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ACCEPTANCE

This dissertation, EXAMINING THE RELATIONSHIP BETWEEN PARTICIPATION IN CROSS CAREER LEARNING COMMUNITIES AND TEACHER RETENTION, by COMFORT YETUNDE AFOLABI, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

EXAMINING THE RELATIONSHIP BETWEEN PARTICIPATION IN CROSS CAREER LEARNING COMMUNITIES AND TEACHER RETENTION
by
Comfort Yetunde Afolabi

As teacher turnover and the demands for accountability and student achievement persist, the need to hire and retain quality teachers becomes increasingly vital. The purpose of this study was to determine if there was a relationship between participation in Cross Career Learning Communities (CCLC), a type of Professional Learning Community (PLC), and teacher retention in participating Network for Enhancing Teacher-Quality (NET-Q) schools in a southeastern state. One-to-one exact matching was used to match 251 teachers in CCLC groups to 251 control teachers on eight variables including both system and individual level variables. Results showed a ten percent significant difference between the retention percentages within the state public school systems favoring CCLC teachers, $\chi^2(1) = 21.17$, $N = 502$, $p < .05$, with a medium effect size of $h = .4$. For teachers participating in CCLCs, a secondary research question asked if there were any differences in teacher retention in schools that had mandatory participation versus those that had voluntary participation. No significant difference was found between participation types and teacher retention. Furthermore, no significant difference was found in the attrition rates between the novice and the veteran teachers participating in the CCLCs. Based on a question from the NET-Q survey, the percentage of teachers indicating that their participation in CCLCs positively influenced their decision to continue in teaching, estimated at 31%, was statistically significant. This study extends the research on one particular type of PLC to teacher retention. The findings of this study may aid school leaders in better understanding how they can

address and impact teacher retention in teaching and in their school buildings. Suggestions for future research and implications for policies addressing teacher support and retention are discussed.

EXAMINING THE RELATIONSHIP BETWEEN PARTICIPATION IN CROSS CAREER LEARNING COMMUNITIES AND TEACHER RETENTION

by
Comfort Yetunde Afolabi

A Dissertation

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in
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CHAPTER 1

INTRODUCTION

Widespread consensus exists among researchers, educators, policymakers, and other stakeholders that the quality of teachers is one of the most important school-related factors influencing student achievement (Darling-Hammond & Youngs, 2002; Education Week, 2011; Hattie, 2009; Marzano, 2003; Rice, 2003). Studies of "teacher effects" demonstrate a strong relationship between teaching and student achievement gains indicating that differential teacher effectiveness is a strong determinant of differences in student learning, far outweighing the effects of differences in class size and heterogeneity (Mendro, Jordan, Gomez, Anderson, & Bembry, 1998; Rivkin, Hanushek & Kain, 2005; Sanders & Rivers, 1996). Sanders and Rivers (1996) further note that students who are assigned to several ineffective teachers in consecutive years have significantly lower achievement and achievement gains than those who are assigned to several highly effective teachers in sequence.

In response to these findings, many policymakers have recognized the pressing need to place teachers at the core of the school improvement agenda. In the past two decades, the education literature and policy environment were replete with recommendations for reforming teacher preparation, improving teacher recruitment and retention, enhancing in-service professional development, and improving teacher quality. From reports in the 80's, such as the Carnegie Forum on Education and the Economy (1986) which focused primarily on the reform of teacher preparation programs, to the most recent federal education legislation, No Child Left Behind (NCLB) in 2001, prominent national efforts to reform education in the United States have emphasized the

importance of placing a highly qualified teacher in every classroom (Borman & Dowling, 2008). Ingersoll (2003) argues that the problem is that of keeping, not placing, qualified teachers in the classroom. He argues that teacher shortages are not the result of too few teachers being trained and recruited but are the result, to a significant extent, of a revolving door, where large numbers of teachers are departing from teaching long before their retirement. Ingersoll concluded that efforts were needed to reduce demand by increasing retention through better working conditions.

With up to 54% of the teaching force made up of Baby Boomers (persons reaching retirement age), the nation will face a school staffing tsunami if nothing is done to the overall design of teaching (National Commission for Teaching and America's Future (NCTAF, 2010). Novice teachers come and go at ever-increasing rates; the turnover among beginning teachers grows every year and increased 40% over the last 16 years (NCTAF, 2010). Keigher (2010) notes that up to 23% of public school teachers leave within their first five years of teaching, 14% migrating to other schools and 9% leaving the profession altogether. Some early research suggests that the teachers who quit are the ones with higher ability (Guarino, Santibanez, Daley, & Brewer, 2004). Research (e.g., Colbert & Wolf, 1992; Darling-Hammond, 2003; Ingersoll, 2001; National Education Association (NEA), 2003; NCTAF, 2010; Rivkin et al., 2005) also indicates that, nationally, about 50 percent of novice teachers with zero experience leave public education within five years of their employment. In Georgia, trend data show that about one-third (33%) of novice teachers and almost half (46%) of novice special education teachers leave within the first five years of teaching (Georgia Professional Standards Commission (GaPSC), 2011). Novice teachers enter the profession ready to take on

challenges and develop successful students. However, they need support and resources during their crucial first years of teaching. Theories and classroom ideas add excellent resource knowledge for new teachers, but many times it is the known practical skills and immediate understanding of how to handle a situation that can either make or break the new teacher's confidence in the classroom. Researchers indicate that teachers require several years to feel fully prepared (Darling-Hammond & Baratz-Snowden, 2007; Palmer, 2007). Specifically, it takes about three to five years of professional experience for a new teacher to demonstrate competence in the classroom (Darling-Hammond, 2007; Eraut, 1995). Others argue that completion of neither a traditional college teacher preparation program nor an alternative certification program adequately prepares new teachers for the challenges they face upon entering the classroom (Darling-Hammond & Baratz-Snowden, 2007; Feiman-Nemser, 2001, 2003). It is evident that teacher preparation should extend beyond the preparation teacher candidates receive in their teacher preparation program and continue even after they begin teaching. If teachers are to become the skilled professionals they need to be and if they are to remain in the field, there is a need for concerted effort and buy-in to expand and improve support programs and structures and to make them more universally available.

Some teacher attrition is inevitable. For instance, some teachers will leave the profession for personal or family reasons such as starting or expanding a family, or due to relocation because a spouse is changing jobs. However, the most common reason for turnover is job dissatisfaction, and the most frequently reported causes of job dissatisfaction both for migrating teachers and teachers who left the profession were low salaries, lack of support from the school administration and/or colleagues, and student

discipline problems (Ingersoll, 2001). Other reasons cited for which teachers leave the profession include, dissatisfaction with workplace conditions, lack of recognition, career factors, and school factors (Liu, Johnson, & Peske, 2004; NEA, 2003; Nweke, Stephens and Toth, 1999; Wiebke & Bardin, 2009).

Teacher attrition can, however, also result from teacher isolation and lack of collegial support. Lack of support for teachers and teacher isolation are perpetuated because teaching continues to remain a largely isolated profession, with few opportunities for teachers to learn together in the context of their work. Teachers spend about 93% of their official workday in isolation from their colleagues, and they spend more if one counts the hours of preparation and grading spent after school hours (MetLife, 2009; Shakrani, 2008). Consequently, teachers rarely have the opportunity to share their practice and reflect on what works or does not work with colleagues and other knowledgeable experts. The occupational norms of privacy that impede joint work and collaboration among teachers have been well documented (Hobson, 2001; Lieberman, 2000; Little, 1990; Lortie, 1975).

As a result of this isolation and lack of support, teachers, particularly novice teachers, often find themselves overwhelmed with no one and nowhere to turn. Tales abound of novice teachers who find themselves in their first year of teaching in a “sink or swim situation” where they have to survive their first few years of teaching. Studies of beginning teachers highlight that many feel “lost at sea” with few resources to help them survive (Berry, 2004; Kauffman, Johnson, Kardos, Liu, & Peske, 2002). New teachers often describe their work as solitary, with few opportunities to reflect on instruction, co-

teach, or plan lessons with colleagues (Johnson & Birkeland, 2003; Kardos & Johnson, 2007). The effect is that America's teaching force is in a constant churn.

Research has shown that teacher turnover is a significant problem affecting school performance and student achievement (Alliance for Excellent Education, 2005; Grissmer & Kirby, 1997; Ingersoll, 2001). This is because issues of teacher recruitment and retention are related to the issue of teacher quality. Teacher turnover affects student learning in several ways. First, in schools or school systems with high turnover, students may be more likely to have inexperienced teachers who tend to be less effective on average (Kane, Rockoff & Staiger, 2006; Liu et al., 2004; Rockoff, 2004; Rivkin et al., 2005). Second, high turnover creates instability in schools, thus making consistent instruction difficult to achieve. This instability may be more difficult in schools trying to implement new reforms, as novice teachers coming in each year are likely to repeat mistakes, rather than improve upon reform implementation. In addition to all these factors, turnover can reduce student learning if more effective teachers are the ones leaving as research suggests (Boyd, Grossman, Lankford, Loeb & Wyckoff, 2008).

The exit of teachers from the profession and the movement of teachers to better schools are costly phenomena for schools and school districts which must recruit, train, or induct teachers hired to replace those who leave. School districts spend money, which could otherwise be directed to improve teaching quality and student achievement, on hiring, replacing and training novice teachers. Researchers interested in the cost of teacher turnover estimate that turnover costs range from 25% to 200% of a leaver's annual salary (Nweke, Eads, Afolabi, Stephen & Toth, 2006). Turnover cost calculations often include the value, in dollar amounts, which are added to the leaver through

induction, in-service training, as well as the cost of hiring a replacement. The Texas teacher turnover project (2000) further noted that the cost of teacher turnover varies with teacher experience and the geographical location of the school district. Nweke et al., contend that the subject matter taught by the teacher who left will also add more variation to the cost of replacing that teacher. The Texas study cited "excessive teacher turnover as a cost to public education beyond the expense of operating schools and is a wasted expense that does not contribute to the education of Texas children" (p. 1). The National Commission on Teaching and America's Future (NCTAF), 2007) estimated that individual urban schools spend $70,000 a year on costs associated with teacher transfers whether the teachers leave the district or not, while nonurban schools spend $33,000 each year. In addition to these school-level costs, urban school districts are estimated to spend another $8,750 for every teacher who leaves the district entirely while nonurban districts spend $6,250. By combining these school and district level costs, NCTAF placed the national cost of recruiting, hiring, and retaining replacement teachers at over $7 billion a year.

It is, therefore, critical to monitor what happens to teachers after they enter the classroom and to develop strategies that may help keep both novice and veteran teachers in the classroom. It becomes vital that once teachers enter the classroom, school districts must provide the support systems that are needed to develop and sustain these teachers in the classroom through high-quality professional development and opportunities for collaboration among teachers. Comprehensive induction has been shown to be effective at keeping good teachers in the classroom (Alliance for Excellent Education, 2005) and as Huling-Austin (1986) noted, the assistance and support provided to candidates during

their induction years critically contribute and directly influence the short and long term retention of these novice teachers.

A system of induction should include a network of supports, people, resources, and processes that are all focused on insuring that novice teachers become effective in their work. NCTAF (2007) further noted that an induction system is both a phase (i.e., a set period of time) and a network of relationships and supports with well defined roles, activities, and outcomes. Research shows that novice teacher turnover rates can be reduced through comprehensive induction, a combination of high-quality mentoring, professional development and support, scheduled interaction with other teachers in the school and in the larger community, and formal formative assessments for novice teachers during their first two years of teaching (Guarino, Santibañez, & Daley, 2006; Smith & Ingersoll, 2004). Increasing support for teachers includes: reference to standards of best practice, enhancing teacher voice and power, and remaking teacher roles to be more collegial. These elements may help address teacher isolation, attrition and improve retention. Research (Guarino et. al., 2006; Kardos & Johnson, 2007) further notes that mentoring and induction programs, particularly those related to collegial support, faculty cohesiveness, and a supportive school community were identified by new teachers as critical to their decision to remain in teaching. Hence, teachers were more likely to stay in schools with "integrated professional cultures" organized around collegial efforts rather than schools organized around veteran or novice oriented activities.

While there is agreement that teachers' professional learning is directly and persistently linked to educational improvement and teacher and school development (Bredeson & Scribner, 2000; Louis, Toole, & Hargreaves, 1999), too often teachers'

personal and professional learning are isolated from their practice. Officially sanctioned and supported learning opportunities are typically decided for the teachers, in externally mandated professional development workshops designed for all, not for any individual teacher (Darling-Hammond, Chung Wei, Andree, Richardson and Orphanos, 2009). While it is impossible or illogical to design and deliver professional development that is specific to individual teachers, membership in a professional learning community may be a means by which teachers can get the support needed to meet some specific needs. Bryk, Sebring, Allensworth, Luppescu and Easton (2009) note that one important investment in teacher quality is meaningful, well-designed, and well implemented professional development. They state that this is one of the five "essential supports" for schools, arguing that all schools need a professional community that focuses on continuous improvement and learning. Indeed, teacher quality is improved through continuous professional learning.

Professional development that has as its goal high levels of learning for all students and teachers requires a form of professional learning that is different from the workshop-driven approach. Rather than the sporadic workshops that teachers attend for professional development, professional development occurs among ongoing teams or groups that meet on a regular basis to discuss student work and find solutions to teachers' challenges. Hord & Hirsh (2008) note that the context most supportive of the learning of teachers is Professional Learning Communities (PLC). Darling-Hammond et al., (2009) note that collaborative approaches to professional learning can promote school change that extends beyond individual classrooms. When teachers in a school learn together, students in the school tend to benefit. They argue further that staff development that

improves the learning of all students organizes adults into learning communities whose goals are aligned with those of the school and district. These groups, commonly referred to as learning communities or communities of practice, operate with a commitment to the norms of improved student learning and continuous school improvement. Group members are engaged in practical ways of improving their teaching to improve student learning and advance academic achievement within their school district.

These types of sustained professional learning groups working together to provide continuous feedback and reinforcement to members may provide the support that teachers need. This will require collaboration among teachers to promote inclusive learning communities of educators who in turn will impact students and their learning. Although it could seem to be rigorous and time consuming, such learning communities may possibly provide the relevant strategies, organizational supports, and collegiality that ensure the career-long development of teachers. These communities have the potential to provide the support that teachers need not only to face the challenges of teaching, but also to influence students' learning and teachers' longevity in the teaching profession.

To improve practice across a school, teachers need to engage with colleagues to question, unlearn, and discard their current, rooted understandings of teaching, learning, and subject matter that do not support student achievement (Spillane & Louis, 2002). Numerous researchers (Crow, Hausman & Scribner, 2002; DuFour & Eaker, 1998; DuFour, Eaker, & DuFour, 2005; Fullan, 2001; Hord, 1997, 2003; Toole & Louis, 2002) argue that nurturing a culture that supports staff in becoming a professional learning community is the most promising avenue for sustained, substantial school improvement. Studies demonstrate that schools with strong professional learning communities produce

important outcomes for students and school professionals (Crow et al., 2002; Toole & Louis, 2002). A Professional Learning Community (PLC) is seen as a powerful staff development approach and potent strategy for school change and improvement (Hord, 1997, 2003). School improvement efforts require that, at the school level, staff work collaboratively to solve educational problems through the development of a robust community of learners who will to take responsibility for, and be committed to, achieving student outcomes (Blase & Blase, 2003). It has been noted that PLCs hold the best promise for sustaining school improvement efforts (Crow et al., 2002; DuFour & Eaker, 1998; DuFour, Eaker, & DuFour, 2005; Hord, 1997, 2003; Toole & Louis, 2002).

Problem Statement

The revolving door syndrome of teachers entering and leaving the teaching profession is a costly phenomenon. Teacher attrition affects student achievement and costs school districts an enormous amount of money to replace the teachers who leave. Some reasons for which teachers leave the profession are lack of support from administrators and other school personnel, school and student related factors, and isolation. Teacher isolation makes it difficult for teachers, especially novice teachers, to garner help or support from other teachers in their school building. Teacher professional development workshops also tend to be sporadic and are not targeted to specific teacher needs. There is evidence that professional learning communities are providing the collegial and collaborative work environment that teachers have been craving. If it is true that isolation is a factor in teacher attrition, it is expected that participation in such learning communities may help alleviate the problem of teacher isolation and lack of

support. This may in turn lead to reduced teacher attrition rates and thus improve the retention of teachers in the profession. I, therefore, propose that collegial connections as those created in professional learning communities are a means by which teachers can develop skills that may lead to effectiveness and foster a sense of belonging needed to promote long-term commitment to teaching.

Purpose and Significance of the Study

Georgia State University (GSU) was awarded two Professional Development School (PDS) grants through the United States Department of Education. One of which was the Network for Enhancing Teacher-Quality (NET-Q). As part of the NET-Q grant, Professional Learning Communities called Cross Career Learning Communities (CCLCs) were formed or reinforced in participating NET-Q schools. The word ‘reinforced’ is used because some of the schools in this NET-Q grant were also part of a previous PDS grant that also had a CCLC component. Consequently, some of the schools may have had exposure to CCLCs prior to the NET-Q grant.

CCLCs are school-based, small, learning communities dedicated to the collaborative analysis of teaching, learning, and assessment practices in the service of increased student achievement. CCLCs were specifically created to include educators across the teaching career spectrum. Consequently, they are composed of a purposeful mix of university and school faculty members and novice and experienced educators, thus creating a seamless transition from prospective to practicing [teachers] and providing needed support to beginning teachers through their first critical years (NET-Q, 2012). CCLCs operate as a support for the successful induction and retention of new

teachers and also as a vehicle for the delivery of the kind of continual, collaborative, and job-embedded professional development needed for both novice and veteran teachers. CCLCs are situated in high-need schools in districts in the state's metropolitan area and are designed to reduce the high rates of teacher turnover that typically occur there.

Various cohorts of CCLC facilitators were trained to lead and guide the discussions during the CCLC meetings utilizing the Critical Friends Group protocols developed by the National School Reform Faculty (www.nsrfharmony.org). The trained facilitators were then charged to form learning communities (CCLCs) in their schools with Georgia State University (GSU) beginning teachers, GSU student teachers, GSU faculty liaisons, mentor teachers and other experienced staff members. The suggested group membership was to be no more than 8-10 members, and the groups were expected to meet at least monthly for at least 1.5 hours. Facilitators selected appropriate protocols to guide discussions during the group meetings. The CCLCs provide both face-to-face and online support through reciprocal mentoring to all members of the community. The project is based on the hypothesis that CCLCs will improve teacher satisfaction due to improved support through learning communities and will consequently increase teacher retention and effectiveness (Black & Neel, 2007). CCLCs use three paradigms in their work: Critical Friends Group Protocols, the *Extended Georgia Framework for Accomplished Teaching*, and the Building Resources: Induction and Development for Georgia Educators (BRIDGE), available through the University of Georgia.

The primary purpose of this study is to examine how teachers' participation in CCLCs, a form of professional learning, relates to teacher retention. Specifically, the study will investigate whether participation is possibly associated with retention. In

addition, the study will investigate if type of participation, such as mandatory or voluntary participation, has a differential relationship with teacher retention. Participation in the CCLC is mandatory in some schools while voluntary in others; thus some schools have full participation while others have partial participation. The secondary purpose of the study is to examine some survey research questions which the participants of the CCLCs were asked regarding their longevity in the teaching profession.

This study is important for two reasons. First, published work on the impact of professional learning communities on teacher retention using statistical analysis is almost non-existent. This research contributes to scholarly knowledge in the area of professional learning communities, professional development and teacher collaboration and the role they play with regard to teacher retention. Second, this study helps inform the work that is being done through a Professional Development grant that was awarded by the United Department of Education (USDOE) to Georgia State University, in terms of the impact of the CCLCs in participating schools particularly with regard to CCLC group formation, levels and types of teacher participation and teacher retention. The study adds to the body of knowledge on PLCs and their relationship to teacher retention.

Research Questions

The following questions will guide the study:

1. Do teachers who participate in CCLCs remain in teaching at a higher rate than teachers who do not participate in CCLCs?
2. Is there a difference in teacher retention rate in schools where participation in CCLCs was mandated and those in which participation was voluntary?

3. Are there any differences in retention rates of novice teachers (zero to three years experience) and veteran teachers (greater than three years experience) in participating PDSs with CCLCs?
4. For teachers who intend to continue teaching, to what extent are their plans to continue in teaching the next school year influenced by participation in a CCLC?

The first three research questions were on behavioral data, while the last research question was based on teachers' perceptions.

Definition of Key Terms

Attrition – This refers to teachers leaving the teaching profession (Ingersoll, 2001).

Critical Friends Groups (CFGs) **–** "A professional learning community consisting of approximately eight to twelve educators who come together voluntarily, at least, once a month for about one to two hours. Group members are committed to improving their practice through collaborative learning" (National School Reform Faculty, 2007). Groups frequently choose from a repertoire of conversational protocols to structure their meetings.

Critical Friends Groups coach – An individual who has been trained by the National School Reform Faculty (NSRF) in order to facilitate the work of a CFG in their local school or district.

Cross Career Learning Communities **–** These are school-based, small learning communities dedicated to the collaborative analysis of teaching, learning, and assessment practices in the service of increased student achievement.

Mobility – This refers to teachers remaining in teaching, but moving to another school the following school year.

Novice teachers – Teachers in their first three years of teaching (zero to three years of teaching experience).

Participation types – There are two participation types referenced in the study:

a) Mandatory – Schools in which the school administrators makes participation in the CCLC compulsory for all teachers.

b) Voluntary – Schools in which teachers could choose to participate in the CCLC or not participate.

Professional development – "Those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (Guskey, 2000, p. 16). Professional development also helps educators develop the capacity to act or react in increasingly complex scenarios through increasingly effective means.

Professional Learning Community – A group of professionals (perhaps a school, a team of teachers, a study group, or a network) characterized by a clear mission, or set of goals for student learning; collaborative professional inquiry and experimentation aimed at continuous improvement towards meeting goals; and a sense of collective responsibility for achieving those goals (Conzemius & O'Neill, 2001; Dufour & Eaker, 1998).

Protocol – "A protocol consists of agreed upon guidelines for a conversation. This type of structure permits very focused conversations to occur. Groups use protocols

for examining student and adult work, giving and receiving feedback, solving problems or dilemmas, observing classrooms or peers, to push thinking on a given issue and to structure a discussion around a text" (National School Reform Faculty, 2007).

Retention – This refers to teachers remaining in public school teaching in the state from one school year to the next.

Veteran teachers – Teachers who have been teaching for more than three years.

Summary

The retention of quality and effective teachers is critical to school performance and student achievement. While some teacher attrition is inevitable, some reasons cited by teachers for leaving the profession such as isolation and lack of support can be better managed. PLCs provide an avenue where teachers can collaboratively work together to solve educational issues through the development of communities of learners. CCLCs, a type of PLC, were developed in PDS participating high-need schools through a NET-Q grant to acts as a support for the successful induction and retention of new teachers and also as a vehicle for the delivery of the kind of continual, collaborative, and job-embedded professional development needed by these teachers. CCLCs are structured in a similar form to the Critical Friends Group, but with some significant enhancements. These enhancements will be further discussed in Chapter two.

This study examines how teachers' participation in CCLCs relates to teacher attrition through statistical analyses using a statewide database. In Chapter three, the various datasets used to investigate the research questions will be described in detail.

CHAPTER 2

REVIEW OF LITERATURE

Attention to professional development with a focus on context and school culture is at the heart of school reform that focuses on building capacity. The No Child Left Behind Act of 2001 (NCLB) addresses in its legislation the key issues of student achievement, school accountability, and school reform (Hanson, Burton, & Guam, 2006). Specifically, it addresses the improvement of student achievement through quality initiatives such as (a) developing school reform models, (b) engaging teachers and school leaders in the reform effort, and (c) promoting capacity building through on-going professional development (NCLB, 2001). This type of reform moves professional development beyond merely supporting the acquisition of new knowledge and skills. It makes teachers rethink and reinvent their practice as noted by Darling-Hammond & McLaughlin, (1995). Professional Learning Communities (PLCs) can provide substantial benefits as a school improvement approach (Fullan, 2001; Hord, 1997; Senge, Cambron-McCabe, Lucas, Smith, Dulton, & Kleiner, 2000) and have received broad support as an ascendant trend in educational policy and practice (Hargreaves, 2007).

Hence, professional learning communities (PLCs) have been ushered to the forefront of educational reform efforts as enablers for schools to address the challenges of increasing student achievement (Fullan, 2001; Hord, 1997; McLaughlin & Talbert, 2001; Senge et al., 2000). Schmoker (2006) stated, “Professional learning communities have emerged as arguably the best, most agreed-upon means by which to continuously improve instruction and student performance” (p. 106). Consequently, there is an increasing use of embedded, and in some cases mandated collaborative work and

collaborative professional development for teachers. Explicitly, the professional learning community model formalizes these collaborative efforts, and embeds them in the school day as a regular component of teachers' work. Collaborative efforts encourage teachers to become active and conscientious learners, based on the belief that public education must respond to and prepare students for a complex and rapidly evolving world (Cibulka & Nakayama, 2000; Fulton & Britton, 2011; Hargreaves, 2003).

PLCs are distinguished by their emphasis on group or collective learning. They are increasingly seen as an effective channel for teacher learning and professional development. There are several studies pointing out the positive impact of membership in a PLC on member-teachers' personal and professional growth (Cochran-Smith & Lytle, 1999; Grossman, Wineburg, & Woolworth, 2001; Lieberman & Grolnick, 1997; Lieberman, 2000; Little, 2002; Vescio, Ross, & Adams, 2008). The premise of this school reform effort is for the purpose of building professional capacity so as to address the dynamic challenges regarding student learning through ongoing collective professional learning (Eaker, DuFour, & DuFour, 2002). The desired effect of building capacity in the school setting is that the learning community can collectively address existing changes and demands regarding student achievement, teacher performance, and accountability (Hord, 1997). Numerous researchers (Crow et al., 2002; DuFour & Eaker, 1998; DuFour, Eaker, & DuFour, 2005; Hord, 1997, 2003; Toole & Louis, 2002) argued that nurturing a culture that supports staff members in becoming a PLC is the most promising avenue for sustained, substantial school improvement. This model of professional development requires a more fundamental change in the institutional structures that have governed schooling than has conventionally existed.

Teacher Professional Development

The National Commission on Teaching & America's Future (1997) in the report "National Commission on Teaching & America's Future," proposed a comprehensive set of recommendations that encompasses the entire continuum of teacher development. One of the recommendations was to reinvent teacher preparation and professional development by embedding professional development in teachers' daily work through joint planning, study groups, peer coaching, and research. Recently, literature on teacher professional development has shifted away from the traditional one day training seminar provided by a visiting expert. In its place, scholars suggest models of professional development that are ongoing, embedded in the daily work of teachers, grounded in teachers' own questions and goals, collaborative, and highly focused on improving student learning and achievement (Darling-Hammond, 2003; Sparks & Loucks-Horsley, 2003; Wilson & Berne, 1999).

Attention to professional development with a focus on context and school culture is at the heart of school reform that focuses on building capacity. High quality professional development is defined as having the characteristics of longevity, context specificity, teacher voice, collaboration, and follow-up (Darling-Hammond & McLaughlin, 1995; Lang & Fox, 2004; Lieberman, 1995; McLeskey & Waldron, 2002; Richardson, 2003). Hawley and Valli (1999) further note that effective professional development is an ongoing, job-embedded, and instruction-focused setting for teacher learning. Darling-Hammond and McLaughlin (1995) noted that effective professional development is "grounded in inquiry, reflection, and experimentation and are participant driven" (p. 597). These characteristics make professional development more

individualized because it is context-specific, teacher-driven and reflective. This form of professional development ultimately has the potential to promote teacher collaboration, make practice public, and positively impact student achievement as participants willingly share tacit knowledge and expertise as well as assume or exhibit a critical inquiry stance (Wood, 2007). Professional development schools, unique and intense school–university collaborations, exemplify this type of teacher professional that is context-specific, job-embedded and enquiry driven.

Professional development schools. Professional development schools (PDS) initiatives are among the most significant education reform movements of the 20th century. Grounded in the visions of renowned educators, such as John Dewey (1929), Ernest Boyer (1983), and John Goodlad (1988), PDS models give rise to innovative ways of thinking about how we educate the highly qualified teacher in the context of inquiry-driven practice (Shroyer, Yahnke, & Heller, 2007). The concept of a PDS dates back to the early 1900s when John Dewey (as cited in Archambaut, 1974) proposed and initiated several laboratory schools that were administered jointly by schools and colleges as sites for research as well as for preparing new teachers. The experimental schools reached their peak in the 1960s without having fulfilled their mission. In the 1980s, with school reformers clamoring for change, PDS emerged as the innovation that could effectively support teacher and student learning (Trachtman, 2007).

PDS are innovative institutions formed through partnership between college education programs and public schools (Goodlad, 1988; Holmes Group, 1995; National Council for Accreditation of Teacher Education (NCATE), 2012), and create bridges

between higher education institutions and the public schools (Levine & Trachtman, 2005). Centering on student needs, university and school faculty form partnerships to impact teachers in a real-world setting. This strategic alliance provides the appropriate context for rethinking and reinventing public schools so they become (a) dynamic sites for developing and sustaining best educational practices, (b) contributors in the preparation of preservice teachers and in the induction of individuals into the teaching profession, (c) providers of opportunities for continued development of practicing professionals, and (d) conductors of research and inquiry (Abdul-Haqq, 1998).

Blending expertise and resources through redesign and restructuring to support their complex mission, PDS partners agree to be intentional and transparent in meeting the needs of a diverse body of students through their focus on building learning communities (Doolittle, Sudeck & Rattigan, 2008). The mission of PDS is the professional preparation of candidates, faculty development, and inquiry directed at the improvement of practice and enhanced student learning. PDSs were designed to accomplish a four-fold agenda: (a) prepare future educators, provide current educators with ongoing professional development, (b) encourage joint school–university faculty investigation of education-related issues, and (c) promote the learning of P–12 students (National Association for Professional Development Schools (NAPDS), 2008). The potential impact of PDS is related to one of its unique features: it is an institution positioned strategically at the intersection of teacher education and school reform (Trachtman, 2007). The PDS model has given rise to innovative ways of thinking about how to educate teachers in the context of inquiry-driven practice. In the late 1990s and early 2000s, the National Council for Accreditation of Teacher Education (NCATE)

further gave credence to the significance of PDS by publishing the NCATE PDS Standards. The standards and assessment process reflected the elements that were vital and valued in the culture of PDS partnerships, such as inquiry, collaboration, equality, and public practice. These PDS components were developed by the NCATE simultaneously and aligned with each other so that practitioners would have a coherent system for supporting institutional growth and assuring internal and external accountability (Levine & Trachtman, 2005).

To facilitate and study the organization and impact of PDS, the United States Department of Education (USDOE) awards grants to colleges and school districts for improving education. The purposes of the NET-Q project are to increase the quality and number of highly qualified teachers who are committed to teaching in high-needs schools. Three of the key programmatic foci of the NET-Q project are the following: (a) enhancing pre-baccalaureate teacher preparation programs, (b) enhancing post-baccalaureate teacher preparation programs, and (c) creating teacher residencies for post-baccalaureate candidates. These initiatives would be achieved by a comprehensive induction/mentor program, enhanced professional development school partnerships, revision of undergraduate teacher preparation programs for elementary school, and the development of faculty knowledge.

As part of the Georgia State University NET-Q project, PLCs were created in some participating schools. Professional learning communities are commended for facilitating intellectual renewal for teachers, improving teaching practices, enhancing student learning, creating stronger teacher efficacy and morale, the development of

teacher leadership, and school reform (Conzemius & O'Neill, 2001; Little, 1990, 2002; Grossman et al., 2001).

Professional learning communities (PLCs). One model for restructuring schools and building capacity that has gained recent popularity is that of reorganizing schools into Professional Learning Communities (PLCs) (Bolam, McMahon, Stoll, Thomas & Wallace, 2005; Ballock, 2007). Hord (1997, 2003) noted that the concept of learning communities is rooted in the work of organizational theorists like Peter Senge (1990). Senge (1990) articulated a view of the workplace as a learning organization and introduced the term "learning organizations" in his book The Fifth Discipline. This framework of learning made sense to members of the education community seeking to reform school in the aftermath of the landmark report A Nation at Risk (National Commission on Excellence in Education, 1983). In response to the interest expressed by educators on learning organizations, Senge et al., (2000) wrote "Schools that Learn: A Fifth Discipline Fieldbook for Educators, Parents, and Everyone Who Cares About Education." In this book, issues specifically germane to school organizations were addressed while continuing to promote the underlying premise of "learning organizations" (Senge, 1990). As schools became engaged in building collaborative work cultures, the term learning organizations came to be referred to as Professional Learning Communities in schools (Dufour & Eaker, 1998). Also referred to as communities of practice (Wenger, 1998), these communities are "groups of people who share a concern, a set of problems, or passion about a topic, who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p.

4). As an organizational arrangement, the PLC is seen as a powerful staff development approach, a potent strategy for school change and improvement (Hord, 1997) and the context most supportive of the learning of professionals (Hord & Hirsh, 2008).

Although there is no universally-accepted definition of a PLC, (Stoll, Bolam, McMahon, Wallace & Thomas, 2006; Williams, Brien, Sprague, & Sullivan, 2008), several researchers have offered various definitions. DuFour (2004) stated that a PLC is a "systematic process in which teachers work together to analyze and improve their classroom practice" (p. 8). Hord (1997) described PLCs as ongoing processes through which teachers and administrators work collaboratively to seek and share learning and to act on their learning, their goal being to enhance their effectiveness as professionals for students' benefit. While Crow et al. (2002) described the concept of a PLC as being comprised of three concentric circles in which the innermost circle represents the relationships that exist between teachers and children, while the outermost ring signifies the relationships between staff and the community at large. The middle ring represents relations among the staff and mediates between the outside world and the inner workings of the classroom. Toole and Louis (2002) argued that the idea of a PLC integrates three mutually influencing concepts: (a) a school culture that emphasizes professionalism, which is client-oriented and knowledge-based; (b) one that emphasizes learning, placing high value on teachers' inquiry and reflection; and (c) one that is communitarian, emphasizing personal connections. This description of a PLC by Toole and Louis (2002) identified the significance of the interactions of the social relationships within a professional learning community.

According to Dufour and Eaker (1998),

> Each word of the phrase "professional learning community" has been chosen purposefully. A "professional" is someone with expertise in a specialized field, an individual who has not only pursued advanced training to enter the field, but who is also expected to remain current in its evolving knowledge base … "Learning" suggests ongoing action and perpetual curiosity … The school that operates as a professional *learning* community recognizes that its members must engage in ongoing study and constant practice that characterize an organization committed to continuous improvement … In a professional learning *community*, educators create an environment that fosters mutual cooperation, emotional support, personal growth as they work together to achieve what they cannot accomplish alone. (pp. xi-xii)

However defined, a PLC can be seen as an avenue that fosters the kinds of adult relationships that can support individual change in classrooms across a whole school (Spillane & Louis, 2002). While there are varied descriptions or definitions of a PLC, there is a general consensus that PLCs involve groups of educators sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth-promoting way (Mid-continent Research for Education and Learning (McREL), 2003; Mitchell & Sackney, 2000; Toole & Loius, 2002) operating as a collective enterprise (King & Newmann, 2001), with a goal to impact student learning. The difficulty in finding a universal definition for PLCs is reflective in the variety of ways they are formed and what they are called. Schmoker (2006) indicated that PLCs have been labeled everything from "communities of practice" to "self-managing teams" (p. 106). What makes a PLC difficult to define is that it is not a prescription, a new program, a model, or an innovation to be implemented (Hord, 1997), rather, a PLC is an infrastructure or a way of working together that results in continuous school improvement, teacher development, and student learning. The PLC structure is one of continuous adult learning, strong collaboration, democratic participation, and consensus

about the school environment and culture and how to attain the desired environment and culture (Hord, 2007).

Translating the ideas of a learning organization from the business world to a learning community in education, Hord (1997) delineated a set of characteristics based on the work of Astuto, Clark, Read, McGree, and Fernandez (1993) who described the interactions of educators in a school where there was ongoing exchange around issues of teaching and learning to improve practice and student learning. The five components that characterize PLCs as outlined by Hord (1997, 2003) are: (a) supportive and shared leadership, sometimes called distributive leadership, in which teachers and administrators collaborate in decision making; (b) shared values and vision centering upon students' learning; (c) collective learning and application of learning, as teachers collaborate and learn from each other on a daily basis; (d) supportive conditions, as the school environment plays a role in community development; and (e) shared personal practice, as teachers discuss their teaching practices with specific students and any emerging challenges.

Little (1990), Kruse, Louis, and Bryk (1994), and McLaughlin and Talbert (2001) also cited many of the same characteristics referenced by Hord (2003) and Stoll et al. (2006) but they added reflective dialogue, de-privatization of practice, professional growth and mutual support and obligation as other important characteristics for developing PLCs focused on school improvement. DuFour (2004) identified three other characteristics to guide the work of PLCs. They were: (a) a focus on learning, (b) a culture of collaboration, and (c) a focus on results. Dufour's first two characteristics were similar to two other characteristics initially mentioned by Hord (2003), so the focus on

results was the other additional characteristic from Dufour (2004). Stoll et al. (2006) also identified three other characteristics of PLCs as significant: mutual trust, inclusive school-wide membership, and networks and partnerships that look beyond the school for sources of learning. Essentially, the list of defining characteristics of PLC continues to grow as more research studies are conducted on PLCs. The concept of shared practice reflects the importance of the "depritivitization of practice" and focus on collaboration (Newmann, 1994). This takes place as teachers constantly engage in discussions about how to solve problems they encounter in their teaching and with student learning.

A PLC is distinguished by three key elements: (a) a focus on learning, (b) professional collaboration, and (c) a focus on results. The process of analysis, reflection, and action is continual. Less successful teachers receive help and support from more successful team members. One teacher (from Northern California) in a PLC likens the supportive culture of collaboration in a PLC to a grove of giant sequoias. He notes,

> To someone standing at the foot of one of the massive organisms, peering upward toward its top, the fragility of the sequoia's shallow root structure may be hard to imagine. Growing in isolation, the giants are susceptible to winds and erosion. But when growing close to other sequoias in a grove, their roots intermingle, providing the entire group of trees with a strong, supportive foundation that helps them all endure the ravages of nature. Similarly, a lone teacher, however capable, may languish in isolation. The encouragement, expertise, and support of colleagues in the learning community create a team even more resilient than the strengths of its individual experts. (Garrett, 2010, p. 2)

In essence, PLCs reduce the sense of isolation that may sometimes develop in some teachers, increases mutual support amongst members as well as improves collegiality. PLCs also expose teachers to what they need to know, offering support and opportunities to learn from one another about how to provide the richest possible opportunities for student growth. Creating positive, collaborative, and lateral

relationships between teachers is important for increasing teacher retention. Supportive and professional relationships are important factors in creating an environment conducive to professional growth. Retaining high quality teachers is contingent upon creating an atmosphere that fosters professional growth and one that supports teachers.

As Cochran-Smith and Lytle (1999) pointed out, “working together in communities, both new and more experienced teachers pose problems, identify discrepancies between theories and practices, challenge common routines, draw on the work of others for generative frameworks, and attempt to make visible much of that which is taken for granted about teaching and learning” (p. 293). This concept presents an image of the teacher in a professional community as a lifelong learner, focusing upon collegial and career-long development (Hammerness et al., 2005).

Members of the PLC thoughtfully study multiple sources of student data to discover where students are performing well or areas where students struggle. Teachers assume a focus on a shared purpose, mutual regard and caring, and a resolve on integrity and truthfulness. Hord (2009) pointed out that PLCs employ a constructivist approach because they model the self-initiating learner working in concert with peers. Learning constructively requires an environment in which learners work collegially and is situated in authentic activities and contexts (Vygotsky, 1978). Hord (2009) noted further that the six principles of constructivism are closely connected to the concepts and dimensions of the professional learning community. These six dimensions as noted by Burns, Menchaca, and Dimock (2001) are:

1. Learners bring unique prior knowledge, experience, and beliefs to a learning situation.
2. Knowledge is constructed uniquely and individually, in multiple ways, through a variety of authentic tools, resources, experiences, and contexts.

3. Learning is both an active and reflective process.
4. Learning is a developmental process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models.
5. Social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning.
6. Learning is internally controlled and mediated by the learner. (pp. 2)

PLCs further encourage constructivism by providing the setting and the working relationships demanded of constructivist learning. Lambert (2003) noted that professional development designs that attend to both teacher and student learning might use what can be referred to as the 'reciprocal processes of constructivist learning.' This refers to learning that is mutual and interactive, thereby investing in the growth of all participants (p. 22).

A key rationale for PLCs is that they provide for ongoing teacher learning (Cochran-Smith & Lytle, 1992; Darling-Hammond & Sykes, 1999; Lieberman & Grolnick, 1996; McLaughlin & Talbert, 2001; Nelson & Hammerman, 1996). Grossman et al. (2001), noted that a PLC must be concerned with its clientele. They argued that for a group of teachers to emerge as a PLC, the well-being of students must be central. Louis and Kruse (1995) and Hord (1997) maintained that, “a core characteristic of the PLC is an undeviating focus on student learning” (p. 9). McLaughlin and Talbert (2006) agreed that it is crucial that teachers examine students’ work to identify their strengths and weaknesses to ensure students’ success. According to this criterion, not all gatherings of teachers, even those in which teachers offer each other fellowship and support, constitute a professional learning community (p. 10). A PLC is more than simply a collection of teachers working together or a social network of educators who share stories, materials, and advice (Coburn & Russell, 2008; Protheroe, 2008). So more than simply providing a

sense of camaraderie, Dufour (2004) noted that the process of collaboration should be developed to impact professional practice and student learning. An effective professional learning community "has the capacity to promote and sustain the learning of all professionals in the school community with the collective purpose of enhancing pupil learning" (Bolam et al., 2005, p. 145).

The improvement of professional practice, which is the most common rationale for the formation of PLCs, is two sided. First, is the mastery of new pedagogical techniques and the second is the need for teachers' continuing intellectual development in the subject matters they teach (Darling-Hammond & Sykes, 1999). Thus, teachers are lifelong students of their subjects and must continue to grow in knowledge and keep up with changes in their disciplines. Teacher professional learning communities must, therefore, be equally concerned with both student and teacher learning.

The Annenberg Institute for School Reform (2004) noted that PLCs promote a commitment to improve both individual content knowledge and professional practice among community members. In an ideal learning community, teachers are engaged in deep levels of inquiry; they are primarily focused on students' learning, and are willing to devise strategies to assist struggling students. Most importantly, teachers work together to teach all students rather than relegating the responsibility for each student with a single teacher. Members of the community thoughtfully study a variety of student data to discover where students are performing well or not well. The staff collectively takes responsibility to learn new content, strategies or approaches to increase its effectiveness in teaching these problem areas (Hord, 2007). So not only is student work analyzed, the teachers' strategies are examined and necessary feedback is provided by group members.

The norm in the professional learning community is that a teacher's behavior is reviewed by colleagues (Louis & Kruse, 1995). This practice is similar to formative evaluation and is seen as "peers helping peers" process. Such review is conducted regularly by teachers who visit each other's classrooms to observe, script notes, and discuss observations with each other. The process is based on the desire for individual and community improvement and is enabled by the mutual respect and trustworthiness of staff members (Hord, 1997). In reality, this practice of reviewing and observing one another may serve as a form of formative evaluation that may help a teacher revise certain areas of their teaching.

Due to the collaborative nature of a PLC, knowledge is not viewed as an object or something that can be owned. Instead, knowledge and/or expertise "resides in the skills understanding and relationship of members as well as in the tools, documents, and processes that embody aspects of the knowledge [expertise]" (Wenger, McDermott, & Snyder, 2002, p. 11). Wenger (1998) argues that in order for collegial learning to occur within a PLC, there must be deliberate attention to both practice and the community itself. King and Newmann (2001) highlight the link between the individual and the collective saying:

> To be sure, high quality instruction depends upon the competence and attitudes of each individual teacher. But in addition, teachers' individual knowledge, skills and disposition must be put to use in an organized, collective enterprise. That is, social resources must be cultivated, and the desired vision for social resources within a school can be summarized as professional community. (p. 89)

Over the past twenty-five years, the educational literature has devoted considerable attention to the topic of PLCs. Across the country, school districts are adopting PLCs as a strategy to increase student achievement by creating a collaborative

school culture focused on learning. DuFour (2004) identified widespread interest in instituting PLCs among professional groups and organizations. Examples include: National Council of Teachers of Mathematics, National Council of Teachers of English, National Science Teachers Association, National Association of Secondary School Principals, National Association of Elementary School Principals, National Middle School Association, National Commission on Teaching and America's Future, National Board of Professional Teaching Standards, and the National Staff Development Council. The National Staff Development Council (2001) has included learning communities as one of the organization's standards for staff development suggesting that PLCs are recognized as a strategy for school improvement, specifically, professional development.

The overarching issues and initiatives that PLCs address include: student learning and effective teaching, promoting equity and high expectations, building leadership capacity, development of shared norms and values, data-based decision making, collaborative planning, and curriculum development (DuFour, 2004; Wells & Feun, 2007). Darling-Hammond (1994) explained that the PLC is an essential component of school improvement because it helps the school personnel stay cohesive and focused on teaching and learning issues. Feger and Arruda's (2008) in their review of the literature on PLCs described the characteristics and activities of PLCs but called for additional empirical research to help clarify the issue within the literature of whether or not to mandate PLCs at the school or district level.

Effects of PLCs on student learning. A key purpose of PLCs is to enhance teacher effectiveness as professionals, for students' ultimate benefit. PLC has emerged as a concept that can not only improve teacher learning, but also could make a difference in

student learning and achievement (Annenberg Institute for School Reform, 2004; Little, 2002; Louis, 2006; Louis and Marks, 1998). Studies have demonstrated that schools with strong professional learning communities produced important outcomes for students and school professionals (Crow et al., 2002; Toole & Louis, 2002). Bolam et al., (2005) noted that an effective learning community has the capacity to promote and sustain the learning of all professionals in the school community with the collective purpose of enhancing pupil learning (p. 145).

Lee and Smith (1996) found in a longitudinal follow-up study of 820 high schools and about 9,904 teachers that achievement gains for eighth and tenth grade students (in mathematics, reading, science and social studies) were significantly higher in schools where teachers took collective responsibility for students' academic success or failure (a characteristic of PLCs). The teachers engaged students in high intellectual learning tasks, and students achieved greater academic gains in math, science, history and reading than students in traditionally organized schools. They also found that the achievement gaps between students from different backgrounds were smaller in these schools, students learned more, and, in the smaller high schools, learning was distributed more equitably. Demographic characteristics of the students such as socio-economic status were, however, confounding variables in this study. The authors found that collective responsibility is associated with less internal stratification in the outcomes (student achievement) by social class. Hence schools where most teachers took more responsibility for learning were environments that were more equitable.

Goddard, Goddard, Tschannen-Moran (2007) in their study that utilized Hierarchical linear modeling (HLM) analyses found that fourth grade students in their

study had higher achievement in mathematics and reading when they attended schools characterized by higher levels of teacher collaboration for school improvement. They argued that when teachers collaborate, they share experiences and knowledge that can promote learning for instructional improvement. Such learning, Goddard et al. (2007) noted, can help teachers solve educational problems, which in turn has the potential to benefit students academically. Results of this study indicated that teacher collaboration was associated with increased levels of student achievement. The study, however, focused on schools in just one district; hence there was no possibility for uncontrolled between-district effects. Saunders, Goldenberg and Gallimore (2009), in their quasi-experimental study, examined the impact of PLCs on student achievement and teacher instruction. They found significant gains in student achievement and improved teacher instruction after nine schools converted routine meetings into professional learning teams guided by explicit protocols that encouraged initiative.

Louis and Marks (1998) found that students achieved at higher levels in schools with PLCs. This was explained by teachers in classrooms focusing on authentic pedagogy, higher quality thinking, substantive conversations, deep knowledge, setting higher expectations for student achievement, and connecting with the world beyond the classroom. Hollins, McIntyre, DeBose, Hollins and Towner (2004) also reported improvement in achievement of students in their study. Their study involved both qualitative and quantitative data collection methods, which enhanced the study because data from the qualitative were used to support findings from the quantitative data analysis. Hollins et al. (2004) reported that achievement for second and third grade struggling African American students increased significantly more than for those of

comparable students within the same district. Specifically, they reported that in 1998, 45% of second graders [at the target school] scored above the 25th percentile compared to 64% in 1999, and 73% in 2000; an overall gain of 28%. District-wide, 48% of second graders scored above the 25th percentile in 1998, 61% in 1999 and 56% in 2000, an overall gain of 12%. Similar gains were also reported for third graders at the target school. In addition, the percentage of students moving into the 50th percentile or higher in target schools exceeded district gains at both grade levels. In addition, Hollins et al. (2004) found that the conversations among the teachers at the study-group meetings changed to being more positive about the children, to facilitate communication, planning and better understanding of the teaching and learning process for urban children in a low-performing school. This in turn helped improve student achievement.

Supovitz and Christman (2003) reported significant gains in student learning in both of their research sites, Cincinnati and Philadelphia. They noted, “there was evidence to suggest that those communities that did engage in structured, sustained and supported instructional discussions and that investigated the relationships between instructional practices and student work produce significant gains in student learning” (p. 5). Specifically, in Philadelphia, there were test score gains in elementary schools throughout the district from 1996-2000. Although these gains were generally attributed to the district’s literacy initiative in the primary grades, the embedded learning communities offered a supportive environment for teachers to learn about the new materials and practices associated with the district’s literacy initiative. Hughes and Kritsonis (2007) selected a sample of schools from a database of schools with staff who had attended PLC workshops and that were implementing PLCs. They noted that during a three-year period,

the majority (90.6%) of the schools reported an increase in standardized math scores; 81.3 percent reported an increase in English/language arts scores between 5 points and 26 points.

Strahan (2003) in his in-depth case study research conducted focus group interviews with administrators, teachers, parents, and support personnel to examine the role of a collaborative professional culture on instructional improvement. Following the focus groups, personal interviews were conducted with select teachers and administrators. The researcher further observed each of the interviewed teachers in two authentic situations: (a) teaching a lesson and (b) participating in a meeting with colleagues. After these observations, more interviews were conducted with the teachers. Archival records, including planning documents and minutes from grade-level team meetings were also gathered and used for triangulation in the study. His case studies of three elementary schools showed that during a five-year period, students from minority and low-income families improved their scores on state achievement tests from less than 50 percent proficient to 75 percent proficiency. He noted that working collaboratively in PLCs was a characteristic of all three schools. Several research endeavors have also further shown that PLCs have a positive impact on student performance and success (Beyond the Book, n.d.; Buffum & Hinman, 2006; Burnette, 2002; Hinman, 2007; Mid-continent Research for Education and Learning (McREL), 2003; Phillips, 2003; Rentfro, 2007; Vescio et al., 2008).

In general, researchers agree that there is a link between teachers' participation in PLCs and student achievement. Hord (1997) explained that the benefits for students include: (a) increased learning that is distributed more equitably in the smaller schools;

(b) larger academic gains in math, science, history, and reading than in traditional schools; (c) and smaller achievement gaps between students from different backgrounds; (d) decreased dropout rate; (e) fewer classes cut; and (f) lower rates of student absenteeism. Finally, the PLC literature at large that examines the relationship between student achievement and teachers' participation in PLCs is emergent rather than definitive (Vescio et al., 2008).

Effects of PLCs on teachers. Erb (1995) found that when teachers work together, they are not only less isolated, but they are also more focused on academic and behavioral outcomes for students than when they work alone. The 2009 Metlife Survey of the American Teacher reported that teachers who are very satisfied with their careers are more likely to work in schools with high levels of collaboration. The results were based on a national survey of 1,003 K-12 public school teachers, 500 K-12 public school principals and 1,018 public school students in grades 3-12 all across the United States. The survey results noted that teachers and principals reported that increased collaboration would have a direct effect on student success. Two-thirds of teachers (67%) and three-quarters (78%) agreed that greater collaboration among teachers and school leaders would have a major impact on improving student achievement. These results are, however, perceptions of school personnel and not actual results of occurrences. Briscoe and Peters (1997) documented that participants valued the chance to share successes and failures, receive encouragement and to reflect on their teaching, all of which were viewed as major departures from the typical practice of teaching in isolation. Webb, Vulliamy, Sarja, Hamalainen and Poikonen, (2009) pointed out that collaborative PLCs play an important role in promoting teacher motivation and welfare and are 'the key to

preventing teachers' burn-out' (Finland Ministry of Education, p. 3). They noted further that in both the English and Finnish schools they worked with, the collaborative and supportive culture with trusted colleagues was highly valued by the teachers. Webb et al. (2009) concluded that being able to share concerns and problems was vital to teacher morale and effectiveness and frequently referred to as a key factor in teacher retention.

Shachar and Shmuelevitz (1997) reported that higher levels of self-efficacy were associated with increased teacher collaboration, whether they were teachers with considerable or limited experience. A 27 item survey instrument was administered to 121 social studies' teachers of the seventh and eighth grades from nine junior high schools in the central district of Israel. Although these teachers comprised over 90% of the total number of social studies teachers in these schools and had a good distribution in terms of age, experience and certificate levels, all the study participants were female. This may have an impact on study findings. Teachers' sense of increased efficacy, an outcome supported by research on teacher collaboration, has been linked to improved student achievement (Englert, Tarrant & Rozendal, 1993; Goddard, Hoy & Woolfolk, 2000; Moore & Esselman, 1992).

Louis and Kruse (1995) found that in schools with a genuine sense of community an increased sense of work efficacy led to increased classroom motivation, work satisfaction, and greater collective responsibility for student learning. Waddell (2010) noted that close relationships with coworkers was one prevalent external influence on the teachers' job satisfaction in the urban schools she studied. Teachers spoke passionately about the relationships, support, and collaboration of fellow teachers, noting that their fellow teachers helped them experience a sense of belonging, ownership, and satisfaction

in their jobs, even when classroom challenges, district mandates and bureaucratic pressures were mounting. While, Berry, Daughtrey and Wieder (2009) found in their regression analysis on the Teachers Network Survey, that colleagues' support was the only school culture factor significantly associated with teachers' planned long-term retention. Teachers who planned to stay in the classroom for up to five years cited opportunities for professional learning or high standards among staff as most important. But colleagues' support was the only school culture factor significantly associated with teachers' planned long-term retention.

Andrews and Lewis (2007) found in their study in Australia that teachers involvement with a PLC, not only enhanced their knowledge base, but also, had a significant impact on their classroom work. They further reported that feedback from the teachers in a PLC provided evidence that there was a strong perception by the teachers that the authentic pedagogy focus in their PLC had strongly impacted their actions in the classrooms and had impacted students' learning experiences. Cochran-Smith and Lytle (1999) shared in their case studies of PLCs in schools around the country, tales of teachers empowered to work together to deepen understanding of their students' learning and how it can be improved. Each case study described the process of developing learning teams, overcoming obstacles, teachers redefining their roles and ultimately teaching to improve learning and student achievement through collaborative work. Research showed that teachers make changes in their practice as a result of participation in a PLC (Englert, Tarrant & Rozendal, 1993; Hollins et al., 2004; Strahan, 2003).

PLCs also produce a change in the professional climate of a school by creating a shift in the mindset that teachers bring to their daily work. Using several search terms,

Vescio et al., (2008) limited their review of the literature on PLCs to comprise only published articles or book chapters that included data about the impact of school-based PLCs on teaching practice and/or student learning. All 11 of the studies in their review cited empirical data suggesting a change in the professional culture of the school. Furthermore, a combination of qualitative and quantitative methods were used in the studies to support this finding. Intrinsic characteristics in PLCs that promote changes in teaching cultures include collaboration, a focus on student learning, teacher authority, and continuous teacher learning. Vescio, et al. (2008) also found evidence of changes in teaching practice in their review. Although, they noted that "few studies moved beyond self reports of positive impact" (p. 80), they reported that the teaching culture and collaboration improved among teachers, with teachers focusing more on student learning than prior to implementation of the PLCs. Furthermore, the six studies that included students' learning outcomes reported improved achievement scores over time, suggesting that PLCs can lead to system-wide change.

Talbert and McLaughlin (2002) argued that rather than hindering teachers from practicing their craft, PLCs provide the forum for these teachers to test and refine their theories in a supported environment. This happens as teachers take a more in-depth look at their teaching with the other teachers helping to refine and explore other methods of teaching a concept. A recent report on teacher and leader effectiveness (Darling-Hammond & Rothman, 2011) in three high performing education systems (Finland, Ontario, and Singapore) showed that all three countries provide considerable time for teachers to work collaboratively and learn together during the regular school schedule, as much as five times what U.S. teachers receive. This enabled teachers become both

individually and collectively more effective and helped ensure that highly effective teachers remain in schools. This buttressed the notion that the quality and effectiveness of teachers may have more to do with the extent to which teachers work with each other. Researchers have argued that the main reason American students do not perform as well as many of their international peers on achievement measures in math and science is because their teachers are not given the kinds of opportunities they need to learn from each other (Stigler & Hiebert, 2009). Darling-Hammond and Rothman (2011) further noted that teachers are most likely to leave the profession if they feel ineffective or unsupported, and that efforts to create opportunities for teachers to collaborate are critically important to avoiding the disruption and cost associated with teacher attrition.

Shernoff, Marínez-Lora, Frazier, Jakobsons and Atkins (2011) found that teacher satisfaction data in their study showed that the group format (i.e., group seminars and PLCs) reduced some of the isolation that teachers, especially newer teachers, experienced in their school. Furthermore, data suggested that PLCs and seminars helped novices become more socially integrated into the school milieu and kept them informed about existing school-wide practices. They noted that these findings support the critical role that social connections, peer collaboration, and a supportive school community plays in helping teachers cope with stressors, manage teaching demands, and grow professionally (Bryk & Schneider, 2002; Shernoff et al., 2011).

In a longitudinal study, Johnson and Birkeland (2003) tracked 50 first- and second-year teachers in Massachusetts. They identified three types of professional culture in their study based on respondents' responses. These were (a) veteran-oriented professional culture which served veteran faculty members with norms emphasizing

privacy and professional autonomy, (b) novice-oriented professional cultures which were dominated by new teachers and featured youth, idealism, and inexperience, and (c) integrated professional cultures which were organized to engage teachers of all experience levels in collegial and collaborative efforts. They found that teachers who remained in teaching were typically employed by schools characterized by "integrated professional cultures, organized to engage teachers of all experience levels in collegial and collaborative efforts" (p. 605) rather than by schools organized around veteran- or novice-oriented activities. These teachers not only reported greater satisfaction but were also more likely to remain in public schools after their 1st year of teaching (89%) had remained in public schools, as compared to 83% from novice-oriented cultures and 75% from veteran-oriented cultures). More striking, they found that 83% of the teachers who had worked in integrated professional cultures during their 1st year were still teaching in the same school during the 2nd year, as compared to only 55% of those from veteran-oriented cultures and 67% of those from novice-oriented cultures.

Critical friends group (CFG). One of the common and formalized PLC format is the Critical Friends Group (CFG). CFGs, an outgrowth of work done by the Annenberg Institute for School Reform at Brown University, are being used nationwide as models for site-based professional development nationwide with a targeted outcome of improved student performance (Franzak, 2002). Originally conceived as a tool for overcoming the isolation and individualism that characterized teachers' work (as noted by Lortie, 1975; Sarason, 1971), the CFG concept brings teachers at all levels of experience together to support one another's professional growth by engaging in collaborative inquiry and

reflection on practices associated with improved teaching and student learning (Bambino, 2002). Curry (2008) noted that CFGs are a particular type of school-based professional community aimed at fostering members' capacities to undertake instructional improvement and school wide reform. CFGs provide deliberate time and structures to promote adult professional growth that is directly linked to student learning. Together, CFG members seek to increase student learning and achievement through ongoing practice-centered collegial conversations about teaching and learning (Curry, 2008).

The National School Reform Faculty (NSRF) initiated the first CFG as a job-embedded form of professional development focused on learning in community through the collaborative examination of student work and teacher practice. The approach is founded on normative-reeducative theoretical assumptions of teacher change (Richardson & Placier, 2001), as topics for development are typically self-selected by a member of the group and focus is on actual problems encountered in their respective classrooms. CFGs have gradually gained widespread popularity as an effective model of teacher development in professional learning communities (NSRF, 2007).

The typical CFG comprises 10 to 12 teachers and administrators who meet once a month for two hours to share their practice with the intent of improving student learning (Franzak, 2002). Teachers in a CFG may teach in the same school building, but even in a situation when they are not, members of the CFG may choose to meet outside the school building at a central location. To achieve their goal, participants in CFGs use structured protocols to explore teaching strategies, conduct peer observations, and analyze evidence of their students work and growth. As a group, the members establish and publicly state student learning goals (school wide goals), help each other think about better teaching

practices, look closely at curriculum and student work, and identify school culture issues that affect student achievement.

The collaborative inquiry model presented by CFGs is grounded in the belief that teachers at all levels can mentor and support one another. Hence, participation in the group offers a wealth of potential as a means of inducting novice teachers into the practice and exposing them to the essence of professional development by inviting them to join with other teachers to examine their own evolving practice. Each CFG has a coach who is selected either from the school staff or from the ranks of trusted outsiders. The coach helps the group build the sense of trust that must exist if they are to work together in a direct, honest, and productive way. The coach also helps the members learn and master techniques that sharpen self-insight, promote creativity, and encourage candid, usable peer feedback. Within the CFG framework, educators belonging to a group learn to collaborate by participating in professional development activities such as examining student and teacher work (Franzak, 2002). Hence, participants engage in discussions centering on student work while also analyzing their own work/practice. Advocates of teachers' collaborative inquiry argue that "true reform depends on members of the teaching profession developing their own systematic and intentional ways of scrutinizing and improving practices" (Cochran-Smith & Lytle, 1999, p. 46). The CFGs operate at very high levels of openness, thoughtfulness and professionalism as the educators discuss issues concerning school improvement, teacher effectiveness, and student achievement. It is indeed a literal example of what Dunne and Honts (1998) meant when they stated that CFGs are practitioner-driven study groups that reflect the growing trend for site-based

professional development in which practitioners behave as managers of their own learning.

Curry (2008) pointed out that a theoretical underpinning belief for CFGs is the proposition that schools cannot be intellectually engaging places for students unless their teachers are likewise actively engaged in learning, thinking, reading and discussing. Within the framework of critical friendship, CFGs engage groups in critical reflection in the climate of friendship. Costa and Kallick (1993) noted that critical friendship practices include when "a trusted person asks provocative questions, provides data to be examined through another lens, and offers critique of a person's work as a friend" (p. 1). Several writers in the area of professional development identified this process as job embedded learning (Sparks & Hirsh, 1997; Wood & Killian, 1998; Zepeda, 1999). Zepeda (1999) noted that job embedded learning can be characterized in three ways - It is relevant to individual teachers, feedback is inherent in the process, and it facilitates the transfer into practice. This attention to daily work activities heightens teachers' consciousness of learning as a continuous process (Rosenholtz, 1989). Dunne & Honts (1998) and Tice (1999) reported that teachers described CFGs as some of the most powerful professional development activities in which they have participated. Bambino (2002) argued that "Critical friends groups help teachers improve instruction and student learning…[and] have been the catalyst for changes in the teaching, learning, culture, and climate of learning communities in a variety of schools" (p. 25). She cited examples of teachers from three schools in CFGs who used information from collaborative feedback to improve their teaching.

Key's (2006) analysis of the body of literature on CFGs revealed four claims about the efficacy of CFGs as agents of professional development and school reform. They are:

1. CFGs foster a culture of community and collaboration.
2. CFGs enhance teacher professionalism.
3. CFGs have the potential to change teachers' thinking and practice.
4. CFGs have the potential to impact student learning. (pp. 1)

Impact of CFG on community and collaboration. Many research findings lend credence to the notion that CFGs positively impact school culture by bringing teachers together to talk about their work, deprivatizing teaching practice with public discussions, and creating ties of community and collegiality (Key, 2006). Curry (2003) found that participation in CFGs removed the usual isolation of teachers at the high school she studied by creating collegial ties across departments and promoting a shared awareness of the school's reform philosophy, a more school-wide orientation towards teaching practice, and greater curricular coherence in the school. The Professional Climate Survey used in the National School Reform Faculty (NSRF) evaluation study showed that CFG teachers collaborated more with each other than non-CFG teachers through such activities as sharing ideas and student work samples, meeting to discuss problems, working to develop materials, and seeking advice about professional issues and problems (Dunne, Nave & Lewis, 2000). Nave (2000) also found that CFG participants engaged in collegial interactions outside of formal meeting times. Seaford (2003) further found that CFG coaches perceived that the disciplines of systems thinking, team learning, and shared vision are manifested to a very great extent within critical friends groups; this also points to a high degree of collegiality and community among the teachers. While Armstrong (2003) found in her qualitative case study that each school in her study moved a step further along a collegiality hierarchy she constructed. The schools noted that they had moved from

isolation to moral support; from congenial to engaging in technical reflection; and from technical reflection to interpretive reflection and practice.

Enhanced professionalism. Researchers (Franzak, 2002; Tice, 1999; Van Soelen, 2003) examining preservice teachers, novice teachers, and veteran teachers, indicated that CFGs promote the development of the professional self. The Professional Climate Survey used in the NSRF evaluation study revealed that participation in CFGs promotes professionalism in teachers (Dunne, et al., 2000). They further noted that CFG members exhibited greater professional engagement than non-CFG teachers. Furthermore, teachers in CFG more strongly agreed that they felt they improved each year and that they were always eager to learn new ways of improving their teaching than non-CFG teachers. Survey findings also revealed that CFG participants had a higher sense of efficacy and responsibility in their teaching; and changed their approach more often for students who were failing by trying new teaching methods than non-CFG teachers. Research supports the notion that student achievement improves as the continual process of teacher reflection, action, and feedback takes place (Cushman, 1999; Dunne et al., 2000).

Participation in CFGs support a teaching identity that is more profession-oriented than technician-oriented. Research clearly shows that CFGs promote collegial and collaborative school cultures and enhance teacher professionalism (Key, 2006). Van Soelen (2003) found that novice teachers in a CFG engaged in discussions focusing on curriculum, assessment, and motivation. These novice teachers supported and enriched each other in professional decision-making rather than struggling through their beginning year in survival mode. Tice (1999) reported that testimonials from veteran teachers showed that their lunch

time conversations developed in terms of professionalism and that the teachers gained new respect for the professionalism of their colleagues following their participation in CFGs.

Impact on teachers thinking and practice. Interviews and observations at twelve schools conducted by Dunne et al. (2000) for the NSRF evaluation study identified several impacts of CFGs on the teaching and learning process. These include a shift in concern from covering the curriculum to ensuring that students had the basic skills needed for reading and writing across subject areas; a shift from teacher-centered to student-centered instruction at a pace that allowed for mastery of material; and more thoughtful connections among curriculum, assessment, and pedagogy. In survey responses, teachers in these schools also reported having more opportunities to learn and a greater desire to continuously develop more effective practices than teachers who did not participate (Dunne et al., 2000).

Nave (2000) described changes that occurred in teacher thinking as a result of participating in CFGs. Teachers reported an increased desire to know and understand student thinking, a change in focus from teacher practice to student learning, and thinking through protocols for assistance in planning their lessons. Teachers in one CFG in Nave's (2000) study demonstrated significant changes in their approaches to writing instruction over the two years in which they focused on student writing. Meyer & Achinstein (1998) presented a "pivotal moment" that defined one novice teacher's professional growth over the course of the next year. Reviewing a video sample from his math class provided the impetus for the teacher to reframe the way he thought about classroom discussions which led to changes in his facilitation style. Curry (2008) also found in a qualitative case study that CFGs enhanced teachers' collegial relationships, their awareness of research-based

practices and reforms, their school-wide knowledge, and their capacity to undertake instructional improvement. CFGs, however, exerted minimal influence on teachers' pedagogical content knowledge. This may be because the CFGs were not focused on providing content-specific help to group members and were set up in an interdisciplinary form.

Nay (2002) and Tice (1999) shared claims by teachers of how they re-evaluated and made changes in their practice, tried new instructional practices and implemented new strategies, and how they used student reflections to refine their practices. These were, however, all self reports from interviews and surveys and were not substantiated with direct observations of the teachers. Research case studies funded by Lucent Technologies Foundation (Lieberman, 2003; Whitford & Fisher, 2003; Wood, 2007; Yendol-Silva, 2003) found that participating teachers indicated an overall positive effect of collaboration on the opportunities to review their practices through their participation in CFGs.

A number of large-scale studies have identified specific ways in which professional community-building can deepen teachers' knowledge, build their skills, and improve instruction (Bryk, Camburn & Louis, 1999; Calkins, Guenther, Belfiore, & Lash, 2007; Goddard et al., 2007; Louis & Marks, 1998; Supovitz & Christman, 2003). Research shows that when schools are strategic in creating time and productive working relationships within academic departments or grade levels, across them, or among teachers school wide, the benefits can include greater consistency in instruction, more willingness to share practices and try new ways of teaching, and more success in solving problems of practice (American Institutes for Research, 2007; Hord, 1997; Joyce &

Calhoun, 1996; Louis, Marks & Kruse, 1996; McLaughlin & Talbert, 2001; Newman & Wehlage, 1997).

*Impact on student learning***.** When changes occur in teacher practice, the resulting effect can be seen in student learning. Key (2006) and Ballock (2007) stated that although the evidence in the area of CFG's impact on teaching and learning is less definitive than for CFGs' impact on community and professionalism, research indicates that CFGs have the potential to facilitate teacher learning that leads to improvements in student learning.

Nave (2000) found evidence of marked improvement in students' writing over a two year period from writing samples of students whose teachers were involved in a CFG compared to classes whose teachers were not involved in a CFG. Reid (2006) found that standardized test scores in the school she studied may have indicated a positive correlation between teacher membership in a CFG and student achievement. She noted that 66% of K-2 students whose teachers were in a CFG were reading at grade level compared to 54% of students whose teachers were not in a CFG. The study, however, did not indicate whether the students were at similar levels at the start of the assignment to CFG and non-CFG. A comprehensive five-year study of 1,500 schools undergoing major reforms found that in schools where teachers formed active professional learning communities, student absenteeism, and dropout rates were reduced and achievement increased significantly in math, science, history, and reading. Furthermore, particular aspects of teachers' PLCs such as a shared sense of intellectual purpose and a sense of collective responsibility for student learning, were associated with a narrowing of achievement gaps in math and science among low and middle income students (Newman & Wehlage, 1997).

Many studies have focused on the characteristics and operations of PLCs, but little is known about the relationships between PLCs and other teacher- or school-level factors such as faculty trust, collective teacher efficacy and teacher commitment (Lee, Zhang & Yin, 2011). For instance, trust has been found to be a significant predictor of people's overall job satisfaction and risk-taking behaviors in an organization (Driscoll, 1978; Serva, Fuller, & Mayer, 2005). Trust is believed to be associated with teachers' and students' performances (Bryk and Schneider, 2002; Bryk and Schneider, 2003; Hoy and Tschannen-Moran, 1999), and has received attention, both in research and in the practice of building a PLC. A trusting atmosphere in school should positively affect teachers' working attitudes, motivation, and consequently their commitment to the teaching profession. Bandura (1997) found that teachers' commitment to work and student learning were closely related to their belief that they could successfully improve student learning (teacher efficacy). Furthermore, a high level of teacher sense of efficacy has been found to be linked to a greater commitment to teaching (Coladarci, 1992; Ware and Kitsantas, 2007) and to increased student achievement (Caprara, Barbaranelli, Steca & Malone, 2005). Hence, it is logical to hypothesize that teacher participation in PLCs can increase teacher efficacy, which in turn can increase teacher satisfaction and ultimately positively impact teacher retention.

Cross career learning communities (CCLCs). Specifically created to support induction, CCLCs are school-based, small learning communities dedicated to the collaborative analysis of teaching, learning, and assessment practices in the service of increased student achievement. CCLCs were specifically created to include educators

across the teaching career spectrum and across institutions and job descriptions. Consequently, they are composed of a purposeful mix of university and school faculty members and novice and experienced educators, thus creating a seamless transition from prospective to practicing and providing needed support to beginning teachers through their first critical years (NET-Q, 2012). The concept of CCLCs as cross career enables openness to different perspectives and configurations (S. Taylor, e-mail communication, April 5, 2012). CCLCs operate as a support for the successful induction and retention of new teachers and also as a vehicle for the delivery of the kind of continual, collaborative, and job-embedded professional development needed for these teachers.

Although the CCLCs are set up in a form similar to the CFGs, there are some significant enhancements. One major difference is that CCLCs are set up to include a purposeful mix of educators across the teaching career spectrum. Thus, members of a CCLC could include in-service, novice, and veteran teachers as well as university faculty (G. Benson, personal communication, November 15, 2012). Another enhancement is that CCLCs have an ongoing training component; monthly seminars are conducted for the CCLC coaches. This is in addition to the five day institute that the coaches attended to become coaches. This concept of monthly seminars is based on the premise that the five day institute may not adequately prepare a coach to lead in schools, but may serve to introduce the coaches to the tools and dispositions needed. The monthly seminars present an opportunity and setting for the coaches to practice what they learned in the five day institute. During the monthly seminars, coaches have the opportunity to learn new protocols; experience new resources; expand their facilitation skills; and hear how some of their colleagues organize their school-based CCLCs (S. Taylor, e-mail communication,

April 5, 2012). In essence, the monthly seminars provide an opportunity for follow-up and reinforcements to these coaches. Consequently, the coaches are better trained and empowered to serve as coaches and facilitators in their school-based CCLCs.

Coaches attending the monthly seminars have provided positive feedback on the value of the monthly seminars. Specifically, participants regularly commented about the ways they planned to apply specific protocols and activities they used in the seminars in their school-based CCLCs. Also, participants reflected on how participating in the seminar helped them refine their facilitation skills (S. Taylor, e-mail communication, April 5, 2012). Like CFGs, the CCLCs also operate at very high levels of openness, thoughtfulness and professionalism as the educators discuss issues concerning school improvement, teacher effectiveness, and student achievement.

Black and Neel (2007) reported in the GSU Induction Project Progress Report that in the first years of the initial CCLC implementation, the CCLCs were perceived as useful and helpful in creating a positive environment for participating teachers. In addition, CCLC members stated that the CCLCs were contributing to a collegial and supportive environment. Their report also showed that CCLC members, particularly new teachers in CCLCs, were retained at higher rates than new teachers were retained in previous years for the participating schools. The retention rate of new teachers returning for the 2007-08 school year was 86%, a statistically significant higher rate than the 63% found for two of the participating school systems in prior years. A seventh grade math teacher summarized the feelings of many new teachers who were members of a CCLC. He wrote,

> "My first year as a teacher has been enriched and improved through the many interactions I have had with other [CCLC] members. I have learned

> new strategies for teaching and classroom management. I have been exposed to new points of view and have had my awareness expanded. And, maybe most importantly, I have made life-long friends. I have often said that I cannot imagine teaching without access to today's technology and, now, I cannot imagine teaching without the support of my CCLC friends." (p. 11)

Black and Neel (2007) also found that statewide testing data showed statistically significant improvement in CCLC treatment schools contrasted with the comparison schools which did not have CCLC treatment. They found continued superior achievement in middle schools and an increase in high schools that was not statistically significant. They noted further that gains in achievement have traditionally been harder to obtain in upper grades than in lower grades.

Summary

Collegial support and interaction with peers are variables that influence teacher retention (Harrell, Leavell, Tassel & McKee, 2004). Furthermore, as stated by Darling-Hammond (1994), opportunities for collegial interaction, professional development, and leadership lead to a better understanding about the nature of quality teaching. The literature showed that PLCs can help improve teacher practice and perhaps student achievement: by improved sense of teacher professionalism; reduced teacher isolation; focus on student work; and increased teacher collaboration and support. These lead to an increased sense of teacher efficacy. Research also showed that teacher practice is positively impacted by participation in PLCs and CFGs. Overall, research revealed that when teachers are given the time and tools to collaborate they become life-long learners, their instructional practice improves, and they are ultimately able to increase student achievement far beyond what they could achieve alone.

If professional learning communities are, as many suggest, to be the new way for schools to implement policy changes, provide for professional development, and effect educational change (Cibulka & Nakayama, 2000; DuFour, Eaker & DuFour, 2005; Hargreaves, 2003; McLaughlin & Talbert, 2006; Zmuda, Kuklis, & Kline, 2004) school leaders can also expect that PLCs will be avenues by which teachers can receive more support and feel less isolated through engagement with one another in collaborative work. The end result of which will be increased teacher support and teacher retention.

The absence of some of the characteristics of PLCs can contribute to teacher turnover and attrition. Yet, there seems to be a gap in the literature on PLCs regarding the impact on teacher retention. Thus, the current study seeks to extend the research on PLCs and CFGs to teacher retention, by examining the impact of participation in CCLCs (a form of PLCs) to teacher retention.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

In this study, I examine how teachers' participation in Cross Career Learning Communities (CCLC), a type of PLC, relates to teacher retention. Furthermore, the study examines if type of participation has a differential relationship with teacher retention.

This chapter presents an overview of the research design, participants and procedures that were used to conduct the research study. I used a quasi-experimental control group matched design. One-to-one exact matching was used to derive a matched group for comparison purposes. I also analyzed existing data collected on teachers participating in the Network for Enhancing Teacher-Quality (NET-Q) grant regarding their participation in the CCLCs.

Research Questions

My research questions are:

1. Do teachers who participate in CCLCs remain in teaching at a higher rate than teachers who do not participate in CCLCs?
2. Is there a difference in teacher retention rate in schools where participation in CCLCs was mandated and those in which participation was voluntary?
3. Are there any differences in retention rates of novice teachers (zero to three years experience) and veteran teachers (greater than three years experience) in participating PDSs with CCLCs?
4. For teachers who intend to continue teaching, to what extent are their plans to continue in teaching the next school year influenced by participation in a CCLC?

My hypotheses are:

Research Hypothesis 1: A greater proportion of CCLC teachers will remain in the schools they are in after one year of CCLC participation than teachers who did not participate in CCLCs.

Research Hypothesis 2: A greater proportion of teachers in schools where participation in CCLCs is mandatory will remain in the same schools compared to teachers in schools where participation is voluntary.

Research Hypothesis 3: There is no difference in the retention rates of the novice and veteran teachers in CCLC.

Research Hypothesis 4: The proportion of teachers indicating that their participation in CCLCs positively influenced their decision to continue in teaching is greater than zero. To test this hypothesis, a confidence interval on the observed proportion was calculated to see if it covers zero. If the confidence interval does not cover zero, then the research hypothesis is supported.

Data Collection and Instrument

The CCLC census database was accessed to identify the teachers in the CCLCs. The Georgia Certified Personnel Information Report (CPI) was also utilized to run descriptive statistics on the teachers in the CCLCs and to select comparison teachers in the school systems for which the CCLCs teachers were employed. The CPI reports are routinely collected by the Georgia Department of Education and made available to other state agencies and other interested stakeholders upon request. The CPI database was also used to calculate teacher mobility and retention statistics within the state public school

system for the teachers and the schools. In addition, data were obtained from a survey that was created to elicit information from participants in the NET-Q grant about the program implementation. Some items on the instrument asked program participants specific questions about their participation in any professional learning communities, including participation in CCLCs.

Study Participants

Various datasets were used to answer the research questions. For question 1, the study participants comprised teachers in schools participating in the CCLCs and comparison teachers who did not participate in CCLCs. There were a total of 256 teachers (treatment) participating in CCLCs in six schools from three school systems. These teachers signed consent forms permitting the NET-Q staff to use their certificate identification numbers for tracking purposes. No signed consent forms were received from a seventh participating school, hence the teachers in that school were not included in the dataset used to answer question 1. These teachers were matched to teachers (comparison) who shared similar characteristics in the same school systems but who were not CCLCs participants. In this study, teachers in the treatment group were teachers participating in the CCLCs who were involved in group meetings at least once a month with other teachers in their schools to discuss issues or other challenges they were facing in their classrooms. In some cases, some teachers in the CCLCs met weekly with other teachers in their school. These teachers were getting additional and continuous support from their peers in their schools in the form of collaborative feedback. Teachers in the control group were teachers who were not exposed to the CCLC treatment. One-to-one

exact matching was used to match the teachers on eight covariates. One-to-one exact matching on the eight covariates yielded exact match for 240 of the teachers in the treatment group. Necessary adjustments were made to find matches for the rest of the cases, which yielded matches for 11 more cases. Consequently, a total of 251 treatment teachers were matched to 251 control teachers. Hence, a total of 512 teachers were in the dataset that was used to answer question 1.

To answer question 2, all the teachers in schools participating in the CCLCs were initially in the dataset (N = 614). However, 205 of the teachers were employed in schools where participation in CCLCs was of a combined format (i.e., voluntary and mandatory participants in CCLCs in the same school). Hence, these teachers were not included in the analysis because question 2 focused on the attrition rates for schools with either mandatory or voluntary participation. In the final analysis, only 409 teachers were included in the dataset used to answer question 2. To answer question 3, all the teachers in schools participating in the CCLCs were included. Data analysis for this question included a total of 614 teachers who were classified as either novice or veteran teachers.

A final set of participants used in the study were the teachers who participated in the NET-Q grant survey about program implementation. This dataset had a total of 120 teachers; these were educators who identified themselves on the survey as teachers employed in PDS schools. In the survey, teachers were asked about their plans for the upcoming school year, and the extent to which participation in a PLC influenced their decision to continue teaching.

The Matching Procedure

The data were preprocessed to adjust and layout the data and the control variables to a format that permitted the types of analyses that were intended in the study. Some variables were recoded to reduce the number of groups, for example, race was recoded from 6 CPI groups to just 3 groups of White, Black and other, to enhance the matching process. Preprocessing of the dataset in this matching method was performed so that the treatment group is as similar as possible to the control group. Ho, Imai, King and Stuart (2007) note that in the preprocessed dataset, the treatment variable is closer to being independent of the covariates, which renders any subsequent parametric adjustment less important. They note further that preprocessing the data make estimates based on the subsequent parametric analysis far less dependent on modeling choices and specifications (p. 201). In addition, since most of the adjustment for potentially confounding control variables is done nonparametrically, the potential for bias is greatly reduced compared to parametric analyses based on the raw data. Consequently, the data were preprocessed to adjust the data without inducing bias.

In this study the single dichotomous causal (or treatment) variable was exposure to CCLC. This is referred to as **T**, where T_i takes a value of 1 if a teacher receives the treatment (CCLC) and 0 if a teacher is untreated ("the control condition"). The observed outcome (or dependent) variable is **Y** which in this study is teacher retention**,** where Y_i takes a value of 1 if a teacher is retained and 0 if a teacher is not retained. Finally, each teacher has a set of 8 characteristics determined prior to the study, these were measured and analyzed as X_j, (j = 1,….,8). All variables in **X** included in the matching procedure are listed later in this discussion (see pages 64-65). To ensure that the data preprocessing

did not induce bias, selection during preprocessing depended only on the variables in **X**, covariate code (covcode) generated. The outcome variable **Y** was not examined during the preprocessing stage. Ho et al. (2007) point out that as long as **Y** is not consulted and is not a part of the rule by which an observation is dropped, preprocessing cannot influence the selection for the matched cases (p. 216).

Ho et al. (2007) note further that the goal of matching and preprocessing the data is to adjust the data prior to the parametric analysis so that (1) the relationship between **T** and **X** is eliminated or reduced, and (2) little bias and inefficiency are induced. Ultimately, the preprocessed dataset will include a selected subset of the observed sample for which **T** and **X** are unrelated, and the treatment and control groups have the same background characteristics. Thus, the probability (*p*) of having a covariate is the same in each group regardless of the treatment group (1 or 0), and the following relationship holds

$$p(X|T=1) = p(X|T=0) \qquad (3.1)$$

One-to-one exact matching enables equation (3.1) to be satisfied. The notion is to match each treated teacher with one control teacher for whom all the values of **X** are identical, i.e., one who is assigned the same covariate code as that of the treatment case. A covariate code is a combination of a set of separate covariate values. This becomes a single value which can be used as a merge-key for the two files (treatment and control). For treatment cases that could not be matched, some adjustments were made to find match cases. In this study, a caliper was set during the matching. This is an acceptable range around a participant in the treatment group within which acceptable matches from the control group can be made. Since the range of the age group was 14 years, 14 years

was set as the caliper for the age group covariate. This age range was used because it divided up the entire range of ages into a useful number of categories. To ensure the quality of the match, the age groups of the treatment and the match cases had to be within a range of 14 years. If cases could not be matched within that caliper, they were excluded from the sample. This caliper was used for the age group covariate of all the teachers. The choice of caliper size is directly related to the trade-off in the number of quality treatment-control matches and the number of treated individuals who will have no acceptable match among the control group members (Lingle, 2009). This matching method also allows selection, duplication or selectively dropping observations from an existing sample without bias, as long as it is done using a rule that is a function only of **T** and **X**.

The non-replacement method was used in the matching. Once a treatment individual is matched with one non-treated individual, both individuals are removed from the dataset. When more than one control case matched a treatment case, one control case was randomly selected. A random variable was created in the match dataset, and the dataset was sorted on that random variable. This is very vital because there were instances when one treated case's covariate code matched several non-treated cases - each of which had the same covariate code. Hence, in a one-to-one match, identifying which of the tied cases was the matched case depended on the order of the data (Guo & Fraser, 2010, p. 168). For the one-to-one matching structure, each treatment group member is allowed to match with only one control group member; similarly only one control group member is allowed to match with a treatment group member. In this study, the first acceptable case was selected as the match for the treatment. This matching

process identified matches for an adequate level of 98% of the cases in the treatment group. The preprocessed dataset is thus, the same as the original data set with any unmatched control observations discarded and with **T** and **X** independent.

Covariates included in the matching model. Treatment teachers were matched with comparison teachers on eight covariates. The variables were used in the matching process because they were readily available in the Certified Personnel Information database and because some of the variables have been cited in the literature to be associated with teacher attrition. Research studies note one consistent finding, that is, attrition is high among young and new teachers and lower among older and more experienced teachers until they reach ages at which retirement is feasible. Researchers note further that this phenomenon produces the well documented U-shaped plot of attrition against age or experience (Boe, Bobbitt, Cook, Whitener, & Weber, 1997; Darling-Hammond & Sclan, 1996; Guarino et al., 2006; Kirby & Grissmer, 1993; Grissmer & Kirby, 1997; Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2001; Kirby, Berends, & Naftel, 1999; Murnane, Singer, & Willett, 1988). Hence, teacher age and experience were critical variables that were included in the matching model. Though both teacher gender and teacher ethnicity have been reported to be associated with turnover in several studies using state data that predate 1985, more recent studies with national data have not found evidence that these variables are related to teacher turnover (Darling-Hammond & Sclan, 1996). Ingersoll (2001) found that males were slightly more likely than females to stay, general education teachers were more likely than special education teachers to stay, and minority teachers were slightly more likely than white teachers to

stay. However, only the general education effect was significant (Ingersoll, 2001). Ingersoll's detection of a higher likelihood of turnover for special education teachers is substantiated by other research studies such as Afolabi, Eads & Nweke, 2007; Boe et al., 1997; Nweke, Eads, Afolabi & Stephens, 2005, 2006. While his finding on gender is echoed in some studies (Stinebrickner, 2001) it is contested by others such as Guarino et al. (2004).

According to the National Association of State Directors of Special Education (NASDSE), teacher attrition in special education is one of the most troublesome issues facing public schools (NASDSE, 1990). Special education teachers leave the profession at higher rates than general education teachers. According to the data from the surveys, more teachers in special education exited the teaching profession than general education teachers: 7.9% of special education and 5.8% of general education teachers left (Boe, Bobbitt & Cook, 1993). Based on data collected from the 1990-1991 Schools and Staffing Survey and the 1992 Teacher Follow-up Survey, it was estimated that 6.3% of teachers in special education and 5.6% of teachers in general education in public schools left the profession nationally (Boe, Cook, Bobbitt, & Weber, 1995).

Consequently, the covariates included in the model are:

1. School System – treatment teachers were matched to comparison teachers in the same school system.
2. School Level – treatment teachers were matched to comparison teachers teaching at the same school level. The variable was coded as *elementary, middle grades and high school.*

3. Age Group – The age variable was computed from birth date to current school year. The age variable was then further categorized into age groups as 21 to 35 years, 36 to 50 years, 51 to 65 years and 65 years and above.
4. Ethnicity – Ethnicity was coded as *African American, White, and Other.* Other ethnicity was comprised of Hispanic, American Indian or Alaska Native, Multi-Racial and Asian.
5. Experience Group - There were seven experience groups with a range of five years in each experience group with the exception of two groups (0-5 years) and over 31. This variable was categorized as 0 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, 26 to 30 years and 31 years and above.
6. Certificate Level – This was coded into *Bachelors, Masters, and Education Specialist/Doctorate.*
7. Certificate Type – This variable refers to the type of certificate held by the teachers, and was categorized into the *Teaching, Performance Based, Intern/ Nonrenewable certificate* types.
8. Teaching Area – This was coded as *regular or special education.*

The covariate code (covcode) derived by combining the individual values of the covariates, using powers of 10 (see equation 3.2). This covcode was generated for everyone in both the treatment and the control groups. Using the SPSS Merge Variables function, the covcode was then used as the match key, to create matches for the treatment file, from the comparison file to create the matched sample.

*COMPUTE covcode=10 ** 9 + (SchlSys1 * 10 ** 8) + (School_level * 10 ** 7)+(AgeGrp4 * 10 ** 6) + (0 * 10 ** 5) + (NewEthnicity * 10 ** 4) +(ExpGroup * 10 ** 3) +(NewCertLevel * 10 ** 2)+(NewCert_Code * 10 ** 1) + (RegEd_Sped).* (3.2)

One of the coefficients is zero; this was used as a placeholder because the final version of the formula did not include the gender variable. Gender was excluded from the formula because there is little or no evidence that it is related to teacher turnover and majority of the teachers in the treatment group were female. See Appendix A for an example of how the covcode was generated.

In this study, whereas the treatment dataset had a total of 256 cases, my initial comparison group dataset had a total of 21,302 cases. After the data were preprocessed, the final control group dataset total matched the total for the treatment cases. Five of the treatment cases could not be matched and thus were discarded from the sample. In the final analysis, a total of 251 treatment cases were matched with 251 control cases who had the same covariate codes as the treatment cases. Table 1 shows the sample characteristics before and after the matching.

Although in some cases matching leads to discarding data, it can actually increase the efficiency of estimates (Smith, 1997). This may seem counterintuitive, as it would seem to violate a first principle of statistics, informally described as “more is better” (Ho et al., 2007).

Table 1

Percent Sample Characteristics Before and After One-to-One Exact Matching

	Pre-match Sample (*N* = 21,558)		Post-match Sample (*N* = 502)	
	Treatment % (*N* = 256)	Control % (*N* = 21,302)	Treatment % (*N* = 251)	Control % (*N* = 251)
School System				
School System A	3.5	17.5	3.6	3.6
School System B	2.0	31.9	2.0	2.0
School System C	94.5	50.6	94.4	94.4
School Level				
Elementary School	44.9	52.2	45.4	45.4
Middle School	3.9	21.3	4.0	4.0
High School	51.2	25.3	50.6	50.6
Other[a]	0.0	1.2	0.0	0.0
Age Group				
21-35 years	30.9	32.8	31.5	31.1
36-50 years	41.4	39.2	41.4	41.8
51-65 years	26.6	26.7	25.9	26.3
66 years and above	1.2	1.3	1.2	0.8
Ethnicity				
White	50.4	53.3	50.6	50.6
Black	35.5	40.8	36.3	36.3
Other[b]	14.1	5.8	13.1	13.1
Experience Group				
0-5 years	30.9	27.5	31.1	31.9
6-10 years	34.4	24.7	33.9	33.9
11-15 years	18.0	17.8	17.9	17.1
16-20 years	5.9	11.1	6.0	6.0
21-25 years	4.7	8.8	4.8	4.4
26-30 years	2.7	6.3	2.8	3.2
31 years and above	3.5	4.3	3.6	3.6
Certificate Level				
Bachelors	27.3	34.8	27.9	27.9
Masters	54.7	47.8	55.8	55.8
Specialist & Doctorate	18.0	17.2	16.3	16.3
Other[c]	0.0	0.2	0.0	0.0
Certificate Code				
Teaching Certificate	81.6	78.7	82.9	82.9
Intern & Nonrenewable Teaching	17.2	11.4	15.9	15.9
Performance-based Teaching	1.2	6.4	1.2	1.2
Other	0.0	3.5	0.0	0.0
Classification				
Regular Education	89.5	84.4	90.0	90.0
Special Education	10.5	15.6	10.0	10.0

Note. a. These include alternative schools, technical schools and Special Education facilities. b. All ethnicities other than White or Black. c. These include persons with Associate degrees.

However, more data are only better when using an estimator that is "self-efficient" (Meng & Romero, 2003) which is an estimator based on a model in which it is sufficiently correct to make use of more data to improve inference.

After choosing the final matched sample, one with maximum balance and a large number of matched observations, retention analyses were then used to answer the following question: Do teachers who participate in CCLCs remain in teaching at a higher rate than teachers who do not participate in CCLCs?

The Balance Test

Ho et al. (2007) note that a good matching procedure reduces bias by increasing balance, decreases the variance and prevents inducing new biases by matching only based on **X** without consulting **Y** until the analysis stage (p. 220). Verifying balance entails checking if equation 3.1 $p(X|T=1)=p(X|T=0)$ holds. One method of verifying balance is to construct a multidimensional histogram of all the variables in **X** for all the treated cases and compare it to a multidimensional histogram for all the control cases. Another method is to examine various low-dimensional summaries.

To test for balance in this study, I used various low-dimensional summaries that compare the means of some variables in **X** for the treatment group with the mean of those same variables in the control group. I also compared the standard deviations of each variable between the two groups, and the treatment and control group histograms one variable at a time. Ho et al. (2007) recommend that balance on covariates that were omitted from the matching procedure should still be checked, so I checked for the balance in both groups on the gender covariate. If the summaries differ between the

treated and the control groups, then equation 3.1 does not hold. Figures 1 through 4 show histograms and Q-Q plots of the sample age and experience.

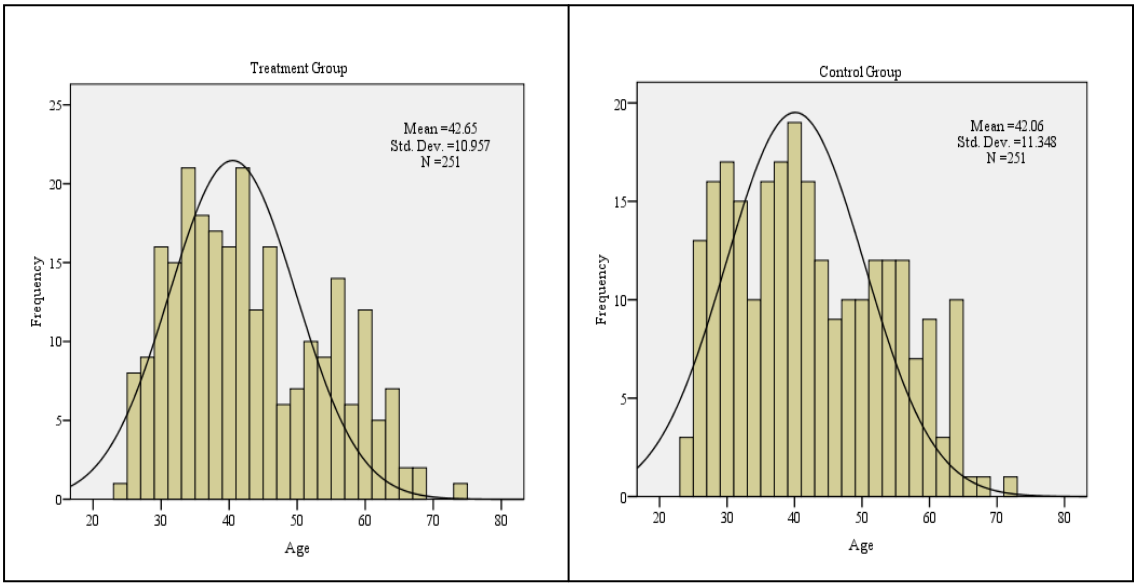

Figure 1. Age distribution of control and treatment groups.

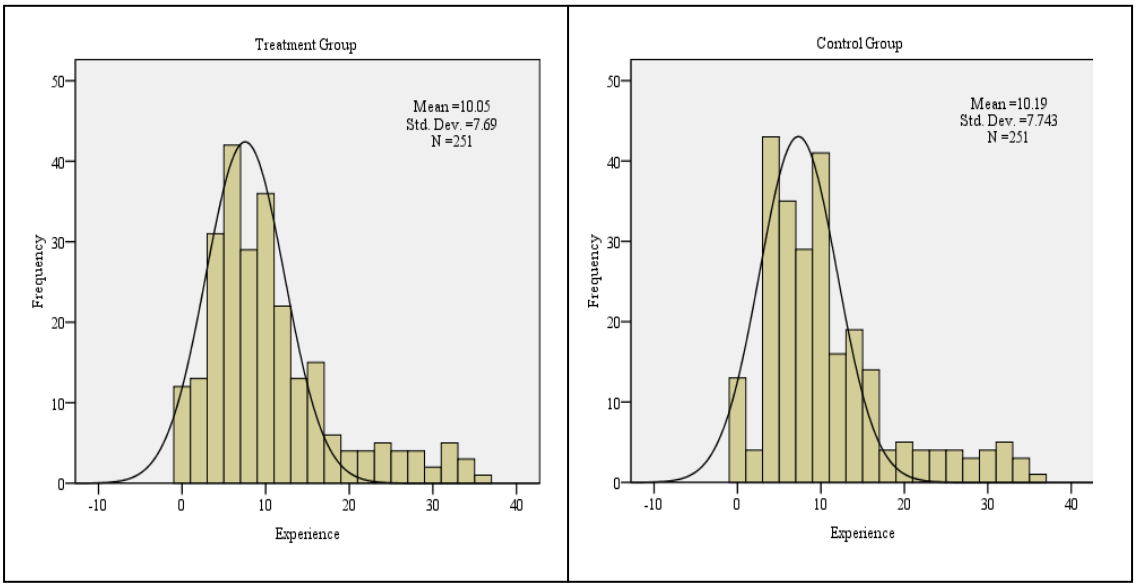

Figure 2. Experience Distribution for Control and Treatment Groups.

Normal Q-Q Plots

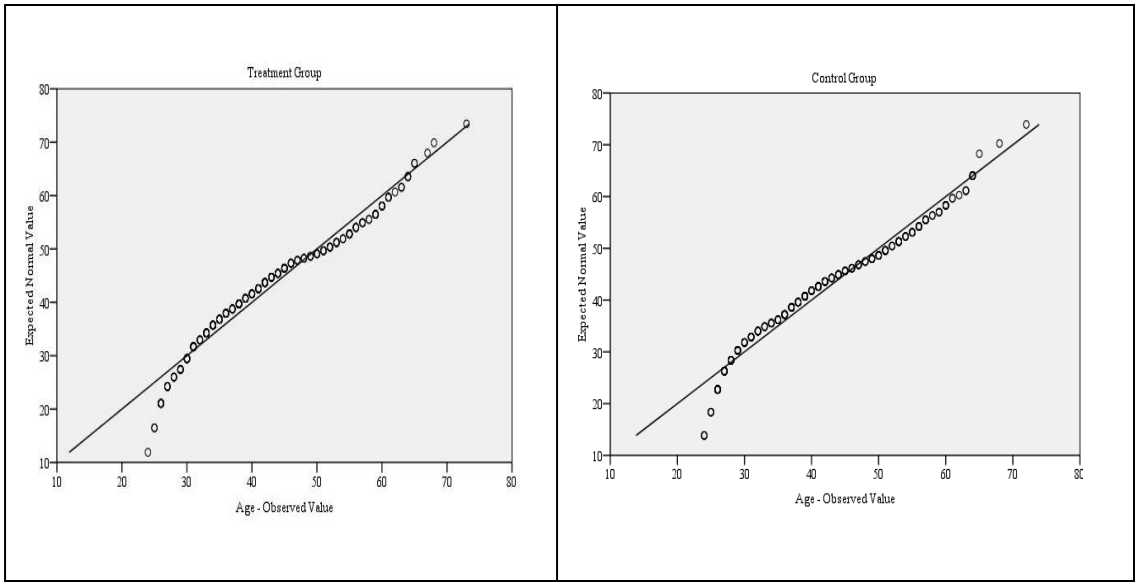

Figure 3. Normal Q-Q Plot of the Age Distribution for Control and Treatment Groups.

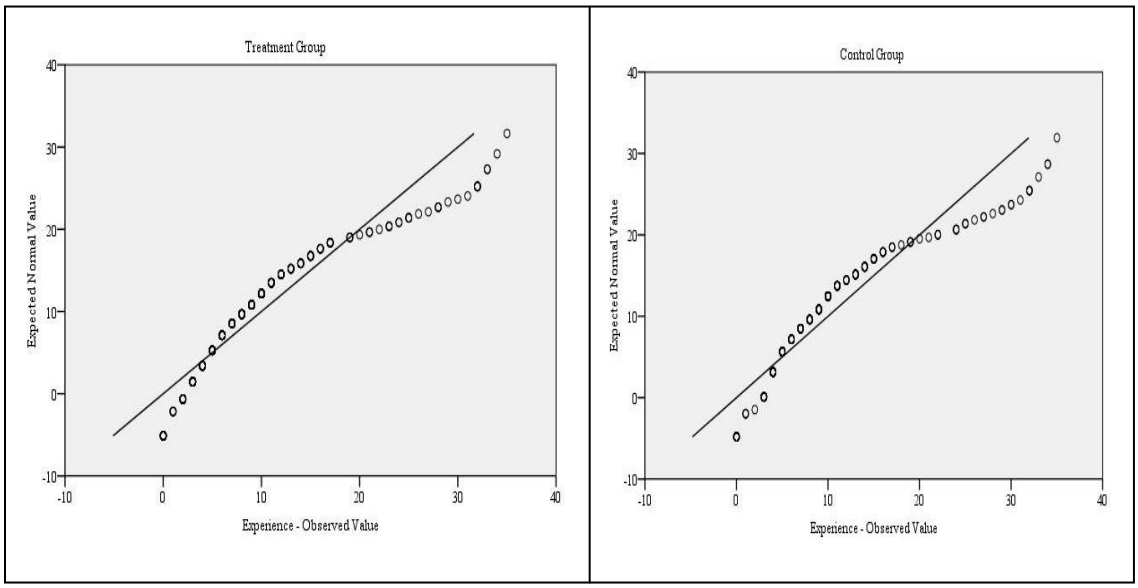

Figure 4. Normal Q-Q Plot of the Experience Distribution for Control and Treatment Groups.

Sensitivity Analysis

Sensitivity analysis allows a researcher to assess the impact that changes in a certain parameter will have on the model's conclusions (Taylor, 2009). The simplest form of sensitivity analysis is to vary one value in the model by a given amount, and examine the impact that the change has on the model's results. In this study, the initial matching process included gender as a covariate, and the age group covariate had a range of 4 years with 11 groups. This model yielded an initial exact match for 205 treatment cases, 40 more matches were found with varying degrees of modifications made to the age and experience group variables. A total of 11 treatment cases could not be matched with any control cases. So for the first model, 95.7% of the treatment cases were matched. The second model excluded the gender variable and had a reduced number of age groups; this model yielded an initial exact match for 240 treatment cases. Hence the second model which matched 98.1% of the treatment cases was a better model. Furthermore, in the second model, only 5 treatment cases could not be matched compared to 11 cases from the first model. Ho et al. (2007) note that the main indicator of success in matching is balance, as well as the number of observations left after matching. Table 2 shows the distribution of cases for the match runs using both models.

Table 2

Distribution of Cases in Matching Models

	First Run		Second Run	
	#	%	#	%
Exact Matches	205	80.1	240	93.8
Altered cases	40	15.6	11	4.3
Discard	11	4.3	5	2.0
TOTAL	256	100	256	100

Computation of Turnover Rates

The rates of the number of public school teachers who left the state public school teaching workforce, or who moved to a different school from one school year to the next (e.g., from 2009-2010 to 2010-11) were computed as a percentage of the total number of public school teachers during the base school year (e.g., 2009-2010). Thus, the rates of the types of teacher turnover (attrition and migration) are directly comparable because they were all computed using the same method. For this computation, it is important to note that the number of teachers in a given school may change from base year to base year. For computing overall attrition and mobility rates and during a range of years of teaching experience (e.g., attrition during the 1-3 years of experience), I adopted the procedure used by the Georgia Professional Standards Commission (GaPSC) for attrition and mobility (Nweke, Afolabi & Stewart, 2002). For example, the number of leavers and movers from 2009-2010 to 2010-11 was determined as teachers in 2009-2010 who were not in 2010-2011 or who moved from one school to another from 2009-2010 to 2010-2011. This was computed as a percentage of the number of teachers during the base year (2009-2010). For a clearer illustration, if a school employed 870 teachers in the 2009-2010 school year, and 79 of those teachers do not return to the school in the 2010-2011 school year, the rate of attrition from that particular school in 2010-2011 is 9.1%. This was derived from 79 (the number of teachers who left) expressed as a percentage of 870 (the total number of teachers in the school).

The Effect Size Index

Effect sizes were calculated for all group differences identified in the study. This procedure is necessary because the APA Task Force on Statistical Inference (Shea, 1996)

reported that the educational research field is placing more importance on practical significance and not just only statistical significance. Wilkinson and the APA Task Force on Statistical Inference (1999) reported that it is important to good research that effect sizes are reported and interpreted. Reporting effect sizes in research findings is imperative for three reasons. First, reporting effect sizes facilitates inclusion of the research work in subsequent meta-analyses research efforts. Second, reporting effect sizes creates a basis upon which researchers can include prior conclusions of the study in subsequent articles published on the same topic. Last, reporting effect sizes may help evaluate how a study fits into the existing body of literature on the topic. Many researchers such as Kirk (1996), Wilkinson & APA Task Force on Statistical Inferences (1999), Thompson (2006) note that effect sizes, when reported, highlight the similarities or differences in related research giving the researcher a place from which to judge practical significance. If research expectations match the null hypothesis when the null hypothesis specifies no difference, the effect size would be zero within sampling error. However, if the expectations do not match the null hypothesis, the expected effect size would not be zero. In general, effect sizes are an average statistic for the particular set of data being analyzed (Vacha-Haase & Thompson, 2004).

The effect size index used in this study was Cohen's *h*, this is $h = \arcsin P_1 - \arcsin P_2$. It is the difference between arcsine transformed population proportions (P's) i.e. $\phi_1 - \phi_2 = h$. The index Cohen's *h* is the difference between proportion P_1 and proportion P_2 after each of these proportions has been transformed using arcsine transformation. The reason for employing the arcsin transformation is to make all *h*'s comparable in the sense of having variances independent of the parameter (Rosenthal,

1994). Thus, unlike P_1-P_2, $\phi_1 - \phi_2 = h$ gives values whose detectability do not depend on whether the ϕ's (and hence the P's fall around the middle or on one side of their possible range (Cohen, 1987).

Cohen (1987) proposed that the terms 'small,' 'medium,' and 'large' are relative, not only to each other, but to the area of behavioral science or even more particularly to the specific content and research method being employed in any given investigation. A conventional frame of reference has been recommended by Cohen. *Small effect size* is $h = .2$. A small difference between proportions is defined as a difference between their arcsine transformation values of .20. A *medium effect size* is $h = .5$. A difference between proportions when $h = .50$, or some difference that through normal experience an average difference would be noticeable to the researcher. A *large effect size* is $h = .8$.

Summary

The prime goal of matching is to achieve balance, the degree to which the treatment and control covariate distributions resemble each other as in equation 3.1, without losing too many observations in the process (Ho et al., 2007). Several matching processes were performed in an effort to obtain the best match for the treatment cases and to avoid the need to discard too many cases. One-to-one exact matching enabled me to match control cases to treatment cases with exactly the same covariate values. The result of this process is considerably less model dependence, reduced potential for bias, less variance, and ultimately a lower mean squared error as noted by (Ho et al., 2007).

CHAPTER 4

RESULTS AND DISCUSSION

The four research questions in this study were answered using three different datasets. These datasets were discussed in detail in Chapter 3, and will be briefly discussed again in conjunction with the data analyses.

For research question 1, the study sample comprised of 502 teachers, 251 CCLC teachers (treatment cases) and 251 teachers in the control group. First, descriptive statistics analysis, as shown in Table 3, was performed. This analysis was utilized to describe and compare the distribution of the treatment and control groups in the study. All the participants in both the CCLC groups and the control group were employed in three school systems across 97 public schools in the state. The treatment cases were drawn from the population of CCLCs members that participated in the program from spring of 2010 to fall of 2010. The teachers participating in CCLCs were in six schools in three school systems during this period. All of the matched cases were also employed in the same three school systems across 92 public schools in the state. Table 3 shows descriptive statistics of both sample groups.

Table 3.

Percent Treatment and Control Sample Distribution

	Treatment Group % (*N* = 251)	Control Group % (*N* = 251)
School System		
School System A	3.6	3.6
School System B	2	2
School System C	94.4	94.4
School Level		
Elementary School	45.4	45.4
Middle School	4	4
High School	50.6	50.6
Other	0	0
Age Group		
21-35 years	31.5	31.1
36-50 years	41.4	41.8
51-65 years	25.9	26.3
66 years and above	1.2	0.8
Ethnicity		
White	50.6	50.6
Black	36.3	36.3
Other[a]	13.1	13.1
Experience Group		
0-5 years	31.1	31.9
6-10 years	33.9	33.9
11-15 years	17.9	17.1
16-20 years	6	6
21-25 years	4.8	4.4
26-30 years	2.8	3.2
31 years and above	3.6	3.6
Certificate Level		
Bachelors	27.9	27.9
Masters	55.8	55.8
Specialist & Doctorate	16.3	16.3
Other	0	0
Certificate Code		
Teaching Certificate	82.9	82.9
Intern & Nonrenewable Teaching	15.9	15.9
Performance-based Teaching	1.2	1.2
Other	0	0
Classification		
Regular Education	90	90
Special Education	10	10

Note. a. All ethnicities other than White or Black.

Research Question 1

Research question 1 asked: Do teachers who participate in CCLCs remain in teaching at a higher rate than teachers who do not participate in CCLCs? The dataset used to answer question 1 had a total of 502 teachers, 251 treatment teachers and 251 control teachers. A chi-square test of independence was performed to examine the relationship between CCLC participation and teacher retention. As shown in Table 4, attrition analysis revealed that only one teacher from the treatment group left the state public school system the following school year; this translates to a retention rate of 99.6% among the treatment group. In the control group, a total of 12 teachers left, yielding a retention rate of 90.8%. There was a retention rate of 99.6% for treatment teachers and 90.8% for teachers in the control group. Figure 5 graphically shows the retention rates for the teachers in the treatment and control groups.

Table 4

Teacher Retention Rates for the Treatment and Control Groups

			Retention Status		
			Not Retained	Retained	Total
Group	Control	Count	23	228	251
		Expected Count	12.0	239.0	251.0
		% within Status	9.2%	90.8%	100.0%
	Treatment	Count	1	250	251
		Expected Count	12.0	239.0	251.0
		% within Status	.4%	99.6%	100.0%
Total		Count	24	478	502
		Expected Count	24.0	478.0	502.0
		% within Status	4.8%	95.2%	100.0%

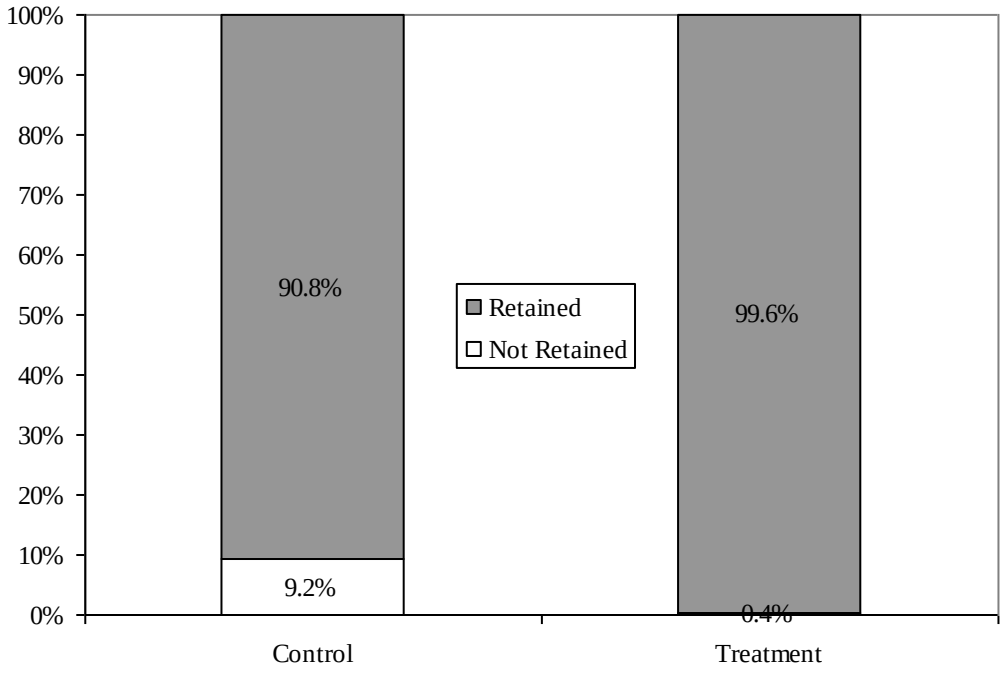

Figure 5. Teacher Retention Rates among Treatment and Control Groups

A chi-square test showed that the difference between the attrition percentages for the treatment and the control groups was statistically significant: $\chi^2(1) = 21.17$, $N = 502$, $p < .05$. Teachers in the treatment group were more likely to remain in teaching than were the control group teachers. This indicates a significant relationship between participation in CCLC and teacher retention. A medium effect size of $h = .4$ was found for the effect of CCLC participation and teacher retention. Post-hoc analysis given alpha = .05, with a sample size of 502 and an effect size of .4 yielded power of over .9 (Cohen, 1987).

Furthermore, as shown in Table 5, teacher mobility analysis revealed that the treatment teachers remained in the same schools at a higher rate than the control teachers. Among the treatment group teachers, only six of the teachers moved to a different school the following school year, accounting for a mobility rate of 2.4%. The mobility rate among the control group teachers was 19.1%. See Figure 6.

Table 5

Teacher Mobility Rates for the Treatment and Control Groups

			Mobility		
			Stayed in Same School	Moved to Different School	Total
Group	Control	Count	203	48	251
		Expected Count	224.0	27.0	251.0
		% within Depvar	80.9%	19.1%	100.0%
	Treatment	Count	245	6	251
		Expected Count	224.0	27.0	251.0
		% within Depvar	97.6%	2.4%	100.0%
Total		Count	448	54	502
		Expected Count	448.0	54.0	502.0
		% within Depvar	89.2%	10.8%	100.0%

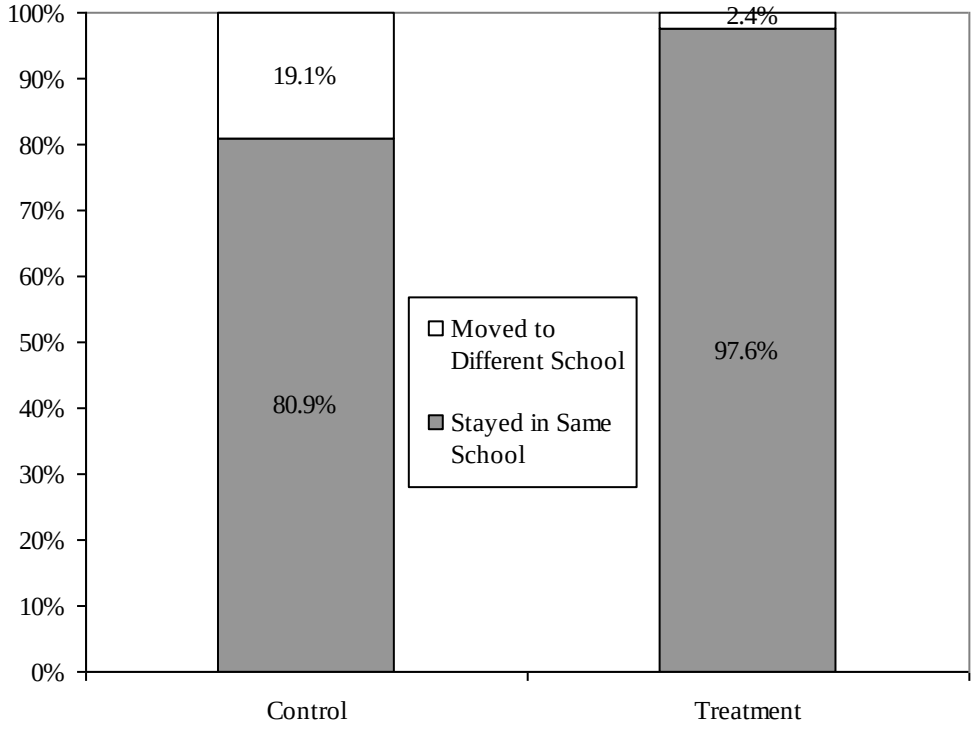

Figure 6. Mobility Rates among Treatment and Control Groups

An interpretation of effect sizes indicated a medium effect size of h =.6 for the effect of CCLC participation and teacher mobility. Post-hoc analysis given alpha = .05, with a sample size of 502 and an effect size of .6 yielded a power value greater than .995 (Cohen, 1987).

A chi-square test showed that the difference between the mobility rates for the treatment and the control groups was statistically significant: $\chi^2(1) = 36.60$, $N = 502$, $p < .05$. This shows a significant relationship between teacher participation in CCLCs and teacher mobility. So, teachers who were exposed to the CCLC treatment remained in the same schools at a higher rate (97.6%) than teachers who did not have exposure to the CCLC treatment (80.9%).

In summary, the retention and mobility analyses as well as the chi-square tests of significance indicate that teachers in the treatment group (teachers who participated in CCLCs) remained in the same schools and teaching in the state public schools at a higher rate than teachers who were not exposed to the CCLC treatment. Furthermore, the relationship between participation in CCLC and teacher retention was statistically significant, both in terms of teacher attrition and teacher mobility. I therefore retain my research hypothesis that a greater proportion of CCLC teachers remained in the schools they are in after one year of CCLC participation than teachers who did not participate in CCLCs.

Further analysis to compare attrition rates in the treatment and control schools before and after CCLC implementation was conducted using SPSS. Table B1 in Appendix B displays the attrition rates of the treatment and control schools before and

after CCLC implementation in order to provide additional context for this study. An explanation of how the attrition rates were calculated is also provided in Appendix B.

Research Question 2

Research question 2 pertained to the difference in teacher retention rate in schools where participation in CCLCs was mandatory and those in which participation was voluntary. This comparison was done among two groups: schools in which CCLC participation was mandatory and schools with voluntary participation. Schools that had a combination of both participation types were excluded from this analysis. The null hypothesis was that there will be no difference in teacher retention between the school with mandatory and voluntary CCLCs. Chi-square test of independence (χ^2 test) was used to test the relationship between teacher retention and levels of participation in CCLCs.

A total of 614 participants were in the initial database for this analysis. However, 205 of the participants had a combination of voluntary and mandatory participation in their schools. Due to the fact that the focus of this research question was on the schools for which participation was exclusively voluntary or mandatory, these 205 participants were not included in the analysis for question 2.

Table 6 and Figure 7 show the distribution of teachers who remain or leave teaching in the state public schools by CCLC participation type. The sample included 409 participants, 137 participants in schools where participation was voluntary and 272 teachers from schools in which participation was mandatory. Retention percentages for both groups of teachers were around 89%, 89.1% for teachers in voluntary schools and 89.3% for teachers in the mandatory schools.

Table 6

Retention Rates of CCLC Participants by CCLC Participation Type

			Retention		
			Left	Retained	Total
Participation Type	Voluntary	Count	15	122	137
		Expected Count	14.7	122.3	137.0
		% within Man_Vol	10.9%	89.1%	100.0%
	Mandatory	Count	29	243	272
		Expected Count	29.3	242.7	272.0
		% within Man_Vol	10.7%	89.3%	100.0%
Total		Count	44	365	409
		Expected Count	44.0	365.0	409.0
		% within Man_Vol	10.8%	89.2%	100.0%

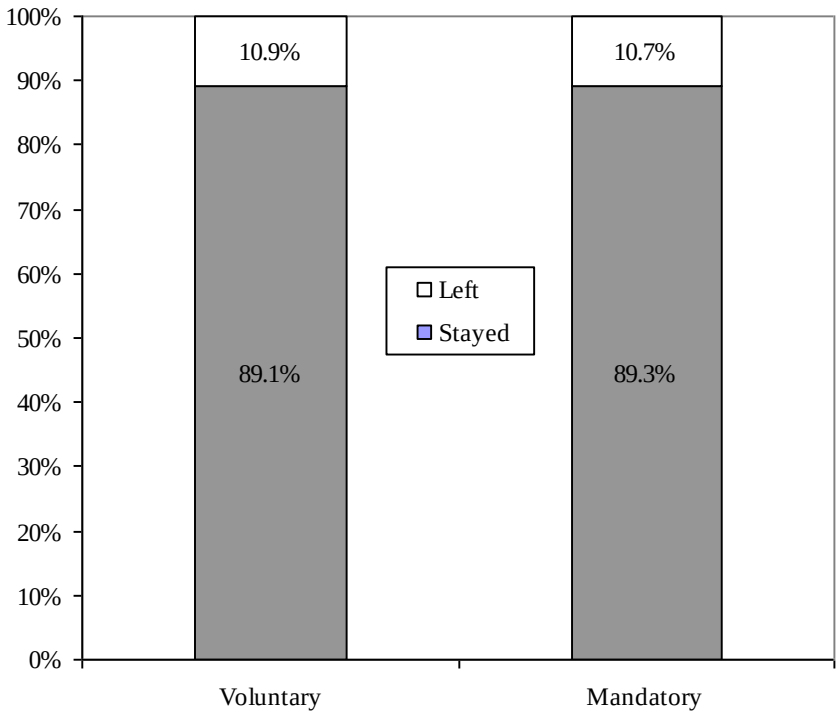

Figure 7. Retention Rates among Teachers in Mandatory and Voluntary Schools

The chi-square test to examine the relationship between participation type and teacher retention was not significant: $\chi^2(1) = .008$, $N = 409$, $p > .05$. Teachers in the schools where participation was mandatory were just as likely as those in the schools with voluntary participation to remain in teaching in the state public schools.

Analyses for mobility rates between the mandatory schools versus the voluntary schools showed a significant difference between the two sets of schools: $\chi^2(1) = 6.991$, $N = 409$, $p < .05$. Teachers in schools where participation was mandatory remained in the same schools at a higher proportion than teachers in the schools where participation was voluntary. A small effect size, $h = .3$ was found for the effect of the type of CCLC participation and teacher mobility. Post-hoc analysis given alpha = .05, with a sample size of 409 and an effect size of .3 yielded a power value of .99 (Cohen, 1987).

Table 7 and Figure 8 show that 87.5% of the teachers in the schools where participation in CCLCs was mandatory remained in the same schools compared to 77.4% of the teachers who were in schools with participation was voluntary.

Table 7

Mobility Rates of CCLC Participants by CCLC Participation Type

			Mobility		
			remained in school	left school	Total
Participation Type	Voluntary	Count	106	31	137
		Expected Count	115.2	21.8	137.0
	Mandatory	Count	238	34	272
		Expected Count	228.8	43.2	272.0
Total		Count	344	65	409
		Expected Count	344.0	65.0	409.0

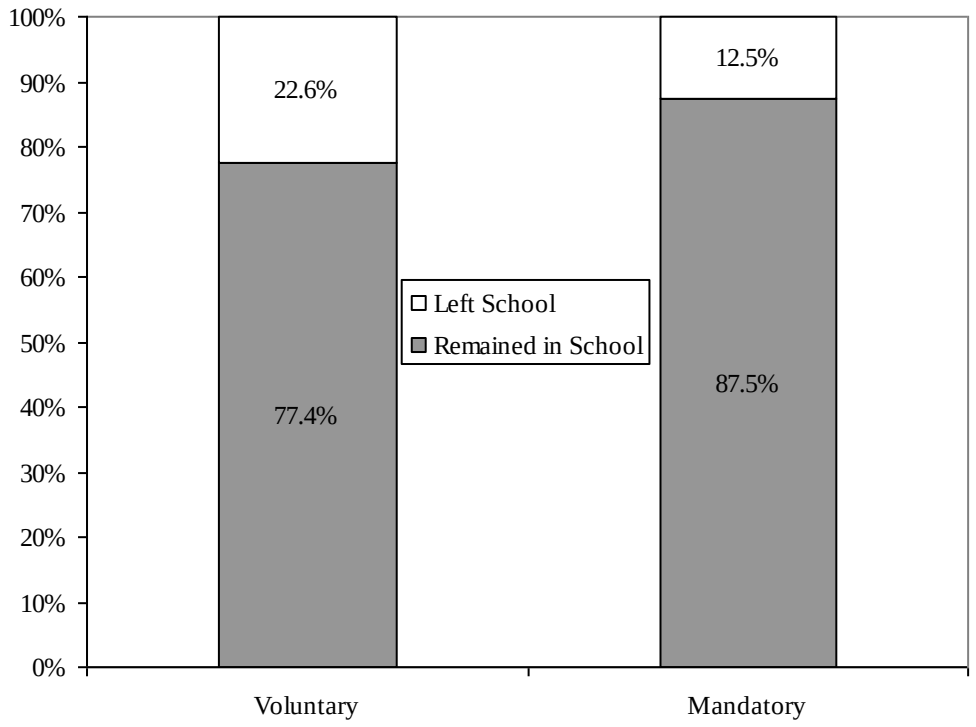

Figure 8. Mobility Rates among Teachers in Mandatory and Voluntary Schools

In summary, the analyses showed that there was no statistical difference in the retention rates among teachers who taught in schools where participation was mandatory compared to schools where participation was voluntary. However, there was a statistically significant difference in teacher mobility rates for teachers in the mandatory schools compared to the teachers in the schools where participation was voluntary. The null hypothesis for research question 2 stated that there will be no difference in schools where participation in CCLC was mandatory and schools where participation was voluntary. This hypothesis was not supported by the data, as a greater percentage of teachers (87.5%) in the schools with mandatory participation remained in the same schools the following school year compared to 77.4% of teachers in the schools where participation was voluntary.

Research Question 3

Research question 3 dealt with the difference in the retention rates of novice teachers (zero to three years experience) and veteran teachers (greater than three years experience) in participating CCLC schools. A total of 614 teachers were in the dataset used to answer question 3. Considering the strong relationship between turnover and experience, and given that teacher attrition is most severe among beginning teachers (Hanushek et al., 2004; Murnane, Singer, Willett, Kemple, & Olsen, 1991), the focus was on the differences in retention rates between novice teachers (zero to three years experience) and veteran teachers (greater than three years experience) in participating CCLC schools. The null hypothesis was that there is no difference in the retention rates of the novice and veteran teachers. Chi-square test of independence (χ^2 test) was used to test differences in the retention and mobility rates of novice and veteran teachers participating in CCLCs. The data, as displayed in Table 8 and Figure 9, show that 91.2% of the veteran teachers remained in teaching in the state public schools compared to 90.2% of the novice teachers participating in CCLCs.

Table 8

Retention Rates of CCLC Participants by Experience Type – Novice versus Veteran Teachers

			Retention		
			Left	Retained	Total
Experience Type	Novice	Count	9	84	93
		Expected Count	8.3	84.7	93.0
	Veteran	Count	46	475	521
		Expected Count	46.7	474.3	521.0
Total		Count	55	559	614
		Expected Count	55.0	559.0	614.0

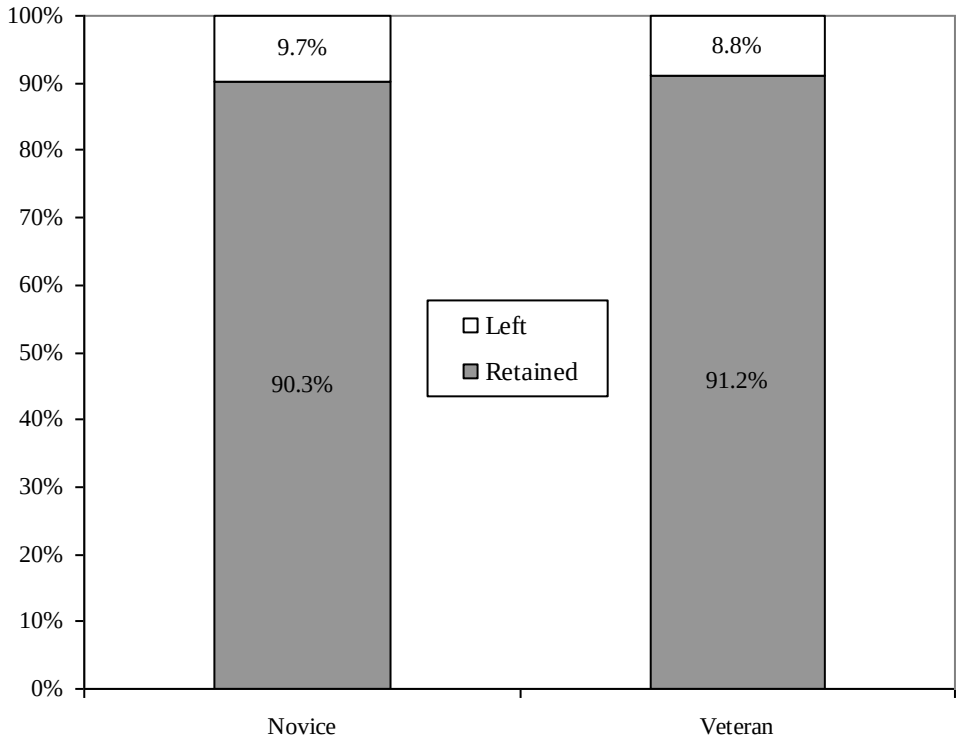

Figure 9. Attrition Rates among Novice and Veteran teachers in the CCLC Schools

Chi-square test of independence showed no significant difference in the attrition rates of the novice and the veteran teachers: $\chi^2(1) = .070$, $N = 614$, $p > .05$. Hence, veteran teachers in the CCLC schools did not remain in teaching at a higher rate than novice teachers.

Teacher mobility was not different between the novice and the veteran teachers, 13.9% of the novice teachers changed schools compared to 15.4% of the veteran teachers. Table 9 and Figure 10 show the distribution of novice and veteran teachers who moved to other schools within the Georgia public school system.

Table 9.

Mobility Rates of CCLC Participants by Experience Type – Novice versus Veteran Teachers

			Mobility		
			remained in school	left school	Total
Experience Type	Novice	Count	80	13	93
		Expected Count	78.9	14.1	93.0
	Veteran	Count	441	80	521
		Expected Count	442.1	78.9	521.0
Total		Count	521	93	614
		Expected Count	521.0	93.0	614.0

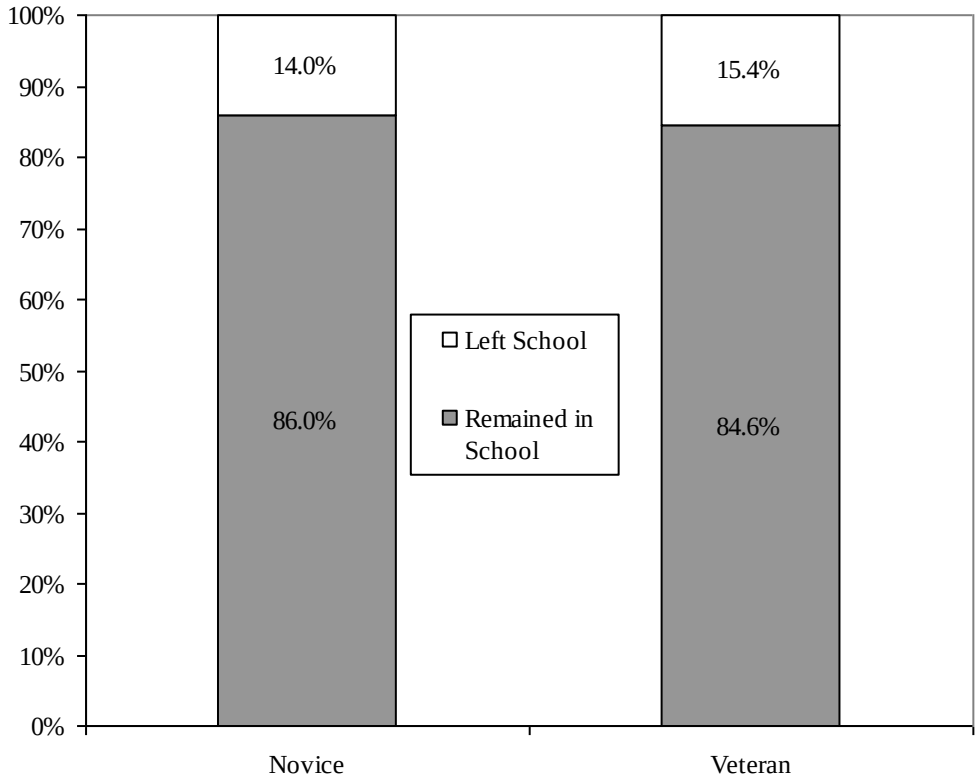

Figure 10. Mobility Rates among Novice and Veteran teachers in the CCLC Schools

Similarly, chi-square test of independence showed no significant difference in the mobility rates of the novice and the veteran CCLC teachers: $\chi^2(1) = .116$, $N = 614$, $p > .05$. Thus, the veteran teachers in the CCLC schools did not remain in the same schools at a higher rate than the novice teachers.

In summary, the hypothesis for research question 3 stated that there is no difference in the retention rates of the novice and veteran teachers. This hypothesis was supported by the data, because the results of the analysis show that there was no statistically significant difference in the retention and mobility rates of the novice and the experienced teachers.

Research Question 4

The final research question addressed the extent to which teachers' plans to continue teaching were influenced by their participation in a CCLC. This question was answered using the data that were gathered from a NET-Q Internet survey, in which a total of 120 teachers identified themselves as teachers participating in CCLCs. A confidence interval on the proportion of positives (versus non-positives) was established using a z-test on proportions to analyze the data. Table 10 shows the distribution of teachers' responses.

Table 10

Distribution of Teachers Survey Responses

	Observed n
Positive influence to continue teaching	37
No influence regarding continuing teaching	83

A confidence interval of $.2254 \leq P \leq .3912 \approx .95$ was obtained from the analysis, where P is the population proportion. This confidence interval does not cover zero; thus the observed proportion of .31 is significantly different than a population proportion of zero. I did not use finite correction factor because the N is large. Also, I used *z* of 1.96 rather than the more computational convenient value of a $z = 2$ as presented in Scheaffer, Mendenhal and Ott (2006). Appendix C provides a detailed description of how the confidence interval was computed.

Summary of Results

In this chapter, I examined the results of chi-square tests used to address the primary research question concerning the relationship between participation in CCLCs and teacher attrition. The results indicated that the difference between the attrition percentages for the treatment and the control groups was statistically significant: $\chi^2(1) = 21.17$, $N = 502$, $p < .05$. I also conducted analyses on teacher mobility rates, the results showed that the difference between the mobility rates for the treatment and the control groups was statistically significant: $\chi^2(1) = 36.60$, $N = 502$, $p < .05$.

Additionally, there was no difference in attrition rates in the schools with mandatory participation when compared to schools with voluntary participation. On the other hand, teachers in school with mandatory participation remained in the same schools at a higher proportion than teachers in schools with voluntary participation. No significant differences were noted in the attrition and mobility rates for the novice and the veteran teachers participating in the CCLCs. Finally, about 30.8% of the teachers who

responded to the NET-Q survey reported that participation in CCLC had a positive influence on their decision to continue teaching.

An interpretation of effect sizes indicated: (a) a small effect size of h =.3 for the effect of type of CCLC participation and teacher mobility, (b) a medium effect size, h =.4 for the effect of CCLC participation and teacher retention, and (c) a medium effect size, h =.6 for the effect of CCLC participation and teacher mobility.

CHAPTER 5

DISCUSSION

Research Questions

Four research questions guided my research study examining the relationship between participation in CCLCs and teacher retention. They are:

1. Do teachers who participate in CCLCs remain in teaching at a higher rate than teachers who do not participate in CCLCs?
2. Is there a difference in teacher retention rate between schools where participation in CCLCs was mandated and those in which participation was voluntary?
3. Are there any differences in retention rates of novice teachers (zero to three years experience) and veteran teachers (greater than three years experience) in participating PDSs with CCLCs?
4. For teachers who intend to continue teaching, to what extent are their plans to continue in teaching the next school year influenced by participation in a CCLC?

Ingersoll (2001) argues that the problem is that of keeping, not placing, qualified teachers in the classroom. Research shows that the reasons teachers give for leaving the profession are associated with the impact of isolation: lack of support, working conditions, lack of influence in school decision-making, classroom intrusions, and inadequate time to collaborate (Cooper & Alvarado, 2006; Darling-Hammond, 2003b; Ingersoll, 1999, 2002, 2007a, 2007b; Ingersoll & Smith, 2003; National Commission on Teaching and America's Future, 2003; Voke, 2002). While attrition due to familial concerns and some other reasons is an ongoing issue and difficult for schools to address, school climate issues such as teacher isolation and lack of support can be effectively

addressed within the school milieu through the use of PLCs to encourage "deprivatization of practice" (Louis and Marks, 1998), increase collaboration (Dunne, Nave, & Lewis, 2000), and moving school culture away from an isolationist orientation (Vescio et al., 2008).

Professional Learning Communities (PLCs) provide the collegial support and collaborative learning for novice and veteran teachers. This support could reduce the isolation and their frustration with the shortcomings of stand-alone practice, and significantly increase retention rates. In PLCs, supportive principals, teacher influence over decisions, collegial relationships, focused professional development, and collaborative work toward goals have all been shown to reduce teacher turnover by increasing job satisfaction (Darling-Hammond, 2003b; DuFour & Eaker, 1998; Glaser, 2003; Ingersoll, 1999; Lambert, 2002; Lambert & Walker, 2002; Scherer, 2003; Sparks, 2003). Participation in PLCs is one way that teachers can have teacher-to-teacher interactions that will help teachers develop professional relations. Relationships are paramount in helping teachers feel empowered, valued and committed to their schools (Fullan, 2001, p. 76), and school leadership may be able to increase teacher retention through encouraging professional relationships in which teachers feel valued.

The research on PLCs is extensive; however, much of the empirical research on PLCs have focused on the impact of PLCs on school culture, teachers' practice and student learning. Other research endeavors have focused on the difficulties in building the social and support structures necessary to allow for critical and deep inquiry into practice and the transition toward systemic change, the barriers along the way, and the strong support and guidance needed for PLCs (Reubel, 2011). In fact, extensive review of the

research literature (e.g. Stoll et al., Vescio et al.) focused on the impact of PLCs on the dynamics of PLCs and the impact of PLCs on student learning and teachers' practice. The research on the impact of PLCs on teacher retention is sparse. Similarly, much of the research regarding teacher retention has focused on the reasons that teachers leave. This study however, focuses attention on reason(s) for retention rather than attrition as noted by Nieto (2003). The current study seeks to extend the research on PLCs and CFGs to teacher retention.

The intent of this study was to examine the relationship between participation in CCLCs and teacher retention. Secondary research was concerned with teacher mobility and the impact of CCLC participation on teacher's decisions to remain in teaching. One major finding in the study was that teacher retention was higher among teachers participating in CCLC treatment groups. My study found statistical significance in the relationship between participation and none participation in CCLCs on the outcome variables of teacher retention and mobility. Medium effect sizes of h=.4 (teacher attrition) and h=.6 (teacher mobility) were noted. Fewer treatment teachers left teaching and moved from their schools than the control teachers. This suggests that participation in CCLCs had a positive impact on teacher retention and mobility. This outcome has educational policy implications. One approach by which school leaders can reduce teacher turnover is to encourage the development of PLCs in schools, provide time for teachers to collaborate, and encourage teachers to participate in PLCs. Effects of teacher participation in PLCs will tend to result in an improvement in teacher turnover rates. School districts especially those with more limited resources will see substantial savings in personnel replacement costs, thus freeing district resources for use in other

programmatic initiatives. Some school leaders may also benefit from participating in PLCs. This may expose school leaders to some of the issues and dilemmas that teachers encounter in the classroom.

My study results were consistent with expectations and similar to those reported by Black and Neel (2007). They reported in the GSU Induction Project Progress Report that CCLC members, particularly new teachers in CCLCs, were retained at higher rates than new teachers were retained in previous years for the participating schools. They reported higher retention rates (86%) for new teachers returning for the 2007-08 school year, a statistically significant higher rate than the 63% found for two of the participating school systems in prior years. My study findings support this, participation in CCLCs had a positive effect on teacher retention, as seen in the finding that the retention rate among CCLC teachers was 99.6% compared to 90.8% among the comparison group teachers.

Johnson and Birkeland (2003) reported that first- and second-year teachers in integrated professional cultures were more likely to remain in public schools after their 1st year of teaching. They reported that 89% of the teachers in their study remained in public schools, compared with 83% from novice-oriented cultures and 75% from veteran-oriented cultures. They also reported that 83% of the teachers who had worked in integrated professional cultures during their 1st year remained in the same schools during the 2nd year, as compared to only 55% of those from veteran-oriented cultures and 67% of those from novice-oriented cultures. My findings are also consistent with these findings, 99.6% of teachers in CCLC groups (treatment) remained in teaching in this state’s public schools compared to 90.8% in the control group (non- treatment) teachers.

Furthermore, 97.6% of the treatment teachers remained in the same schools compared to 80.9% of the non-treatment teachers.

Berry, Daughtrey and Wieder (2009) found in their regression analysis on the Teachers Network survey, that colleagues' support was the only school culture factor significantly associated with teachers' planned long-term retention. Teachers who planned to stay in the classroom for up to five years cited opportunities for professional learning or high standards among staff as most important. But colleagues' support was the only school culture factor significantly associated with teachers' planned long-term retention. But collaboration was by far the dominant factor in retaining teacher leaders for 10 ($p < .05$) or 15 ($p < .01$) years. Although their study was not specifically on PLCs, my finding on the impact of CCLC participation on teachers' intention to continue teaching supports this finding. Almost one-third of the teachers who completed the NET-Q survey reported that that participation in CCLCs had a positive influence on their decision to continue teaching. This finding also supports the finding that teachers in the CCLC groups (treatment) remained in teaching and in the same schools at higher rates than the control group (non-treatment) teachers.

My study further addressed Feger & Arruda's (2008) call for additional empirical research to help clarify the issue within the literature, "while characteristics and activities [of PLCs] are described, the question of whether to mandate PLCs at the school or district level is not well defined" (p. 5). Whereas DuFour (2004) advocates for school wide participation and maintains that schools cannot allow teachers to opt out of participating, others such as Kline (2007) noted that perceptions of PLCs were viewed in a more positive way when framed as voluntary rather than required activities. Consequently,

school leaders face a dilemma. By mandating participation, school leaders potentially risk inadvertently disempowering and alienating teachers through the teachers' perceived loss of autonomy or, if participation was left voluntary, school leaders risk having less than optimal numbers of teachers participating, thus prohibiting the school-wide implementation that DuFour advocates.

My study provides empirical evidence needed to determine the effect of participation in PLC-type professional development groups on teacher attrition and mobility percentages and if attrition and mobility differs between teachers who are mandated versus those who voluntarily participate. There was no significance difference in attrition rates between CCLC mandated and voluntary schools, however, mobility rate was lower in schools CCLC mandated schools than in the voluntary schools. This suggests that school-wide participation in CCLCs may have encouraged the teachers in the CCLC mandated schools to remain in the same schools at a higher rate than teachers in the schools where participation was voluntary. This may also suggest that making participation in CCLCs mandatory was not seen as negative considering that it positively impacted teacher mobility rates in the schools.

Participation in CCLCs was beneficial to the novice as well as the veteran teachers. There were no significant differences in the attrition and mobility rates of both the novice and the veteran teachers. PLCs such as CCLCs help novice teachers develop collegial relationships and navigate school norms while at the same time reinvigorate and energize veteran teachers.

Some of the noted benefits of PLCs are: (a) reducing teacher isolation, (b) increasing job satisfaction and higher morale, (c) increasing peer learning and, (d)

increasing knowledge of effective teaching strategies (Annenberg Institute, 2004; The Center for Comprehensive School Reform and Improvement, 2009). These imply that teacher retention can be enhanced by professional learning communities. In this study, I argue that permitting teachers to develop positive relationships with their colleagues, such those that occur in CCLCs, a form of PLC, is crucial to teacher retention. Teachers' involvement in CCLCs provides an avenue for teachers to share their concerns and problems. This opportunity may help improve teacher morale and effectiveness and may help to drastically reduce retention issues especially in high-need schools as noted in this study.

Limitations of the Study

This study has some limitations. The first limitation was the economic downturn which seemed to be a mediating factor in the retention rates for the 2011-2012 school year. This could have made teachers remain in the state public schools or in the same schools due to the low prospects of finding employment in the teaching profession or elsewhere. Future analysis using the annual CPI teacher counts may show the actual situation regarding attrition and mobility trend data. Second, the majority of the treatment teachers were employed in a school system that has a culture of professional development. This could have also impacted teacher retention.

Furthermore, a true experimental design could not be used in the study. A true experimental design requires that participants be randomly assigned to treatment and comparison groups. This condition could not be met in this research study. Participation in the treatment group was based on CCLC participation which was an existing condition

prior to implementing this study. Thus, I had no control regarding the percentages by ethnic group, gender, experience and age groups, grade level and other variables. Furthermore, because participants were not randomly assigned to the treatment and control groups, causal inferences become more difficult to support and threats to internal validity, especially selection, are heightened.

Another limitation is that the CCLCs were in the initial phase of implementation in most of the schools. Most of the CCLC groups in the study were in their first phase of implementation. Thus, mobility rates were examined for just one year.

Summary and Suggestions for Further Research

Few studies have been conducted with respect to teacher retention and PLCs. This observation may represent a deficiency in primary research on how participation in PLCs and others such as CCLCs impact teacher attrition and/or mobility. This research can provide a guideline by which other interventions for teacher retention can be compared. Study results showed that teacher retention and mobility rates among teachers in the CCLCs (treatment) were higher than those reported for the teachers control group (non-treatment).

It should be noted that these findings are the result from this particular study and additional investigation is recommended. Data used in my study were collected in the first year following CCLC implementation in the NET-Q grant. Although, I found significance in my study, these data from the first year of implementation really represent baseline data for the program. It may not give a true and convincing representation of the potential impact of the program on teacher retention. Hence, longitudinal research would

be of value. Future research endeavors based on my study could include a larger sample which will include more treatment school systems, school levels, and schools. Future research also could examine if there are any differences in the retention and mobility rates between elementary and high school teachers. The findings of this study provide an impetus for further investigation into the impact of PLCs on teacher retention. I would encourage additional studies over the life of the NET-Q grant so that a solid research base on the impact of the CCLCs would be established. However, future researchers ought to be able to build upon this research to conduct similar analysis on the impact of PLCs and other similar professional development work.

An extension of this research study could include the use of qualitative research methods. Adopting qualitative research methods could provide additional data regarding how teachers' decision to remain in teaching was influenced by their participation in CCLCs. Furthermore, conducting observations during CCLC meetings and teacher and school leader interviews would provide rich and deep information regarding the fidelity of the CCLC implementation and the efficacy and impact of the CCLCs on the teachers, the schools and the school culture.

Finally, as teachers are given the tools and time to collaborate (as in the case with the CCLCs) and as they become life-long learners, it is hoped that their instructional practices will improve, and that they are ultimately able to increase student achievement far beyond what any of them could accomplish single-handedly. Thus, future research building upon this study could examine the impact of participation in CCLCs on student achievement.

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APPENDIXES

APPENDIX A

GENERATING A COVARIATE CODE (COVCODE)

The coding for the variables is as follows:

- School System – System A =1, System B =2, and System C = 3.
- School Level – Elementary =1, middle grades = 2, high school = 3, and other = 4.
- Age Group – 21 to 35 years = 1, 36 to 50 years = 2, 51 to 65 years =3, and 65 years and above.
- Ethnicity – White =1, African American=2, Other =3.
- Experience Group – 0 to 5 years =1, 6 to 10 years = 2, 11 to 15 years = 3, 16 to 20 years = 4, 21 to 25 years =5, 26 to 30 years =6 and 31 years and over = 7.
- Certificate Level – Bachelors = 1, Masters = 2, and Education Specialist/Doctorate = 3.
- Certificate Type – This variable refers to the type of certificate held by the teachers, and was categorized into the Teaching = 1, Intern/Nonrenewable = 2, Performance Based = 3, and 4= other.
- Teaching Area – Regular = 1, and special education = 2.

The formula used to generate the covariate code was:

*COMPUTE covcode=10 ** 9 + (SchlSys1 * 10 ** 8) + (School_level * 10 ** 7) +(AgeGrp4 * 10 ** 6) + (0 * 10 ** 5) + (NewEthnicity * 10 ** 4) +(ExpGroup * 10 ** 3) +(NewCertLevel * 10 ** 2)+ (NewCert_Code * 10 ** 1) + (RegEd_Sped).*

So, for a hypothetical teacher who is teaching in school System A, in an Elementary school, who was 40 years old, who was White, with 8 years of teaching experience, teaching with a Masters degree, holding a Performance Based certificate and teaching special education, the covariate code generated was 112012232. Thus, a teacher in the treatment group with covcode 112012232 was matched with someone in the control group who had the same covcode. If two or more teachers in the control group matched a CCLC (treatment) teacher, then one teacher from the control group was randomly selected.

APPENDIX B

CALCULATING ATTRITION RATES FOR TREATMENT AND COMPARISON SCHOOLS BEFORE AND AFTER CCLC IMPLEMENTATION

Further analyses to compare attrition rates in the treatment and control schools three years before and one year after CCLC implementation were done using SPSS. Annual CPI databases were matched from one school year to another to determine the attrition rates. Table B1 shows the attrition rates in each of the schools three years before and one year after CCLC implementation in the NET-Q grant. The data revealed that attrition rates dropped from FY10 to FY11 in four out of the seven treatment schools that had CCLCs. In addition, attrition rates were lower in five out of the seven treatment schools when compared to the attrition rates in their comparison schools.

Table B1

Attrition Rates in Treatment and Comparison Schools Before and After CCLC Implementation

School	FY07 % Attrition from School	FY08 % Attrition from School	FY09 % Attrition from School	FY10 % Attrition from School	FY11 % Attrition from School
Treatment School A (M)	24.3	20.8	14.3	13.4	9.9
Control School A	17.3	36.6	25.0	15.4	16.2
Treatment School B (M)	27.7	26.1	13.1	13.3	15.8
Control School B	17.9	25.3	14.3	8.5	17.9
Treatment School C (V)	28.0	29.4	20.8	16.7	28.0
Control School C	16.0	12.0	42.9	38.9	52.9
Treatment School D (V)	17.4	24.0	23.6	18.7	25.3
Control School D	17.6	15.2	20.2	11.9	24.4
Treatment School E (V)	19.4	47.8	24.3	18.9	9.1
Control School E	12.2	18.6	7.3	16.3	10.0
Treatment School F (C)	28.2	19.8	24.0	30.3	14.8
Control School F	23.6	21.4	24.1	46.4	6.3
Treatment School G (C)	24.3	17.8	14.1	15.0	9.9
Control School G	24.6	26.0	21.6	16.7	20.6

Note. M denotes mandatory participation; V denotes voluntary participation, while C denotes a combination of voluntary and mandatory participation.

Matching on the school level was based on three variables; ethnic group, free and reduced lunch percentages, and student achievement. While, matching on the teacher level was on eight either school or system level variables. The following discussion focuses on the upper right hand quadrant of Table B1. Further analysis comparing attrition rates in CCLC mandatory schools with comparison schools showed that attrition rates in the mandatory schools were lower than in the control schools the year following CCLC implementation (FY11) based on point estimates. From a descriptive statistics viewpoint, although the attrition rate in treatment school B, increased from FY10 to FY11, the rate was still lower than the attrition rate reported in control school B. The left vertical line shows some history of attrition rates in the schools. While the bottom section of the horizontal line shows context with the voluntary and the combination schools where only a limited number of teachers participated in CCLCs. As a result, data on the voluntary and combination schools may only represent a small percentage of the teachers in the school.

APPENDIX C

COMPUTING THE CONFIDENCE INTERVAL FOR RESEARCH QUESTION 4

$\hat{p} = \frac{\text{Proportion of possible responses}}{\text{Total number of responses}}$

$\hat{p} = \frac{37}{120}$

$\hat{V}(\hat{p}) = \frac{\hat{p}\,\hat{q}}{n - 1}$

Where $\hat{q} = 1 - \hat{p}$

$\hat{V}(\hat{p}) = \frac{(.3083)\ (1-.3083)}{120 - 1}$

$\hat{V}(\hat{p}) = \frac{(.3083)\ (.6917)}{120 - 1}$

$\hat{V}(\hat{p}) = \frac{.2133}{119} = .00179$

$\sqrt{\hat{V}(\hat{p})} = .0423$

$z\sqrt{\hat{V}(\hat{p})} = (z)\ (.0423)$

$1.96\sqrt{\hat{V}(\hat{p})} = (1.96)\ (.0423)$

$= 0.0829$

Confidence Interval

$= (\hat{p} - 0.0829 \leq P \leq \hat{p} + 0.0829) \approx .95$

$= (.3083 - 0.0829 \leq p \leq .3083 + 0.0829) \approx .95$

$= .2254 \leq P \leq .3912 \approx .95$

The confidence interval does not include zero; thus, the observed proportion of .31 is significantly different than a population proportion of zero.

I did not use finite correction factor because the N is large. Also, I used *z* of 1.96 rather than the more computational convenient value of a z = 2 as presented in Scheaffer, Mendenhal, and Ott (2006).