [Last year, from my understanding...] (202:202) (Super)
Codes:[INSUFEQUIP]
No memos

Last year, from my understanding, the departmental chair had some money to spend, MOI money, but she did not consult the department concerning what was needed. She bought what she wanted. But now she is not there. She bought a lot of stuff and she spent a lot of money on kits. I do not think that you should spend all your money on kits. I think that you should buy a variety of stuff. She did not ask the input of the people that are going to be using it.

P 1: P 1: KA Personal INTERVIEW -1:35 [they were unaware of this, so t...] (206:206) (Super)
Codes:[NOADMTEACOMM]
No memos

They were unaware of this, so that means there was a lack of communication between the administrative staff and the teaching staff. Prior to my arriving there, they bought $75,000 worth of science equipment, but I cannot say where it is now. It could have gone home with someone. Not with the administrative staff. . / because of the change in the teachers.

Appendix F.
Personal interview Transcript of VL

Quotations and Codes Edited in Atlas.ti
Date/Time:2013-05-09 01:09:54

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:1 [We are supposed to be doing walk...] (7:7) (Super)
Codes:[walkthrus]
No memos

We are supposed to be doing walk-throughs instead we are doing quite a bit of professional development.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:2 [Read 180 program] (7:7) (Super)
Codes:[walkthrus]
No memos

Implementing Read 180 program.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:3 [Louisiana Components of Effect...] (11:11) (Super)
Codes:[TTT]
No memos

Louisiana Components of Effective Teaching first started, I was chosen to be a trainer of trainer so the training was extensive so I have been doing that for quite a few years now and that is also very interesting, because I am interested in good teaching practices. I not only use is for myself but use it to help younger new teachers.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:4 [Then with technology, I started...] (11:11) (Super)
Codes:[TTT]
No memos

Then with technology, I started a job teaching technology before I even knew how to integrate technology and so I was trying to get up to speed on that and did a lot of professional development trying to learn how to innovate technology. Those are my 3 big areas that I have been heavily involved in over the last 20 years or so. That is a lot of training, but I have enjoyed it all and I have used it all.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:5 [All of that training can be us...] (15:15) (Super)
Codes:[BENEPD]
No memos

All of that training can be used in my job now and especially the Louisiana Components of Effective Teaching and all of the other tasks that I was involved in are perfectly in line. Our Science department needs a lot of help, so I am specifically able to help them in detail so there goes my Science stuff again. The project that I was involved in with LaSIP was a math and science integration project. So all the stuff I learned there with calculators and probes, I am now able to implement in both math and science. The technology, you know technology is one of the most engaging tools that we have for all teachers so that I am able to apply what I learned with all teachers. So yes, every bit of it. There is very little that I can remember that I am not actually using all the time.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:6 [You are right; I am able to ap...] (19:19) (Super)
Codes:[BENEPD]
No memos

You are right; I am able to apply my training to all aspects of this job.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:7 [Oh man, I do not see enough ha...] (23:23) (Super)
Codes:[NOHANDSON]
No memos

Oh man, I do not see enough hands-on stuff. It depends totally on the teacher. One teacher will be doing a lot of hands-on stuff and another person will be doing all traditional. I would say the ratio is 50/50 to those who are willing to try hands-on and those who are just going straight from the book and notes and shy away or don't have the energy or motivation to try anything hands-on or lab stuff. It is about 50/50 from what I see.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:8 [was in charge of Thinking Maps...] (27:27) (Super)
Codes:[DISTSUP]
No memos

I was in charge of Thinking Maps which is one of our school improvement strategies. I have trained to be a trainer for Thinking Maps. I have trained for the district. We did some at the end of summer and beginning of the year to get some training for the district wide Thinking Maps initiative and at school we had several of our own maybe half-day trainings and then Louisiana Components of Effective Teaching again is my other thing that I did with our teachers to start off the year. Those were like several hours long at least each of those things.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:9 [They seem to like the Thinking...] (31:31) (Super)
Codes:[EXPOSNEWPROG]
No memos

They seem to like the Thinking Maps

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:10 [The Thinking Maps are taking o...] (39:39) (Super)
Codes:[EXPOSNEWPROG]
No memos

The Thinking Maps are taking off. We started with a couple of days in 2 hours sections to give them the general idea and then we started the Thinking Maps initiative where I give them a little flyer once a week for 8 weeks to where it is sort of on the tail end of that now and we might have 2 left, but I see Thinking maps all over the place in the school.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:11 [I think it depends on the personality . . .] (43:43) (Super)
Codes:[TCHRATT]
No memos

I think it depends on the personality of the teacher a lot. You know a lot of people are just going to jump on things right away, but for the most part the group that we have there are some early implementers and we are really big about putting student work out in the halls. When the other teachers see all this cool work and then some of them start to come along, too. So that is kind of a neat little trick that is helping with the implementation.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:12 [I would add more time for teak...] (47:47) (Super)
Codes:[IDEALPD]
No memos

I would add more time for teachers to create things that they can take immediately back to their classrooms.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:13 [Yes something that you show the...] (51:51) (Super)
Codes:[IDEALPD]
No memos

Yes something that you show them something new and then I can't say how it is going to apply in a math class to show them what we think might work for them and then have them actually create something that they can take back and use pretty quickly before it fades from their mind. That is kind of a way I would try to go, but to make sure that that always happens would be nice.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:14 [The things that we do, we try ...] (55:55) (Super)
Codes:[JOBEMBPD]
No memos

The things that we do, we try not to keep the teachers after school. We try to structure our day so that we have some early release time which is new at this school.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:15 [Oh yes rather than stay. They ...] (59:59) (Super)
Codes:[JOBEMBPD]
No memos

Oh yes rather than stay. They don't stay after school. Even if you pay them, sometimes it is really difficult. They have kids and places to go and a lot of them have other jobs and carpool or they are tired. It is hard to get them to stay after school. It is really hard.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:16 [the one I remember the most is ...] (63:63) (Super)
Codes:[MOSMEMPD]
No memos

The one I remember the most is the day I saw the data collectors and the CDLs and the grafting calculators because we always had no money to buy any of the equipment and I always wanted to do experiments. What we did was low tech. We did a lot of low tech stuff, but what they were showing us was stuff that was affordable and they were giving us some of it and it was so cool the stuff they did.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:17 [They had these stations and we...] (67:67) (Super)
Codes:[MOSMEMPD]
No memos

They had these stations and we went from station to station and it was digital temperature and then they had motion detectors and it was just really amazing to me. I got so excited about it and that was the most interesting one.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:18 [Don't talk too much. You have ...] (71:71) (Super)
Codes:[IDEALPD]
No memos

Don't talk too much. You have to get your idea out there and structure a discussion and let people talk and make them accountable for some kind of learning. If you are somewhere and they are just talking and talking and they are not either showing a movie or getting you interested in it some kind of way even with grades as a repercussion, it does not stay and does not stick unless you have something invested in at least a discussion in a group.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:19 [Right, I have been to a lot of...] (75:75) (Super)
Codes:[TCHRINPUT]
No memos

Right, I have been to a lot of things and I have seen teachers cutting up in the back and so if they are sitting back there cutting up give them something to do. They are still accountable.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:20 [Now for the most part you are ...] (77:77) (Super)
Codes:[implrbts]
No memos

Now for the most part you are saying when you go back afterwards you are learning that on Thinking Maps, you are getting pretty good implementation.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:21 [For this year, we have thrown ...] (83:83) (Super)
Codes:[BARRTOIMPL]
No memos

For this year, we have thrown a lot at them and I think they are overwhelmed and so many of the new mandates that they have to do not just for us but for the district like online lesson plans, grade books, new curriculum, activities, curriculum application guides and then you try to throw in Thinking Maps, it kind of overwhelms them and they get stressed out and then they have students to deal with and they have families. It is a lot, a whole lot. I do not think that we are that unusual even though we are in reconstitution this year. I do not think that we are that unusual in that respect. I think a lot of people kind of face the same things

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:22 [For the most part, the most re...] (91:91) (Super)
Codes:[SATISSTATQUO]
No memos

For the most part, the most resistant implementers are the more experienced teachers who have been in the habit of using textbooks and going page by page through the books and they have worksheets that they are married to and procedures and they do not want to try anything new because it does not fit in with what they have been doing and they want change. They do not want to do Thinking Maps. They want worksheets. They want what is comfortable for them. They are doing vocabulary. They are doing questions in the back of the chapter. That is the biggest thing I think.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:23 [Yes like this too shall pass k...] (95:95) (Super)
Codes:[SAIISTATQUO]
No memos

Yes like this too shall pass kind of thinking. Then there are those that have been there so long and they think that is going to go away. I do not think they understand that little by little they had to take in pieces of things that have come along.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:25 [follow-up I mean things like t...] (107:107) (Super)
Codes:[ROLESFOLLOWUP]
No memos

follow-up I mean things like trying to keep track of data to see how well the programs are affecting academic improvement in students. I'd like to have some sort of system to track and see even with the lesson plans how closely they are using it. Someone could look through the lesson plans and tally how many are using it and make charts, stuff like that. We want to do the benchmark test thing and we are on the verge of getting that organized. We need to see where we are, but those things take time and they take manpower and you have to have a structure and you have to have deadlines and we are not there yet. We are not that organized. We do not have enough people to do all this data analysis that needs to be done.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:26 [Yes, I would have to say I did...] (123:123) (Super)
Codes:[ADMSUP]
No memos

Yes, I would have to say I did. I would approach the administrators with needs and wants and for the most part, I do not remember anybody trying to stop me from doing anything. I got them to put a big fish tank in the back. They were not real crazy about that, but they did it. They put it out of the way, but it did not stop me. Then they got used to it. I know how to handle them. They tell me no one time and I go ask again until they tell me yes. It really was not too much of a problem.

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:27 [es. They want the summers off ...] (131:131) (Super)
Codes:[LONGTERMPD]
No memos

They want the summers off until the kids can take care of themselves. It is definitely personal. Some of the older ones, they are not going anywhere and not doing anything no matter what. You cannot devise a mandate that would fit for them. I don't think so. You are not going to get everybody in the summer. You have to time it. You have to really research it ahead of time with who is your population is going to be and understand what other obligations they have and if they know it early enough then you can pick 2 to 3 weeks and they can plan for it. You have to start like in January because you have to know who is going to do GEE tutoring, retesting, and what week is that going to be and who is going on vacation and give them enough time where they can put yours in and then they can plan their vacation around it. Once you wait until they planned their vacation then you can forget about squeezing anything in. You have to start real early looking for recruits and then surveying them about a date and let them have some input on that. At some point, it just has to be a decision that you make that fits for the most people

P 2: P 2: PERSONAL INTERVIEW WITH VL highlighted.doc - 2:28 [I would say maybe again, those...] (139:139) (Super)
Codes:[LONGTERMPD]
No memos

I would say maybe again, those with young children, they are not going to do summers. But taking them out of the mix, I would say about 50% would. At some point in their career, they will not have to worry about young children so at that point they may be interested. So the very young teachers, we have to eliminate if we are going to offer something long in the summer. The very old they are not going to come.

Appendix G.

Focus Group Interview Guide

Participants:
Site:
NF: Thank you so much for consenting to participate in this study. I would like to go over the consent form with you before we start our interview. Would you like to read over the form before we begin?

NF: Do you have any questions before we begin?
Our discussion will be taped in order to transcribe it later. I will start the tape now. …. Thank you for agreeing to participate in this focus group discussion. Your participation in this interview is strictly voluntary. You may terminate the interview at any time. If I ask any questions, that you do not feel comfortable answering you may simply pass on the question or indicate verbally that you do not wish to answer. I can pause in the taping whenever you need to take a break. Our purpose for the discussion today is to get your perceptions of how participation in professional development has benefited you in terms of your own professional growth and in the way you now conduct your classes. Please state your first name, the subject that you teach, and years of experience. In order to properly transcribe the tapes of our discussion, it would help if you would state your first name at the beginning of your answer to a question. We would like to give everyone a chance to participate, but questions do not have to be answered in any particular order.

Introductory Question----

As you have probably discovered, professional development takes a variety of forms. These experiences tend to vary in length, content, location and in the types of presenters. Would you describe some of the types of professional development activities that you have participated in within the last two years?

Follow-up Question … of the activities that you mentioned (repeat answers), how many of them lasted two or more weeks? Were there other professional development activities that you have found to be beneficial over the years?

Transition Questions---

Which of these experiences do you think were most beneficial to you in terms of your professional growth?

Which do you feel had the greatest impact on changing your teaching practices in the classroom?

Would you say that most of these experiences had a long-term effect on your teaching or short term effect on your teaching based on the way you conduct your classes now?

Follow-up Question: How would you characterize the effect your participation in professional development has had on the achievement of the students you teach?

Key Questions----

How often do you get to share what you have learned in professional development with other teachers here at school? District?

How much time are you given during the school day to meet with colleagues?
How much of this time is spent in analyzing student work? …… reviewing student data?

How often are you able to incorporate hands-on lab experiments in your classes?

What are some of the barriers that you face in attempting to do hands –on activities?

What are some features that you would like to see included in the professional development experiences of teachers in your school? ……district?

Tell us about your worst experience(s) in attending professional development or staff development activities.

Describe for us what you consider to be your most highly rated professional development experience? What kinds of things did you do?

All things considered, what advice would you give to a teacher about to select a professional development program to attend this summer?

Do you have any questions you would like to ask?

Summary: Does this adequately summarize what we have said?

Ending: Have we missed anything? Thank you for participating in this discussion.

Appendix H.

Quotations and Codes Focus Group #1

Edited in Atlas.ti
04/01/2013 05:53:46 PM
Code-Filter: All [23]
PD-Filter: All [2]
Quotation-Filter: All [40]

PRIMARY DOCUMENTS

CODES	Group 1	Totals
EonSA	1	1
EXPOSNEWPROG	1	1
HIGHTURNOVERTFA	1	1
IDEALPD	6	6
INCHANDSON	2	2
INSUFEQUIP	4	4
INSUFTRAIN	3	3
ISOLATION	3	3
JOBEMBPD	1	1
MWOTCHRS	1	1
NOADMSUP	1	1
NOFOLLWUP	1	1
NOTCHRINPUT	1	1
ODI	1	1
OSFA	3	3
PARTMOSMEM	1	1
PDUNPLAN	1	1
SOS	4	4
TCHRPRES	2	2
TTT	1	1
UNTIMELYPD	2	2
VOSCHOOLS	1	1

P 2: Quotations codes Focus Group 1 - 2:1 [Instead they do classroom management...] (11:11) (Super)
Codes:[SOS]
No memos

Instead they do classroom management, thinking maps…things that we already know. They say nothing new. They say nothing new.

P 2: Quotations codes Focus Group 1 - 2:2 [teachers are teaching teachers] (15:15) (Super)
Codes:[TTT]
No memos

teachers are teaching teachers.

P 2: Quotations codes Focus Group 2:3 [I have seen the same presenter...] (15:15) (Super)
Codes:[SOS]
No memos

I have seen the same presenters and presentation three times the knowledge on the same things and something so old and so outdated that I am embarrassed.

P 2: Quotations codes Focus Group - 2:4 [The people are still using an ...] (19:19) (Super)
Codes:[ODI] [SOS]
No memos

The people are still using an overhead, and using their hands to point and in some instances words are misspelled. I know that in six years the statistics have changed and they are giving us the same information on stress.

P 2: Quotations codes Focus Group [The technology we have in the ...] (21:21) (Super)
Codes:[INSUFTRAIN]
No memos

The technology we have in the classroom is excellent, except. I don't know how to use it.

P 2: Quotations codes Focus Group [Yes, for example I have a Prom...] (25:25) (Super)
Codes:[INSUFEQUIP] [INSUFTRAIN]
No memos

Yes, for example I have a Promethian Board I use as a whiteboard or a projection screen. I have to figure out how to use it on my own so I have ordered a manual. I am trying to teach myself how to use it, which will take quite a while. We are now receiving training on a program called Kurtweil which is excellent if you have computers.

P 2: Quotations codes Focus Group 1 2:7 [Kurtweil. It is a computer ass...] (29:29) (Super)
Codes:[EXPOSNEWPROG]
No memos

Kurtweil. It is a computer assisted program in reading.

P 2: Quotations codes Focus Group 1 - 2:8 [The point is we are receiving ...] (31:31) (Super)
Codes:[INSUFEQUIP]
No memos

The point is we are receiving training on Kurtweil which is an excellent program, but we don't have the equipment needed to use it. We don't have the computers, we don't have the ear phones, and we don't have a place for students to go

P 2: Quotations codes Focus Group 1 2:9 [They are not giving us profess...] (33:33) (Super)
Codes:[INSUFEQUIP] [INSUFTRAIN]
No memos

They are not giving us professional development that we need on the equipment we have and they are giving us professional development on equipment we do not have.

P 2: Quotations codes Focus Group1 - 2:10 [before we got the Promethian b...] (47:47) (Super)
Codes:[OSFA]
No memos

before we got the Promethian board here, we all had training on the Promethian board, but it was so much so fast It was Rush! Rush!

P 2: Quotations codes Focus Group 1- 2:11 [Of course the teachers who are...] (51:51) (Super)
Codes:[OSFA]
No memos

Of course the teachers who are not technology savvy simply shut down when they got back to school.

P 2: Quotations codes Focus Group 1 - 2:12 [Actually, the best training I ...] (57:57) (Super)
Codes:[PARTMOSMEM]
No memos

Actually, the best training I received was off campus. It was offered by Teach for America on a first come first serve basis, you had to have a ticket. It was called "Teach Like A Champion". It was not through the school.

P 2: Quotations codes Focus Group 1 - 2:13 [even when you learn you still ...] (64:64) (Super)
Codes:[INSUFEQUIP]
No memos

even when you learn you still can't put it into practice. I had redone all of my tests for when they set up the laptops or computers. I have done all that I can do. I have no where to send my kids to take the test on the

P 2: Quotations codes Focus Group 1- 2:14 [Actually, I can't recall one f...] (70:70) (Super)
Codes:[EonSA]
No memos

Actually, I can't recall one focusing specifically on student achievement.

P 2: Quotations codes Focus Group 1- 2:15 [They do the same stuff over and...] (74:74) (Super)
Codes:[SOS]
No memos

They do the same stuff over and over. I could do something more informative. There is nothing new. That is why I am so disgusted.

P 2: Quotations codes Focus Group 1 - 2:16 [No. They never ask what we need...] (76:76) (Super)
Codes:[NOTCHRINPUT]
No memos

No. They never ask what we need to talk about. I think we could make it more informative than what they are doing.

P 2: Quotations codes Focus Group 1- 2:17 [I went to one school to see ho...] (84:85) (Super)
Codes:[VOSCHOOLS]
No memos

I went to one school to see how their English classes were taught, because they told us we had to teach students how to write paragraphs. The English teachers here weren't doing it.

S----- They still aren't doing it. I have students to do papers and they come back with one paragraph…no indentation. I drew arrows to show them how. Some of them actually drew the arrows in their papers, but at least they were getting it. So I said very well. Let's just erase the arrows.

P 2: Quotations codes Focus Group 1- 2:18 [Informal. Several years ago we...] (89:89) (Super)
Codes:[MWOTCHRS]
No memos

Informal. Several years ago we had what was called circuits. The circuit teachers were from science, reading, English and math. We all had the same planning period. So if we had to meet or a problem, we could get together to say call a parent.

P 2: Quotations codes Focus Group 1 - 2:19 [.A------, Never. Never.] (96:96) (Super)
Codes:[NOADMSUP]
No memos

.A------, Never. Never.

P 2: Quotations codes Focus Group 1 - 2:20 [My second year they asked me t...] (100:100) (Super)
Codes:[TCHRPRES]
No memos

My second year they asked me to present at the professional development district wide session where we all met at…..school. All the schools were there. So I went and presented to all the middle school science teachers at that time.

P 2: Quotations codes Focus Group 1- 2:21 [I sponsored Family LEAP Night ...] (102:102) (Super)
Codes:[TCHRPRES]
No memos

I sponsored Family LEAP Night I ended up getting an outside speaker. We got the word out soon and it ended up being widely attended.

P 2: Quotations codes Focus Group 1- 2:22 [We sort of get together on our...] (105:105) (Super)
Codes:[JOBEMBPD]
No memos

We sort of get together on our own, informally. I don't even know who most of the math teachers are…..social studies …English- Language Arts and so forth.

P 2: Quotations codes Focus Group 1 - 2:23 [This to me had nothing to do w...] (118:118) (Super)
Codes:[UNTIMELYPD]
No memos

This to me had nothing to do with the time we had just spent with him (principal from the successful school). Those two things were like oil and water.

P 2: Quotations codes Focus Group 1 - 2:24 [The thing is we had this day a...] (121:121) (Super)
Codes:[PDUNPLAN]
No memos

The thing is we had this day and we did not have specific plans for it. So the principal said, this friend of mine has done a remarkable job at the S------ A------. in New Orleans. I will ask him to come in and speak to us….give us some ideas.

P 2: Quotations codes Focus Group 1 - 2:25 [Yes. We were going over strategies...] (122:122) (Super)
Codes:[UNTIMELYPD]
No memos

Yes. We were going over strategies in January that should have been done in August. Untimely!
P 2: Quotations codes Focus Group 1 - 2:26 [I improved tremendously from m...] (128:128) (Super)

Codes:[NOFOLLWUP]
No memos

I improved tremendously from my first year to my second year. Then.... nothing…stagnant.

P 2: Quotations codes Focus Group 1 - 2:27 [Every day I try to do activity...] (130:130) (Super)
Codes:[INCHANDSON]
No memos

Every day I try to do activities every day. Large scale or small scale… but every day.

P 2: Quotations codes Focus Group 1- 2:28 [I try to do activities as time...] (131:131) (Super)
Codes:[INCHANDSON]
No memos

I try to do activities as time and equipment allows. I am trying to put more activities into what I'm doing.

P 2: Quotations codes Focus Group 1 - 2:29 [I'd like to see an interdisciplinary...] (136:136) (Super)
Codes:[IDEALPD]
No memos

I'd like to see an interdisciplinary curriculum implemented. Teachers. from the math, science, social studies and English departments working together as a team. That way we could focus on what the students need. Planning together, sharing ideas.

P 2: Quotations codes Focus Group 1 - 2:30 [From a new teacher's perspective...] (139:139) (Super)
Codes:[IDEALPD]
No memos

From a new teacher's perspective, I would like see a comprehensive presentation on the disciplinary program at this school. This I how we do it. Establish the rules and stick to them. Check on how the plans are being implemented throughout the year. Here is what I expect from teachers. Here is what I expect from students. There are clear expectations for everyone.

P 2: Quotations codes Focus Group 1 - 2:31 [I would like to see them come ...] (141:141) (Super)
Codes:[IDEALPD]
No memos

I would like to see them come up with directions and plans for how to care for the equipment we have.

P 2: Quotations codes Focus Group 1 - 2:32 [schools keep getting all this ...] (150:150) (Super)
Codes:[IDEALPD]
No memos

schools keep getting all this technology yet there is no responsibility for caring for the equipment. If there were a set of rules students and teachers would be more responsible there's no account ability. No one says run the virus protection software on the computer at least once per week. So when you get ready to use the equipment, It is sub-par and no one is accountable.

P 2: Quotations codes Focus Group 1 - 2:33 [I am a new teacher, so I would...] (152:152) (Super)
Codes:[IDEALPD]

No memos

I am a new teacher, so I would advise them to seek training on classroom management and discipline.

P 2: Quotations codes Focus Group 1 - 2:34 [How to integrate content. Know...] (153:153) (Super)
Codes:[IDEALPD]
No memos

How to integrate content. Knowing something about the English curriculum would help science teachers who have to teach writing.

P 2: Quotations codes Focus Group 1 - 2:35 [Well they don't make a distinction...] (155:155) (Super)
Codes:[OSFA]
No memos

Well they don't make a distinction between the beginning teachers and the more experienced teachers. This makes it boring. They put everyone on the same level. I don't think that teachers who are experienced in using computers should be taught in how to turn on a laptop. With new teachers, classroom management is about 90 percent of what they need.

P 2: Quotations codes Focus Group 1 -2:36 [There is a lot of talent on this...] (157:157) (Super)
Codes:[ISOLATION]
No memos

There is a lot of talent on this faculty.

Quotations codes Focus Group 1- 2:37 [I don't know who they are. I s...] (158:158) (Super)
Codes:[ISOLATION]
No memos

I don't know who they are. I see very few of the other teachers here.

P 2: Quotations codes Focus Group 1 - 2:38 [We pretty much end up staying ...] (159:159) (Super)
Codes:[ISOLATION]
No memos

We pretty much end up staying in our rooms. I used to go to the teacher's lounge, but mostly I eat in my room.

P 2: Quotations codes Focus Group 1 - 2:39 [Turnover is high in the parish...] (163:163) (Super)
Codes:[HIGHTURNOVERTFA]
No memos

Turnover is high in the parish. I was laid off at the end of last year. They also have a contract with Teach for America, they stay for two years.

Appendix I.

Focus Group #2 (Rural School): Quotations/Codes from Transcript

Edited in Atlas.ti
All 73 Quotations/Codes
Edited by:Super
Date/Time: 2013-04-05 03:34:55

FOCUS GROUP #2 [I will start with LaSIP. We...] (10:10) (Super)
Codes:[EXPOSNEWPROG]
No memos

I will start with LaSIP. We were able to use the training either as a source towards a Master's or just take it as a workshop.

FOCUS GROUP #2 - [I did Kaman Institute which was...] (10:10) (Super)
Codes:[EXPOSNEWPROG]
No memos

I did Kagan Institute which was in Metairie. It was about Collaboration and establishing Cooperative Learning Groups and there was Four Blocks training.

FOCUS GROUP #2 [They came in and built that in...] (10:10) (Super)
Codes:[JOBEMBPD]
No memos

They came in and built that into the school day 4 blocks is the literacy program that we use. They always come to the school for that one

FOCUS GROUP #2 [Louisiana Reading Conference in...] (26:26) (Super)
Codes:[ATTENDCONF]
No memos

Louisiana Reading Conference in Baton Rouge and basically they were explaining how to use textbooks. There were a lot of literacy strategies and techniques to use in a classroom depending on grade levels.

FOCUS GROUP #2 [She did a lot of modeling of h...] (26:26) (Super)
Codes:[MODLIN]
No memos

She did a lot of modeling of how to use the strategies versus us sitting in a conference room telling us how to use the type of strategy, but not actually modeling. With us, she modeled with two second grade classes. She did both second grade classes, differently, guided reading and writing.

FOCUS GROUP #2 [The professional Learning Comm...] (31:31) (Super)
Codes:[LONGTERMPD]
No memos

The professional Learning Community our focus for our school improvement plan is literacy, specifically reading comprehension.

FOCUS GROUP #2 [We do have different groups wh...] (31:31) (Super)
Codes:[LONGTERMPD]
No memos

We do have different groups where we get together and do common assessment across grade levels and then we come back together and see what worked and what did not work for each of the different teachers. We try to make our assessments better, as well as, sharing students work. One time, we also analyzed standardized testing, you remember.

FOCUS GROUP #2 [The only other thing I have ha...] (37:37) (Super)
Codes:[EXPOSNEWPROG]
No memos

The only other thing I have had is math manipulative training on the weekend.

FOCUS GROUP #2 [Accelerated Reader training] (47:47) (Super)
Codes:[EXPOSNEWPROG]
No memos

Accelerated Reader training

FOCUS GROUP #2 [I participated with the Louisiana...] (53:53) (Super)
No codes
No memos

I participated with the Louisiana Reading Association

FOCUS GROUP #2 [I participated with the Louisiana...] (53:53) (Super)
Codes:[ATTENDCONF]
No memos

I participated with the Louisiana Reading Association with Ms. G-- when we went to Baton Rouge.

FOCUS GROUP #2 3:14 [The shared reading lesson, the...] (61:61) (Super)
Codes:[MODLIN]
No memos

The shared reading lesson, the models where we actually get to see someone actually doing it and teaching the class.

FOCUS GROUP #2 3:15 [Instead of her just telling us...] (65:65) (Super)
Codes:[MODLIN]
No memos

Instead of her just telling us what we could do, we actually saw it and I think that benefited us a great deal.

FOCUS GROUP #2 3:16 [When you go behind someone to ...] (67:67) (Super)
Codes:[MODLIN]
No memos

When you go behind someone to try to implement reading strategies, the students are already somewhat familiar with it, so it does make it easier to make the transition versus again teachers going somewhere else seeing it modeled and then bringing it back to your class.

FOCUS GROUP #2 3:17 [It is still a lot for me to do...] (71:71) (Super)
Codes:[MODLIN]
No memos

It is still a lot for me to do, but at least I saw her do it with them. Even if I am doing it wrong, she showed us what to do from the beginning of the reading instead of moving to the end.

FOCUS GROUP #2 3:18 [It is still a work in progress...] (75:75) (Super)
Codes:[MODLIN]
No memos

It is still a work in progress and could take years to really master the 4-block method, but once you see it, you got it and it works a lot better.

FOCUS GROUP #2 3:19 [They even took the time with u...] (79:79) (Super)
Codes:[MODLIN]
No memos

They even took the time with us to take 4-block and our curriculum and integrate the two. They showed us how to fit it in and be able to use 4-blocks to meet our grade level expectations. That was very helpful to me as a first year teacher.

FOCUS GROUP #2 3:20 [The first year they come in a...] (85:85) (Super)
Codes:[MODLIN]
No memos

The first year they come in and they do some modeling and this is a framework, it is not a program so whatever programs your district has you can incorporate it into their framework. So after modeling, they show the teachers how to incorporate your curriculum into their framework and the next step they will be coming back soon and the next step usually when they come back they come in and observe you teach a lesson and they jump in when they see where they can help you and it is a collaborative thing at that point where if you still feel uncomfortable about something they want you to start teaching the students and then they are going to jump in and work with you to work out all the kinks.

FOCUS GROUP #2 3:21 [She modeled the lesson and that...] (87:87) (Super)
Codes:[MODLIN]
No memos

She modeled the lesson and that was last year when she modeled the lesson and we did the 2-day workshop outside of the classroom and then came into the classroom and modeled the lesson and then she came back this year and she watched us do the lesson.

FOCUS GROUP #2 3:22 [all the feedback is what really...] (91:91) (Super)
Codes:[FEEDBACK]
No memos

all the feedback is what really helped.

FOCUS GROUP #2 3:23 [I found beneficial this year w...] (93:93) (Super)
Codes:[implrbts]
No memos

I found beneficial this year was LaSIP. It was hard, but I am comfortable with manipulatives now and then Kagan, I really loved Kagan. It was so phenomenal, I recommend anybody to go to the Cooperative Learning Institute. That man is incredible. I implemented even before I began to do anything well. I did some that first week, because I loved it so much and I did not want to forget it.

FOCUS GROUP #2 3:24 [I would say for me, I am no lo...] (104:104) (Super)
Codes:[IMPACTONIMPLPD]
No memos

I would say for me, I am no longer being a traditional teacher where everything is so teacher directed. It is more student oriented. Versus it always being teacher centered.

FOCUS GROUP #2 3:25 [I think the things that LaSIP ...] (112:112) (Super)
Codes:[BENEPD]
No memos

I think the things that LaSIP taught me the most was not to give the students the information up front to always come back with a question and let them do the thinking instead of us doing the thinking.

FOCUS GROUP #2 3:27 [Because you know when the stud...] (116:116) (Super)
Codes:[BENEPD]
No memos

Because you know when the students raise their hand, they want you to give them the answers. They want you to guide them. You want to give it them and you automatically go to help them. He is like, “No. Don’t do that!”

FOCUS GROUP #2 3:28 [They are kind of like quiet an...] (118:118) (Super)
Codes:[BENEPD]
No memos

They are kind of like quiet and they not interacting as much, but I think we both changed for the better this year. Now you go, and I am like is this W’s class? The kids are talking and all so it is like she has changed, too.

FOCUS GROUP #2 3:29 [Think about the question you w...] (119:119) (Super)
Codes:[BENEPD]
No memos

Think about the question you would ask yourself to get them to start using better questioning skills instead of all those direct questions. That is what I had to do for myself. I had to stop myself and think about what I am going to say.

FOCUS GROUP #2 3:31 [In everywhere we go, we have t...] (139:139) (Super)
Codes:[OPENTOCHANGE]
No memos

In everywhere we go, we have to change because we in a different school district and my last school district they were implementing ITI (Integrated Thematic Instruction). Then down here it is like, they will be doing something else. I think it is an advantage too, because you get to take pieces of everything. There are things I have learned from ITI that I use here and I am sure I'm definitely going to take the 4 Blocks with me.

FOCUS GROUP #2 - 3:32 [major barrier is that you are...] (143:143) (Super)
No codes
No memos

major barrier is that you are overwhelmed with everything. It is hard to take everything you learned and implement it into the class.

FOCUS GROUP #2 3:33 [I think for me one of the major...] (143:143) (Super)
Codes:[BARRTOCHANGE]
No memos

I think for me one of the major barriers is that you are overwhelmed with everything. It is hard to take everything you learned and implement it into the class.

FOCUS GROUP #2 - 3:34 [Not really having a clear dire...] (147:147) (Super)
Codes:[BARRTOCHANGE]
No memos

Not really having a clear direct path of which one you really want me to spend more time on. All I know is what works best for me. Sometimes it is too much, so it is like, what do I do? It is kind of overwhelming.

FOCUS GROUP #2 3:35 [will I be able to use 4 Block ...] (150:150) (Super)
Codes:[BARRTOCHANGE]
No memos

will I be able to use 4 Block in Science and Project Read will I be able to use 4 Blocks in Science or Math or will it be strictly for reading although they primarily answered my questions, that was a barrier for me, initially.

FOCUS GROUP #2 3:36 [I got so frustrated, because t...] (152:152) (Super)
Codes:[BARRTOCHANGE]
No memos

I got so frustrated, because they kept showing you all kinds of things. I thought all of it was supposed to go together.

FOCUS GROUP #2 3:37 [If the kids had more time, the...] (157:157) (Super)
No codes
No memos

If the kids had more time, then they would use those skills with each subject not just reading and math. By the time they do get to the sixth grade, they would really be able to read a science text, because they are utilizing those same strategies that they learned with reading.

FOCUS GROUP #2 3:39 [My other barrier is with the o...] (163:163) (Super)
Codes:[BARRTOIMPL]
No memos

My other barrier is with the overwhelming number of programs.

FOCUS GROUP #2 3:41 [Then one time I went to CF and...] (169:169) (Super)
Codes:[BARRTOIMPL]
No memos

Then one time I went to CF and she was like, that is because they have not learned it yet. You know they have to use this skill to get to that skill. They did not learn that skill yet. So you better teach them that before you can do the next one. So that is another barrier, the gaps in the curriculum.

FOCUS GROUP #2 3:42 [We are finding through our PLC...] (171:171) (Super)
Codes:[BARRTOIMPL] [LONGTERMPD]
No memos

We are finding through our PLC where we are coming together across grade levels that a lot of the things in the comprehensive curriculum repeat the exact same things from grade level to grade level and then also there are big gaps where second grade stops on some things and third grade picks up way beyond that.

FOCUS GROUP #2 3:43 [Who has time to read all those...] (177:177) (Super)
Codes:[BARRTOIMPL]
No memos

Who has time to read all those books extensively to get what you need out of them? We grade papers and have families and we have children and husbands and whatever else we do outside of work.

FOCUS GROUP #2 3:44 [We really have to depend on ea...] (191:191) (Super)
Codes:[TTT]
No memos

We really have to depend on each other for everything, because both of us are new to second grade. She spent a half a year in this district and I am new to this district. I am learning things so we have to kind of use that time for our own professional development.

FOCUS GROUP #2 3:46 [We discussed that with Ms. ___...] (198:198) (Super)
Codes:[BARRTOIMPL]
No memos

We discussed that with Ms. _______ and we discussed that between the two of us in the hallway one day and I said okay where does your curriculum stop at because my kids don't know anything and I am supposed to start at elapsed time that is where third grade starts, but the second graders are coming in and they do not know enough to start there.

FOCUS GROUP #2 3:47 [I am teaching times of day and...] (200:200) (Super)
Codes:[BARRTOIMPL]
No memos

I am teaching times of day and it is still a struggle to stop at a quarter past or a quarter to the hour. We do not necessarily go deep into how much time has passed... It's kind of like this. You ask questions like how long does it take to read a book. Does it take more than a minute or less than a minute? You ask, does it take a 30 minute time span to read a book? They have no

idea.
FOCUS GROUP #2 3:48 [They were just talking about co...] (204:204) (Super)
Codes:[MWOTCHRS]
No memos

hey were just talking about collaborating with their teammates and I do not have a teammate to collaborate with. I am by myself.

FOCUS GROUP #2 3:50 [I just need time to catch up.] (214:214) (Super)
No codes
No memos

I just need time to catch up.

FOCUS GROUP #2 3:51 [If you need me to read a book ...] (214:214) (Super)
No codes
No memos

If you need me to read a book or do anything else you have to give me that time.

FOCUS GROUP #2
P 3: PLAQUEMINE FOCUS GROU1.doc - 3:52 [Honestly, it takes me the whole...] (214:214) (Super)
No codes
No memos

Honestly, it takes me the whole weekend to plan a lesson. I have to grade all of the papers for every subject and put all of that stuff in. Our policy is to put in grades at least once a week, but it is just overwhelming.

FOCUS GROUP #2 3:54 [This is what is added to the p...] (222:222) (Super)
Codes:[BARRTOIMPL]
No memos

This is what is added to the pot. Yes, there is always added stuff. It is never okay; now I want you check out these books for next year to do that.

FOCUS GROUP #2 3:55 [The time needed to catch up a...] (228:228) (Super)
Codes:[BARRTOIMPL]
No memos

The time needed to catch up and the time that needs to be available is taken away from us. They (students) are leaving at 12:15 We have to be in a meeting for 12:20.and we can’t leave until 3:15 or 3:30. So can I please have that time to catch up on grading papers and get my room back in order?

FOCUS GROUP #2 3:56 [I have wasted at least 4 hours...] (228:228) (Super)
No codes
No memos

I have wasted at least 4 hours of my day of which I feel like I could have been more effective in catching up and getting all those tasks done without having to take it home.

FOCUS GROUP #2 3:58 [this year I feel like I am on ...] (237:237) (Super)

Codes:[BARRTOIMPL]
No memos

this year I feel like I am on roller skates without the little stoppers. (Laughter) I mean it really does feel that way. It is like I have been going and going and I really can't slow down, like she said, to catch up.

FOCUS GROUP #2 3:59 [It seems like that snowball...] (239:239) (Super)
Codes:[BARRTOIMPL] [TCHOVERLOAD]
No memos

It seems like that snowball that starts little goes down the hill and every week something more is added on to it, but you haven't finished what you had the week before so it just keeps building and building, but yet there is no slimming back down again.

FOCUS GROUP #2 3:60 [we are trying to get our routine...] (243:243) (Super)
Codes:[] [TCHOVERLOAD]
No memos

we are trying to get our routines into place and everything and then boom here is 4 Blocks and we are learning something with 4 Blocks. Well then we try to digest that and then boom here comes something else

FOCUS GROUP #2 3:61 [So we should take whatever pro...] (247:247) (Super)
Codes:[LONGTERMPD]
No memos

So we should take whatever professional development that we want to focus on that year and immerse in it until we feel comfortable with it before we are moving on to something else, because you feel like you are just jumping all over the place.

FOCUS GROUP #2 3:62 [I came in as a new teacher and...] (249:249) (Super)
Codes:[INSUFTRAIN]
No memos

I came in as a new teacher and the district gave us these big binders and said go for it. You know we have to read through all this and know all the policies and procedures and everything for the first day of school. The first day of school for me was crazy. It was chaotic. I did not really know what to do.

FOCUS GROUP #2 3:64 [I did not know what was on the...] (253:253) (Super)
Codes:[INSUFTRAIN]
No memos

I did not know what was on the kids supply list. It was foolish.

FOCUS GROUP #2 3:65 [No, but it was seeing all this...] (259:259) (Super)
Codes:[INSUFTRAIN]
No memos

No, but it was seeing all this supply money and also the teachers and seeing the parents for the first time and they are throwing all these supplies to you and it was too much. I felt like saying, Hi I'm Pat G. Throw your kids in. I'll see what I can do with him this week. (Laughter)

FOCUS GROUP #2 3:66 [You know what, what is it call...] (262:262) (Super)
Codes:[WORSTEXPPD]
No memos

You know what, what it is called it something like convocation type thing that they have at the beginning of the year when they get all the teachers in the parish together and then they have this speaker

FOCUS GROUP #2 3:67 [One year they had a guy up the...] (266:266) (Super)
Codes:[WORSTEXPPD]
No memos

One year they had a guy up there telling us everything that we already knew and what we already had been doing. It was like we were in Education 101 class or something. It was a waste of time. I do not know where they find the speakers for these events, but Oh My God, they need to find better motivational speakers.

FOCUS GROUP #2 3:68 [This would be an excellent time...] (268:268) (Super)
Codes:[WORSTEXPPD]
No memos

This would be an excellent time to be a catch up day. Instead we have this big meeting coming up. We are all coming from being observed by whomever. We had two observations last week and I have two more observations this week. Mid terms are coming up and we have spring break the following week. We could make better use of the time.

FOCUS GROUP #2 3:70 [Once a month we met in Belle C...] (280:280) (Super)
Codes:[MANDATORPD]
No memos

Once a month we met in Belle Chasse for the district PLC and they would give us our unit test scores and we were not allowed to see the kids' tests, we were only given the scores.

FOCUS GROUP #2 3:71 [As a teacher, if I cannot see...] (284:284) (Super)
Codes:[NOTCHRINPUT]
No memos

As a teacher, if I cannot see what my kids are doing wrong then how am I going to correct it? They would not even trust us with the test …. give it back to us to look at them and see where our students are making mistakes. To me it was a waste of time, because in the third grade it ended up with everybody just complaining about the format of the test and the scores that they were getting back. Because there was no other feedback, it just ended up being kind of like a waste of time. To drive all the way to Belle Chasse and back was pointless.

FOCUS GROUP #2 3:73 [For me, it has to be interesting...] (296:296) (Super)
Codes:[IDEALPD]
No memos

For me, it has to be interesting enough, because I am not one that can keep still too long and do stuff that is not interesting.

FOCUS GROUP #2 3:74 [My advice would be to pick the...] (300:300) (Super)
Codes:[IDEALPD]

No memos

My advice would be to pick the program that you know you will use immediately in a classroom. Pick the one that will be the most effective for you to use in the classroom.

FOCUS GROUP #2 3:75 [Think about yourself and think...] (302:302) (Super)
Codes:[IDEALPD]
No memos

Think about yourself and think about what is going to make you grow…. something that is going to make you a better teacher. I does not necessarily it have to be instructional or what you can use in a classroom, it could be something that will just help you.

FOCUS GROUP #2 3:76 [I was thinking more as content...] (308:308) (Super)
Codes:[IDEALPD]
No memos

I was thinking more as content area something you would need to learn or really want to learn in the content area, but I think she is right about the other part of it as well the personal part of it.

FOCUS GROUP #2 3:79 [We talked about Touch Math and...] (318:318) (Super)
Codes:[LACKTCHRINPUT]
No memos

We talked about Touch Math and I noticed that when I talked to the administration about it, it was not a priority. I did research on Touch Math just from our conversation and I would love for that to be one of the strategies that we use for math in second grade. So far as our input, we may feel more effective for our kids because we are in there and we have some level of understanding of the kids problems.

FOCUS GROUP #2 3:81 [They do kind of give it to you...] (318:318) (Super)
Codes:[LACKTCHRINPUT]
No memos

They do kind of give it to you and say here is what you are supposed to do. You can modify it to use it in the classroom. If you modify them, tell me that you modified them and how you modified them and why you modified them. (laughter)

FOCUS GROUP #2 3:82 [One is that the kids use all p...] (322:322) (Super)
No codes
No memos

One is that the kids use all parts of their body to add and subtract. It is a common thread throughout the school. (Laughter) By the time they get to fifth and sixth grade, they still do not know their addition and subtraction facts and every year it seems like you start the school year out spending 3 weeks re-teaching addition and subtraction and regrouping.

FOCUS GROUP #2 3:83 [I have spoken to our curriculum...] (322:322) (Super)
Codes:[LACKTCHRINPUT]
No memos

I have spoken to our curriculum coordinator and he kind of just brushed it off a little bit. He said he had heard of it and that is as far as it went.

FOCUS GROUP #2 3:85 [That is the same thing like ...] (326:326) (Super)
No codes
No memos

That is the same thing like with the LaSIP. We came back with the brand new idea about the St. Tammany website. Remember when they showed us the lesson plans and we felt this is great. All the teachers got together and planned. That made it easier, because they had all the resources, pretest, posttest, power points everything for that one lesson...

FOCUS GROUP #2 3:86 [We told the administrators about...] (326:326) (Super)
Codes:[LACKTCHRINPUT]
No memos

We told the administrators about it. Do you remember how they were? Oh. That was so amazing to us.

FOCUS GROUP #2 3:87 [That is the same thing like ...] (326:326) (Super)
Codes:[LACKTCHRINPUT]
No memos

That is the same thing like with the LaSIP. We came back with the brand new idea about the St. Tammany website. Remember when they showed us the lesson plans and we felt this is great.

FOCUS GROUP #2 3:88 [So the things that ignite us a...] (328:328) (Super)
Codes:[LACKTCHRINPUT]
No memos

So the things that ignite us and excite us we tell them and it does ring a bell sometimes and but most of the time it falls on deaf ears.

P 3: FOCUS GROUP 2.doc - 3:89 [es, especially with math and s...] (332:332) (Super)
Codes:[LACKTCHRINPUT]
No memos

especially with math and science, because the focus of the school is on reading comprehension.

P 3: FOCUS GROUP 2.doc - 3:90 [It not like you give a check f...] (336:336) (Super)
Codes:[NOADMSUP] No memos
It not like you give a check for a stipend to go to educators and I am there every Saturday, but it is like oh well forget the tax and forget you getting tuition reimbursement. You find that out on your own.

Appendix J.

Statements of Informed Consent: Committee for the Protection of Human Subjects in Research

THE UNIVERSITY of NEW ORLEANS

Department of Curriculum and Instruction
(504) 280- 6607
(504) 280-1120 Fax

1. Personal Interview Consent Form

1. **Title of Research Study**
   "A Mixed-Methods Inquiry Into Science Teachers' Perceptions of the Effects of Professional Development Experiences on Implementation of Research-Based Instructional Strategies"

2. **Project Co-Director**
   Norma D. Felton, Distinguished Educator, Louisiana Department of Education and Graduate Student….School of Education….Department of Curriculum and Instruction… *University of New Orleans, 2000 Lakeshore Drive, New Orleans, Louisiana 70148-2030. Telephone: (504) 280-6607.This research project is in partial fulfillment of Doctor of Philosophy requirements in the College of Education and Department of Curriculum and Instruction under the supervision of Dr. Yvelyne McCarthy University of New Orleans, 2000 Lakeshore Drive, New Orleans, Louisiana 70148-2030. Telephone: (504) 280-6607.*

3. **Purpose of this Research Study**
   The purpose of this research is to study teacher perceptions of factors which influence transfer of formal professional development experiences into classroom practice.

4. **Procedures for this Research Study**
   In this part of the study, you will be involved in a **30-minute interview**. The project director will serve as interviewer for the session. The discussion will be audio taped. You are free to choose which questions to respond to and which topics to discuss. You may refuse to answer any questions raised in the interview and you may terminate the interview at any time.

5. **Potential risks or discomforts**
   Recalling unpleasant experiences may cause slight emotional distress for some participants. It is also possible that fatigue may set in toward the end of the interview. Please remember that all aspects of your participation in this study are voluntary. If you desire to discuss the possibility of the aforementioned discomforts occurring or any others you think you may experience, please feel free to call the project director at the number listed in number 2 of this form.

6. Potential Benefits to You or Others

Many teachers participate in professional development activities throughout their professional careers. Some teachers are highly successful in transferring these experiences into effective classroom practices. Yet, many teachers exposed to the same activities are not successful in transferring these experiences into practice. Your perceptions as to why this occurs can be very useful in shaping recommendations that can help professional developers plan and deliver more effective professional development programs for you and other in-service teachers.

7. Alternative Procedures

No alternative procedures are anticipated, but if unforeseen circumstances should arise, your continued participation is entirely voluntary. You may withdraw consent and terminate participation at any time without consequence.

8. Protection of Confidentiality

Your name and the name of your school will be kept confidential at all times. The interview tape will be transcribed by the Project Co-Director with identifying information deleted or disguised. The signed consent form, audio tape, interview transcript and any other material related to this project will be maintained in a secure and confidential manner by the Project Co-Director. If the results of this study are published, participants' names, schools and any other identifying information will not be used.

9. Signatures and Consent to Participate

I have been fully informed of the above described procedure with its possible benefits and risks and I have given my permission to participate in this study.

________________________ ________________________ __________

Signature of Participant Name of Participant (Print) Date

Norma D. Felton _Norma D. Felton_______________ __________

Signature of Project Co-DirectorName of Project Co-Director Date

THE UNIVERSITY of NEW ORLEANS

Department of Curriculum and Instruction
(504) 280- 6607
(504) 280-1120 Fax

2. Survey Participation Consent Form

1. **Title of Research Study**
   "A Mixed-Methods Inquiry Into Science Teachers' Perceptions of the Effects of Professional Development Experiences on Implementation of Research-Based Instructional Strategies"

2. **Project Co-Director**
   Norma D. Felton, Distinguished Educator, Louisiana Department of Education and Graduate Student….. School of Education…. Department of Curriculum and Instruction… University of New Orleans. Telephone: Day 225-280- 6607
   This research project is in partial fulfillment of Doctor of Philosophy requirements in the College of Education and Department of Curriculum and Instruction under the supervision Dr. Yvelyne McCarthy University of New Orleans, 2000 Lakeshore Drive, New Orleans, Louisiana 70148-2030. Telephone: (504) 280-6607.

3. **Purpose of this Research Study**
   The purpose of this research is to study teacher perceptions of factors which influence transfer of formal professional development experiences into classroom practice.

4. **Procedures for the Survey**
   Your participation in the survey is strictly voluntary. The individual surveys will be analyzed and the data compiled as part of the study. You are free to choose which questions to answer and which topics to discuss. Your participation and completion of the survey is appreciated and needed for the success of this research study. You can end your participation in the survey at any time or simply return the partially completed survey form.

5. **Potential risks or discomforts**
   Recalling unpleasant experiences may cause slight emotional distress for some participants. It is also possible that fatigue may set in toward the end of the survey. Please remember that all aspects of your participation in this study are voluntary. If you desire to discuss the possibility of the aforementioned discomforts occurring or any others you think you may experience, please feel free to call the project director at the number listed in number 2 of this form.

6. **Potential Benefits to You or Others**
Many teachers participate in professional development activities throughout their professional careers. Some teachers are highly successful in transferring these experiences into effective classroom practices. Yet, many teachers exposed to the same activities are not successful in transferring these experiences into practice. Your perceptions as to why this occurs can be very useful in shaping recommendations that can help professional developers plan and deliver more effective professional development programs for you and other in-service teachers.

7. **Alternative Procedures**
No alternative procedures are anticipated, but if unforeseen circumstances should arise, your continued participation is entirely voluntary. You may withdraw consent and terminate participation at any time without consequence.

8. **Protection of Confidentiality**
The names of all participants and the names of their respective schools will be kept confidential at all times. The signed consent forms, and any other materials related to this project will be maintained in a secure and confidential manner by the Project Director. If the results of this study are published, participants' names, schools and any other identifying information will not be used.

9. **Signatures and Consent to Participate**
I have been fully informed of the above described procedure with its possible benefits and risks, and I am willing to participate in this study as indicated by my signature below.

_______________________________ _______________________ _____________
Signature of Participant Name of Participant (Print) Date

Norma D. Felton _Norma D. Felton____________ _____________
Signature of Project Co-Director Name of Project Co-Director Date

THE UNIVERSITY of NEW ORLEANS

Department of Curriculum and Instruction
(504) 280- 6607
(504) 280-1120 Fax

3. Focus Group Consent Form

1. **Title of Research Study**
   "A Mixed-Methods Inquiry Into Science Teachers' Perceptions of the Effects of Professional Development Experiences on Implementation of Research-Based Instructional Strategies"

2. **Project Co-Director**
   Norma D. Felton, Distinguished Educator, Louisiana Department of Education and Graduate Student….. School of Education…. Department of Curriculum and Instruction… University of New Orleans. Telephone: (504) 280-6607
   This research project is in partial fulfillment of Doctor of Philosophy requirements in the College of Education and Department of Curriculum and Instruction under the supervision Dr. Yvelyne McCarthy University of New Orleans, 2000 Lakeshore Drive, New Orleans, Louisiana 70148-2030. Telephone: (504) 280-6607.

3. **Purpose of this Research Study**
   The purpose of this research is to study teacher perceptions of factors which influence transfer of formal professional development experiences into classroom practice.

4. **Procedures for this Research Study**
   Your participation in the Focus Group discussion is strictly voluntary. During the discussion you will interact with 4-5 other participants. These group sessions will be audio taped for transcription at a later date. You are free to choose which topics to discuss and in which activities to participate. You may refuse to answer any questions raised during the focus group session and can end participation at any time.

5. **Potential risks or discomforts**
   Recalling unpleasant experiences may cause slight emotional distress for some participants. It is also possible that fatigue may set in toward the end of the interview or focus group discussion. Please remember that all aspects of your participation in this study are voluntary. If you desire to discuss the possibility of the aforementioned discomforts occurring or any others you think you may experience, please feel free to call the project director at the number listed in number 2 of this form.

6. **Potential Benefits to You or Others**

Many teachers participate in professional development activities throughout their professional careers. Some teachers are highly successful in transferring these experiences into effective classroom practices. Yet, many teachers exposed to the same activities are not successful in transferring these experiences into practice. Your perceptions as to why this occurs can be very useful in shaping recommendations that can help professional developers plan and deliver more effective professional development programs for you and other in-service teachers.

7. Alternative Procedures

No alternative procedures are anticipated, but if unforeseen circumstances should arise, your continued participation is entirely voluntary. You may withdraw consent and terminate participation at any time without consequence.

8. **Protection of Confidentiality**

The names of all participants and the names of their respective schools will be kept confidential at all times. The interview tapes will be transcribed with identifying information deleted or disguised. The signed consent forms, audio tapes, observation transcripts and any other materials related to this project will be maintained in a secure and confidential manner by the Project Co-Director. If the results of this study are published, participants' names, schools and any other identifying information will not be used.

9. **Signatures and Consent to Participate**

I have been fully informed of the above described procedure with its possible benefits and risks, and I have given my permission to participate in this study.

______________________________ ______________________________

Signature of Participant Name of Participant (Print) Date

Norma D. Felton _______Norma D. Felton_________ ____________

Signature of Project Co-Director Name of Project Co-Director Date

4.

University Committee for the Protection

of Human Subjects in Research

University of New Orleans

Campus Correspondence

Norma Felton
Yvelyne McCarthy

3/29/2014

RE: Teachers' perceptions of factors that influence levels of classroom implementation of formal professional development experiences

IRB#: 11ap04

The IRB has deemed that the proposed research project is now in compliance with current University of New Orleans and Federal regulations.

Be advised that approval is only valid for one year from the approval date. Any changes to the procedures or protocols must be reviewed and approved by the IRB prior to implementation. Use the IRB# listed on the first page of this letter in all future correspondence regarding this proposal.

If an adverse, unforeseen event occurs (e.g., physical, social, or emotional harm), you are required to inform the IRB as soon as possible after the event.

Best of luck with your project!
Sincerely,

Laura Scaramella, Ph.D.
Chair, University Committee for the Protection of Human Subjects in Research

Appendix K

Doctoral Examination Approval Form

THE UNIVERSITY *of* NEW ORLEANS
GRADUATE SCHOOL

Name: Norma Davis Felton

Title of Manuscript: "A MIXED-METHODS INQUIRY INTO SCIENCE TEACHERS' PERCEPTIONS of the EFFECTS of PROFESSIONAL DEVELOPMENT EXPERIENCES on IMPLEMENTATION of RESEARCH-BASED INSTRUCTIONAL PRACTICES"

I release the aforementioned student's manuscript for review by the Dean of the Graduate School and verify the following:

I. I have read and approved this manuscript.
II. The research involved in this study conforms to the regulations of the Office of Research, the University Committee on Human Subjects or the University Committee on Animal Subjects.

Ivan Gill	Ivan Gill	November 22, 2014
Major Professor's Signature	Printed Name	Date Of Exam

I. I have read and approved this manuscript.

Yvelyne Germain-McCarthy	Yvelyne Germain-McCarthy
Committee Member's Signature	Printed Name
	Richard Speaker
Committee Member's Signature	Printed Name
Patricia Austin	Patricia Austin
Committee Member's Signature	Printed Name
Claire Thoreson / jpg	Claire Thoreson
Committee Member's Signature	Printed Name

Executive Director of the Graduate School	Donna Dickerson, Ph.D.

7/1/13

Vita

Norma Davis Felton obtained her B. S. in science education from Southern University in 1960 and a M.S. in General Science from Oregon State University in 1972. She received a degree in medical technology (M.T., ASCP) from LSU at Charity Hospital in 1974. She pursued further studies at the University of New Orleans earning a M. S. + 30 and enrolling in UNO's doctoral program while working full-time and raising four children. She received a Ph.D. in curriculum and instruction from the University of New Orleans in 2014.

Dr. Felton taught science for many years in the public schools of New Orleans. She was hired by the Louisiana Department of Education in the Distinguished Educator program in 2001. Distinguished Educators are chosen through a competitive process based on knowledge and experience to serve as "change agents" in low performing schools in the state of Louisiana.

She retired in 2006 with more than 30 years of experience. She was rehired a year later at the University of New Orleans to serve as LaSIP Site Coordinator, a position she had held previously at Tulane University and University of New Orleans for more than a decade.