AN INVESTIGATION INTO THE RELATIONSHIPS AMONG MIDDLE SCHOOL TEACHERS' BELIEFS ABOUT COLLABORATION, THEIR PERCEPTIONS OF FORMATIVE ASSESSMENT, AND SELECTED TEACHER CHARACTERISTICS

by

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AN INVESTIGATION INTO THE RELATIONSHIPS AMONG MIDDLE SCHOOL TEACHERS' BELIEFS ABOUT COLLABORATION, THEIR PERCEPTIONS OF FORMATIVE ASSESSMENT, AND SELECTED TEACHER CHARACTERISTICS

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The purpose of this descriptive study is to examine the relationships among middle school teachers' beliefs about collaboration, their rationale for using common formative assessments, and selected teacher characteristics that might help explain these beliefs and rationale. Previous research separately shows that collaboration and formative assessment practices each influence higher student achievement. Previous research also suggests that these practices are underused and usually not connected programmatically. This study aims to understand the gap between research supported education theory and classroom teaching practices. A parallel mixed methods design that merges interview data and survey data was used for this study. Seventy-six middle school teachers from two middle schools were purposefully selected to complete an online survey about teacher characteristics, collaboration, and common formative assessments. The school sites were selected because they have a mandate that requires teachers to use common formative assessments and to collaborate regularly in professional learning communities

(PLCs), thereby ensuring that the participants have experience with the practices being examined.

The findings indicate that teachers believe collaboration benefits instruction and assessment informs instruction. The findings suggest that age might play a role in the relationship between teacher beliefs and assessment. They also suggest that the degree to which teachers get along with each other influences the success of a collaborative group and that collaboration is not limited to structured meetings.

PREFACE

Based on eight years of working in K-12 schools I have observed Professional Learning Communities (PLC) content teachers working collaboratively to improve student learning through reflection on instruction and learning, in two conditions: (a) implemented as successful collaborative groups and (b) implemented as punitive, unsupportive groups. In the case where professional learning communities have been implemented successfully, all teachers supported each other by sharing materials, lesson plans, and assessments, and by co-creating classroom materials. In the case where professional learning communities have been implemented unsuccessfully, teachers often felt threatened by their colleagues and did not support one another; teachers only focused on the achievement of their individual students. Two distinct experiences at the same school with two different PLCs exemplify the differences between a collaborative, successful PLC and a punitive, unsuccessful PLC. As a member of a productive science PLC, I recall working with my PLC team to design activities around a newly available piece of technology. The PLC leader announced at a meeting that we now had wikis available and we were challenged to figure out a way to use them in the classroom. We spent the meeting working on ideas together and developed a wiki vocabulary tool for all of our students to use.

This positive PLC experience contrasts vividly a negative PLC event experienced several years earlier while I was working with a different group of people. During my first year teaching mathematics, I worked with an unproductive, punitive PLC. While attending a mathematics PLC meeting I was asked to share my students' scores on a recent assessment. After sharing my scores my PLC leader told me that I had to work harder to get my scores up, and when I requested some of her materials she avoided sharing her resources with me and redirected all the responsibility toward me.

These two incidents capture only two examples, but the cases speak to the overall tone of all the respective PLC meetings. The mathematics PLC was punitive, and not helpful to daily teaching, while the science PLC was collaborative and helpful to daily teaching. The perception of the administration was that both PLCs were highly productive because the overt actions observed by the administrators looked the same with both PLCs: common assessments were given and PLCs met regularly. However, as I learned during several individual meetings with the school principal, the administration was unaware of the two very different processes that the groups enacted which resulted in the same observable outcomes. The view of the administration was obscured because of their limited engagement with the actual daily events of the PLC; administrators rarely attended PLC meetings and rarely asked for feedback from PLC members. And, it is the experience that is significant to the teacher, not the end result; therefore I think the process teachers experience needs to be investigated further so that it can be determined what makes PLCs significant to teachers. It is important to disentangle collaboration beliefs, collaboration practices, assessment values, assessment beliefs, and perceptions of

common formative assessment uses so that the embedded processes and experiences can be determined and understood.

CHAPTER 1. INTRODUCTION

The purpose of this study was to describe teachers' beliefs and practices of peer collaboration and their opinion of using common formative assessment (teachers working together to design and administer assessments). Collaboration in the context of this paper is defined as educators working together to raise the achievement of all students (Clement & Vandenberghe, 2000). Common assessment is of national importance because 4.35 billion dollars of federal funding of the "Race to the Top Program of 2009" (Race to the Top) has been made available to the states in an effort to reform state and local K-12 education. Race to the Top applicants are awarded funding based on selection criteria that include implementing common standards, transitioning to high-quality assessments, and designing and implementing common assessments (U.S. Department of Education, 2010b). Additional emphasis on common assessments is evident in the congressional act, Elementary and Secondary Education Act (ESEA), more commonly referred to as "The No Child Left Behind Act of 2001," which carries with it $24.4 billion dollars in federal funds available to states that implement assessments at specific grade levels that show student improvement over the year (U.S. Department of Education, 2003).

Assessment, as defined by Popham (2003), refers to any activity designed to uncover covert abilities, skills, or knowledge using an overt action. The terms test and assessment are used interchangeably in the assessment community (Popham, 2003), but

this study will use the term assessment. Assessment activities can be formal measures of student learning, such as written tests, or assessments can be informal measures of student learning, such as teacher questioning of individual students and student groups or observations of individual students and student groups. Most assessments fall into two categories, summative and formative. Summative assessment refers to an assessment of learning that occurs after instruction and is often used to grade, rank, or hold students accountable (Popham, 2003). Formative assessment differs from summative assessment in purpose and implementation with the purpose to inform instruction and implementation occurring during instruction.

The term formative assessment was first used by Michael Scriven (1967) and was defined as a method for enabling teachers to make timely instructional decisions using student data. Formative assessment can involve formal and informal methods for collecting student data. Any opportunity for a student to demonstrate learning, such as observations, performance tasks, portfolios, science laboratory activities, and paper/pencil tests, can be used as a formative assessment if teachers and students then make decisions based on the data from the assessment (Popham, 2003). The intent of formative assessments is not to assign grades, but to provide information to students and teachers during instruction. The idea that formative assessment forms instruction and informs students and teachers is generally agreed upon in the literature (e.g., Ainsworth & Viegut, 2006; Bell & Cowie, 2001; Black & William, 1998; Fisher & Frey, 2007; Popham, 2003; Reeves, 2007). Formative assessment enables teachers to make timely and data-based instructional decisions that ensure individual student learning needs are

met. One variation on formative assessment is common formative assessment. The term common formative assessment is defined by Larry Ainsworth and Donald Viegut in *Common Formative Assessments* (Ainsworth & Viegut, 2006). Common formative assessments are frequent, collaborative, moldable, and responsive assessments designed by teachers who work collaboratively to help a group of students develop agreed upon knowledge and skills.

A critical element of common formative assessment is the collaborative work in which teachers engage. The idea of collaboration is often operationalized in schools through professional learning communities (PLCs). Professional learning communities are structured in a similar way to the communities of practice discussed by Wenger (1998). Wenger argues that learning communities encourage professional growth because members bond over common purpose and use their developed personal relationships to strengthen their professional growth (Wenger, 1998). One purpose of the PLC is to develop assessments all members of the group give simultaneously to their students and then return to a follow-up meeting to discuss results and future instruction. Collaboration is defined and explained in the research on Professional Learning Communities by DuFour, Eaker, and DuFour (2006) in *Learning by Doing: A Handbook for Professional Learning Communities at Work*. DuFour, Eaker, and DuFour (2006) describe a professional learning community as collaborative learning among colleagues used in schools as a way to organize teachers into working groups. Collaboration is often facilitated through participation in PLCs. As explained by Reynolds (2009), PLCs allow for frequent interaction among colleagues across all levels of experience which allows

teachers to maintain a sense of shared responsibility for the success of all students involved, not just for the ones in their own classrooms. Collaboration in the context of this paper refers to working with colleagues to reach a consensus on the knowledge and skills necessary for the success of a shared group of students (DuFour et al., 2006).

This research describes how teacher background characteristics might explain relationships among collaboration beliefs, collaboration practices, assessment factors, and perceptions of common formative assessment use. Collaboration beliefs and practices include the aspects of sharing, outputs, and productivity. Common formative assessment aspects include ideas such as evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload. It has been established in the literature that teachers who use formative assessment, collaboration, and common formative assessment implement instruction that results in improved student learning (Ainsworth & Viegut, 2006; Black & Wiliam, 1998; Fuchs & Fuchs, 1986; Fontana & Fernandes, 1994; Graham, 2007). It has also been found that although productive, teachers rarely use collaboration, formative assessment and common formative assessment practices (Cizek, Fitzgerald, & Rachor, 1996; Forbes, 2007; Graham, 2007; Maclellan, 2001; McNair, Bhargava, Adams, Edgerton, & Kypros, 2003). This study explored the relationships among collaboration beliefs, collaboration practices, assessment factors, and perceptions of assessment use in order to understand the role selected teacher characteristics played in these relationships.

Purpose

The purpose of this study was to explore teacher beliefs, rationale and characteristics. This mixed methods parallel design, also known as concurrent design, merged both qualitative and quantitative data to better understand teacher collaboration practices, teacher collaboration perceptions, assessment factors, and teacher perceptions of common formative assessment as they relate to teacher background characteristics (TBC). The school sites selected for this study have been implementing common formative assessments for five years. Both school sites have been recognized by the education community as models of professional learning communities, as evidenced by, district and state requests to observe the schools' PLC in action, and by the national presentations both principals have made on this topic. The literature suggests that both collaboration and common formative assessment are not highly practiced (Cizek, Fitzgerald, & Rachor, 1996; Forbes, 2007; Graham, 2007; Maclellan, 2001; McNair, Bhargava, Adams, Edgerton, & Kypros, 2003), and the examination of the beliefs of teachers about common formative assessment at the chosen sites provides an opportunity for specific information. Ainsworth and Viegut (2006) argue that formative assessments are most powerful when they are designed, implemented, and analyzed collaboratively, often within a PLC. They and DuFour further argue that the critical link between formative assessment and common formative assessment is collaboration. This study seeks to describe the relationships among selected teacher background characteristics, collaboration practices, collaboration beliefs, perceptions of common formative assessment use, and aspects of common formative assessment that are valued by the teachers.

Rationale

The "No Child Left Behind Act of 2001" (NCLB) and "Race to the Top Program of 2009" are evidence of the growing movement in education to encourage teachers to use assessment. Assessment is the expectation of administrators and PLCs were often used by school districts as a means to compose assessments. . These movements have led administrators and school district leaders to devote significant time to the implementation of PLCs. NCLB is federal legislation introduced by President George W. Bush in 2001 that sets high standards and measurable goals by enacting a standards-based education model. NCLB brings the idea of the education achievement gap to the forefront. The achievement gap refers to the observed disparity among student subgroups on performance in school, generally divided by race, ethnicity and gender. A critical component of this legislation requires states to create and administer basic assessments to all students at specific grade levels. This emphasis on assessment as a tool for accountability has increased the pressure on individual schools and teachers to collect data throughout the year so that they can prepare students for the state accountability tests.

There is increased emphasis on individual accountability as a result of NCLB and the self-authored assessments many teachers use to monitor their students' progress in a standards-based curriculum serve to address the need for accountability. The Race to the Top Fund is an incentive program designed to instigate reforms in K-12 education in four areas (U.S. Department of Education, 2010b):

- Adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy;
- Building data systems that measure student growth and success, and inform teachers and principals about how they can improve instruction;
- Recruiting, developing, rewarding, and retaining effective teachers and principals, especially where they are needed most; and
- Turning around our lowest-achieving schools.

All states are eligible to apply for Race to the Top funding with awards being given to the states with the most achievable and ambitious plans for reform. State applications for funding are scored on a 500 point scale, with 70 points devoted to standards and assessment. The specific criteria evaluated relating to standards and assessment include: developing and adopting common standards; supporting the transition to enhanced standards and high-quality assessments; and, developing and implementing common, high-quality assessments. Phase 1 and Phase 2 of Race to the Top resulted in Delaware, the District of Columbia, Florida, Georgia, Hawaii, Maryland, Massachusetts, New York, North Carolina, Ohio, Rhode Island, and Tennessee being awarded funding (U.S. Department of Education, 2010a).

The emphasis on adopting common standards paves the way for collaboration because the consensus about what to teach is mandated for the teachers and establishes a common goal. The Common Core Standards Initiative is a state-led effort facilitated by the National Governor's Association (NGA) and the Council of Chief State School

Officers (CCSSO) (U.S. Department of Education, 2009). Thirty-eight states and the District of Columbia have adopted common core standards, with Oregon most recently adopting common core standards October 29, 2010 (National Governors Association Center for Best Practices and the Council of Chief State School Officers, 2010). If teachers are addressing the same content across classrooms then it becomes more natural and efficient to share ideas because they are working with the same material. The drive to develop high quality assessments encourages formative assessment in classrooms because teachers need to know how their students are performing prior to the end-of-the-year summative assessments.

Emphasis of assessment and collaboration in the standards. Each of the governing associations for the core content areas advocates for assessment of some type as seen in the National Science Education Standards (NSES), the National Council of Teachers of Mathematics (NCTM) standards, the National Council of Teachers of English (NCTE) standards, and the National Council for the Social Studies (NCSS). Each organization includes both standards for content and standards for assessment. In addition to addressing content and assessment, each of the content areas includes suggestions on collaboration. Even though the publications from the governing organizations devote significantly less attention to collaboration than they do to assessment, at least by addressing collaboration a clear message of value is sent. National Science Education Standards were established by the National Research Council (NRC) in 1996 and provide an overview of the guiding research-based principles in

science education. Principles and Standards for School Mathematics (2000) are guidelines authored by the National Council of Teachers of Mathematics that outline recommendations that ensure that all students receive the highest quality mathematics teaching. The National Council of Teachers of English in collaboration with the International Reading Association (IRA) developed standards devoted to supporting the teaching and learning of English and language arts. In 1991, IRA and NCTE collaborated to describe standards for assessment in Standards for the Assessment of Reading and Writing (1994). The National Council for the Social Studies in 1994 developed curriculum standards, Expectations of Excellence: Curriculum Standards for Social Studies (1996). The associations for education practitioners in each of the content areas communicate the importance of assessment and collaboration by including assessment and collaboration recommendations in their publications as discussed below.

Assessment and collaboration in science. The National Science Education Standards (1996) advocate for assessments that are formative and summative. The National Science Education Standards (1996) include a description of the purpose of assessments that emphasizes that assessments should communicate information about teaching and learning to students, educators, parents, and external stakeholders. The NSES emphasize the use of feedback as a means for enabling change at all levels,

> Assessment data provide students with feedback on how well they are meeting the expectations of their teachers and parents, teachers with feedback on how well their students are learning, districts with feedback on the effectiveness of their

> teachers and programs, and policy makers with feedback on how well policies are working (p.76, 1996).

Additionally, the NSES insist that students learn from assessments. The assessment process outlined in the standards includes four components: data use, data collection, methods to collect data, and users of data. The term "data use" includes using data to plan for teaching, allocate resources, and assign grades. Data collection is identified for the purpose of describing and quantifying student achievement, teacher preparation, and program instruments. Methods to collect data include paper/pencil testing, interviews, portfolios, and performance observation. Users of data consist of teachers, students, parents, policy makers, and administrators. These four components can be merged in different ways to meet the needs of varying populations. For example, teachers use student data collected during an observation to design teaching practices. Even without directly stating that formative assessment should be included in science curriculum the standards convey the message by including components accepted as part of formative assessment, such as using assessment data to change instructional plans. The National Science Education Standards (1996) encourage collaboration in Chapter 3: Science Teaching Standards. Teaching Standard A includes "work together as colleagues within and across disciplines and grade levels" (p.30, 1996). The standards emphasis that collective planning is critical to successful teaching and the teachers should use colleagues as a resource.

Assessment and collaboration in mathematics. The mathematics education community emphasizes aspects of formative assessment in their standards. The NCTM

standards include a section on assessment, articulating that "assessment should support the learning of important mathematics and furnish useful information to both teachers and students" (NCTM, 1989). The NCTM stance on assessment advocates for assessments that move learning forward and occur during instruction. NCTM standards articulate that assessment should guide teachers and students to make instructional decisions based on student learning. Mathematics assessment data should focus on understanding and can be collected through questions, interviews, writing tasks, and observations. By advocating for assessments that provide information to students and teachers, NCTM is addressing an important component of formative assessment: data should be used to inform instruction. The NCTM (1989) standards explicitly describe the benefits of collaboration, **"**collaborating with others--pairing an experienced teacher with a new teacher or forming a community of teachers--to observe, analyze, and discuss teaching and students' thinking is a powerful, yet neglected, form of professional development" (p. 89, 1989).

Assessment and collaboration in English and reading. Standards for the Assessment of Reading and Writing (1994) include guidelines for creating assessments that are designed to improve the achievement of all students and to measure student progress toward national education standards. Portfolio assessments, project based assessments, and performance tasks are provided as models of credible evidence for English and language arts student data. The language arts and reading standards support formative assessment by describing assessments as a means for collecting evidence about student knowledge and minimize the use of assessments to rank students. Standards for

the Assessment of Reading and Writing (1994) call for an assessment process that not only involves multiple perspectives, but also incorporates multiple stakeholders in the design, development, interpretation, and reporting of assessments. Collaboration is included in teaching recommendations by science educators, mathematics educators, and English and language arts educators.

Assessment and collaboration in social studies. The development of the National History Standards has a lengthy history that includes competition among the competing interests of historians, social scientists, social efficiency reformers, and educators. The struggle to create National History Standards that both inform students about history accurately and enable students to develop as citizens is at the center of the debate. Because of the debate about what to teach and the compromises made over time on the standards, they do not address how to teach as much as the other standards do (Kliebard, 2004). Following the debate in the 1990s surrounding the National History Standards new standards gained acceptance; *Expectations of Excellence: Curriculum Standards for Social Studies* (1996) are content driven, but the National Council for the Social Studies position statement addresses the need for assessment and accountability in social studies. The position statement addresses the organization's concerns with the lack of focus on social studies assessment in "The No Child Left Behind Act of 2001" and calls for revisions in the reauthorization that include assessment requirements for social studies. The request for social studies to be included in national accountability is clear, "[s]ocial studies educators need and want assessment results and data to improve their practice" (Griffin, 2010, p. 2). While the position statement goes into great detail

about the need for assessment, there is less detail surrounding the NCSS position on collaboration. The NCSS advocates for teachers to work together to disaggregate data to reflect on practice.

National attention on assessment and collaboration. United States Secretary of Education Arne Duncan and former United States Secretary of Education Margaret Spellings significantly contributed to the authorship of legislation that is making educators more accountable by requiring states to measure student academic progress. Federal law requires each state to measure academic progress in reading and math in grades 3 through 8 and once during grades 10 through 12, and in science at least once during grades 3-5; grades 6-9, and grades 10-12. This emphasis on accountable through assessments has lead to the increase in externally imposed assessments designed to inform stakeholders of education progress in schools. The signing of "No Child Left Behind" (NCLB) created the need for each state to determine what is meant by student proficiency, meaning that states must determine the advancement in knowledge or skills that students must demonstrate at the end of the school year. Because teachers are being held accountable based on end-of-the-year tests scores there is a natural need for knowledge about how student learning is progressing to be proficient on the assessments and how students will perform on the end-of-the-year summative assessments. Many teachers do not see instructional benefits from required educational tests and tend to associate all testing with something negative (Popham, 2003). However, appropriately used and well-designed tests can provide insights about how to best teach students. Formative assessment is important to keep instruction tightly connected to student

understanding, but not all teachers are using it to its full potential because of negative views of assessment (Popham, 2006). It has been found that the process of classroom formative assessment requires a significant amount of work by teachers to create assessment opportunities in the school day, collect student data, analyze student data, and refine instruction using student data as compared to a school day without formative assessments (Popham, 2003; Reeves, 2007). If teachers collaborate and share the work load they can create more opportunities for assessment and have more data for refining instruction (Reeves, 2007). Formative assessment is a valuable tool whether used in isolation or collaboration; however, as an isolated activity it is effective at simply transforming classrooms, but common formative assessments have the potential to transform schools (Popham, 2003; Reeves, 2007).

Formative assessment is defined by Bell and Cowie (2001) as "the process used by teachers and students to recognize and respond to student learning in order to enhance that learning, during the learning" (p. 540). Further explanation from Dylan Wiliam and Paul Black (1998) describes formative assessment as "evidence that is actually used to adapt the teaching to meet student needs" (p.140). Many leaders in education have included formative assessment in their philosophies including Benjamin Bloom (1968) and Robert Marzano (2007). Benjamin Bloom's work on Learning for Mastery uses formative assessment as its foundation (Bloom, 1968) and argues that formative assessments, instructionally motivated assessments, should be used throughout instruction to inform learners so that all students can master the content. Marzano,

similar to Bloom, advocates for classroom instruction that moves learning forward and enables all students to master the content. Marzano suggests that formative assessments are a tool that can effectively move learning forward and inform students and teachers (Marzano, 2007).

Common formative assessments allow educators to receive regular and timely feedback regarding student understanding of the most critical standards while capitalizing on the benefits of collaboration by encouraging educators to share effective instructional approaches and compare data across classrooms. Teachers work in teams to share and analyze data from the common formative assessments. Teachers then use the results gleaned from the analysis to plan instructional activities. In this model teachers are designing instructional units based on the data and are able to determine instructional activities and instructional pacing appropriate to their students. Before starting the process for the next common formative assessment the learning needs of all students are addressed using the data from the most current common formative assessment. Common formative assessments are assessments planned, implemented and analyzed collaboratively by teachers so that data can be collected to inform instruction across classrooms (Reeves, 2007). Teachers are able to track student progress, share instructional interventions, and plan for external summative assessments as a collaborative group (Ainsworth & Viegut, 2006). Common formative assessment is one type of formative assessment being advocated for use by teachers because while meeting

the demands of standards-based education it maximizes the benefits of both collaboration and formative assessment.

Assessment and collaboration in schools. In the interest of capitalizing on teacher instructional time and planning time it is important to determine how collaboration and assessment work symbiotically. Research from Reynolds (2009) supports the notion that teacher participation in professional learning communities encourages improved teaching practices that lead to a shared goal of student academic success in all classrooms. While collaboration on all aspects of teaching is advocated in the PLC model, collaboration on assessments is heavily emphasized as a means for improving the instructional process (Reeves, 2007). During collaboration teachers not only exchange ideas regarding learning activities, but also share assessment resources. When teachers are implementing assessments in their classrooms they will have a greater variety available to them as a result of the collaboration. Collaboration during the assessment process results in not only variety of assessments, but also more valid assessments (Reynolds, 2009). Variety in assessments enables teachers to triangulate data and provide students with opportunities to demonstrate understanding in a manner aligned to their preferred learning style (Popham, 2003). By working with colleagues to evaluate assessments teachers are more likely to eliminate bias and include items aligned to psychometric principles (Popham, 2003). Professional learning communities encourage collaboration and are being promoted by education researchers.

Identifying a mutually beneficial situation for teachers, students, and other stakeholders. According to the National Center for Education Statistics (2008), each week teachers spend an average of 30.2 hours delivering instruction to students and a total of 52.7 hours engaged in other school related activities. It is in the best interest of educators if the planning time and professional development are used efficiently, considering teachers have little time during the day and collaboration helps them to see other's perspective. Administrators and school district leaders need to be informed about teacher beliefs and practices regarding collaboration and assessment so that they can support the use of these practices through establishing common planning time and designing relevant professional development. Coordinating teachers' schedules so that members of the same PLC will have the same planning period requires the master schedule to be designed around planning periods. Time during the school day is limited and finding common planning time can require re-working the master schedule or even changing the hours of the school day (DuFour et al, 2006). If administrators are making the effort to find time for collaboration, then it is important to understand specific aspects teachers value so that administrators are better able to encourage collaboration.

The literature review that follows will show instructional benefits of collaboration, formative assessment, and common formative assessment, while also showing the difficulty in implementing collaborative learning, formative assessment, and common formative assessment. Numerous researchers suggest that increased student achievement is often the result of increased formative assessment (e.g., Black & Wiliam,

1998; Fuchs & Fuchs, 1986; Fontana & Fernandes, 1994), and that student achievement is often associated with frequent teacher collaboration (Graham, 2007; Clement & Vandenberghe, 2000). The research on common formative assessment is limited because of the relative newness of the formalization of the concept. The scant literature available demonstrates the benefits of collaboration, formative assessment, and common formative assessment while highlighting beliefs and practice in terms of collaboration with an emphasis on the collaboration factors that include sharing, outputs created, and productivity, but is by no means exhaustive. Additionally, the literature addresses teachers' rationales for using common formative assessment with an emphasis on the evaluating teaching, diagnosing student strengths and weaknesses, implementing new instructional strategies, and dividing the workload. Gaps in research regarding the beliefs and personal choices regarding practice of these collaboration and assessment exist. It is not evident from the current research whether teacher characteristics relate to teachers' beliefs about collaboration and practices or if teacher characteristics relate to common formative assessment practices. It is important to identify teacher characteristics as they relate to values and practice about collaboration and common formative assessment because of the gap between education policies advocating for common formative assessment and classroom assessment practices. To maximize the potential of formative assessment, research suggests that teachers need to collaborate (Ainsworth & Viegut, 2006). The literature review that follows will show that research is needed to determine if a relationship exists between teacher collaboration practices, collaboration beliefs, and assessment beliefs and values and if teacher background characteristics play a role in

these relationships. Research has not been found that examines the link between collaboration beliefs and practices, common formative assessment rationales, and teacher characteristics. This review of literature will explore collaboration, formative assessment, and collaboration in K-12 education.

Definitions

Collaboration: Collaboration refers to two or more people working together towards a common goal (DuFour, et al, 2006).

Professional learning community: A professional learning community, commonly referred to as a PLC, is a group of educators dedicated to working together to improve learning for the students they collectively teach (DuFour, et al., 2006).

Formative Assessment: Formative assessment, also referred to as assessments for learning (Marzano, 2007), are intended to provide information to teachers and students so that instructional decisions can be made based on student performance (Scriven, 1967). Formative assessments are embedded in instruction and continue to be used throughout the learning process to inform teachers and students (Scriven, 1967; Marzano, 2007; Black & Wiliam, 2009).

Common Formative Assessment: Common formative assessments are assessments used to inform instruction that are collaboratively designed, implemented, and analyzed by two or more teachers collectively sharing responsibility for a group of students (Ainsworth & Viegut, 2006); DuFour et al., 2006).

CHAPTER 2. LITERATURE REVIEW

The purpose of this study was to describe the relationship among teachers' beliefs and practices as they relate to collaboration and common formative assessment and if selected teacher background characteristics played a role in these relationships. This chapter reviews the literature related to collaboration, formative assessment, and common formative assessment. Collaboration is discussed in the first section with attention on the collaborative aspects most relevant to middle school instruction. The collaborative aspects reviewed include sharing among teachers, outputs created by collaborating, and teacher productivity in terms of accomplishing classroom related tasks. The second section reviews literature relating to formative assessment. While this study did not examine formative assessment as a major construct, the literature on formative assessment informs the literature on common formative assessment because the difference between formative assessment and common formative assessment is the collaborative aspect present in common formative assessment, but absent from formative assessment (Ainsworth & Viegut, 2006). The aspects of formative assessment that are the focus of the review include evaluating teaching and diagnosing student strengths and weaknesses. The third section of this literature review addresses common formative assessment, but is limited due to the relative newness of the instructional practice. The common formative assessment emphasis is placed on the common formative assessment

process and the resulting implementation of new instructional strategies and how the process distributes the workload among teachers.

Collaboration

Collaboration is a term often associated with professional learning communities and education reform. Collaboration can be defined as individuals working together as a group towards common goals through the sharing of knowledge, skills, and information (DuFour, et al, 2005). Examination of the field of collaboration is useful for this study because professional learning communities are considered a collaborative education approach (DuFour, 2004) and the term collaboration is used throughout the PLC literature. Professional learning communities are teams of two or more educators working together to raise the achievement of a shared group of students through action research and collective inquiry (DuFour, et al, 2005). Professional learning communities meet regularly with frequency ranging from weekly to daily (DuFour, et al, 2006). Professional learning communities are composed of teachers with common ground; this could be teachers of the same content area, teachers of the same grade level, or teachers who share a group of students. Professional learning communities are essential for understanding the relationships among teacher characteristics, collaboration, and common formative assessment because professional learning communities are the framework from which collaboration can easily occur in schools and also the launching place for common formative assessments. Professional learning communities depend on frequent interaction among colleagues across all levels of experience allowing teachers to maintain a sense of shared responsibility for the success of all students, not just for the

ones in their own classrooms (Mis, 2009; Reynolds, 2009). The goals of professional learning community include working in collaboration with colleagues in the process of collective inquiry to meet the learning needs for each student (DuFour et al., 2006). Collaboration factors championed by supporters of professional learning communities include sharing ideas and resources within the collaborative group, group outputs that include assessments, classroom policies, instructional activities, and an increased productivity when the group collaborates.

Benefits of Collaboration

Sharing. Sharing ideas and resources invites multiple perspectives. Sharing ideas during planning can improve instruction by providing an environment to generate more ideas (Clement & Vandenberghe, 2000; Forbes, 2007) enabling multiple perspectives that provide instructional feedback to members of the collaborative group (Graham, 2007; Moston, 2008). In 2000, Clement and Vandenberghe published their findings from a three phase qualitative study aimed at developing a theory on the relationship between elementary school teachers' autonomy from each other and collegiality and the impact on professional development. Their research suggests that a balanced combination of autonomy and collegiality have a positive impact on elementary teachers' professional development. Improved teaching resulted from the exchange of and generation of instructional ideas, especially classroom management ideas, during collaboration (Clement & Vandenberghe, 2000). One teacher explains,

> I have to pay attention I don't become too loose. The children can tell things they wouldn't be allowed to tell in other classes. I have to take care

> I don't go too far. When we work together for both our groups, my colleague says sometimes: I wouldn't tolerate what you permit. . .This really makes me think about the way I interact with the children (Clement & Vandenberghe, 2000, p. 92).

In 2007 Forbes investigated collaboration in K-3 science classrooms using a case study approach. Based on Forbes' anecdotal observations during the case study it is evident that teachers generate more ideas in groups (2007). Forbes concludes, "Individual teacher competencies increase in a collaborative professional community" (Forbes, 2007, p. 112). For example, during a meeting with an individual teacher the teacher provided one idea for diversifying their questioning practices. But, when the same teacher was in a group meeting they generated four ideas. Perry Graham (2007) employed a mixed methods case study format to examine a middle school in its first year using the professional learning community model. The relationship between professional learning community activities and changes in both teacher knowledge and changes in teacher instructional practices was analyzed using survey and interview data. Perry Graham's case study (2007) utilizing the Teacher Activity Survey demonstrated that changes in teachers' content knowledge and instructional practices correlate with participation in collaborative learning environments, specifically, professional learning communities. Results were further analyzed based on years of teaching experience, grade level taught, and subject taught (Graham, 2007). The average score for change in knowledge and skills is 3.7 on a 1-5 point scale (1 being not at all and 5 being a great extent). Teacher

follow-up comments from the post-survey interviews suggest that sharing experiences with colleagues improves instruction,

> [M]y development in previous years was based on my own reflection and perceptions—I only had myself. This year I can reflect through the eyes of four to nine other people. When you're only looking at it from your own perspective, you can't see that it might be you. When you have so many eyes to see things, that alone has helped with my reflection and growth—ten times more growth this year than in previous years because I'm seeing things through at least ten other eyes. I have the opportunity to not only work with them and reflect with them, but to see things from their perspective as well as my own (Graham, 2007, p.8).

Moston (2008) employed a mixed method study using interview responses and survey data to investigate graduate faculty members' perceptions and perceived practices of professional learning communities in adult education. Faculty responses from the survey show that feedback from peers is used to improve teaching methods (Moston, 2008). Eighty percent of university faculty agreed with the following statement, "I have sought feedback from my colleagues about ways that I can more actively engage my students in the classroom" (p. 91). Collaboration in the form of sharing ideas and resources allows for multiple perspectives and feedback, which results in teacher reported format improved instructional practices.

Outputs. Collaborating with colleagues involves the joint creation of outputs used in the classroom, including assessments, classroom procedures, and instructional

activities. Clement and Vandenberghe (2000) found that in many instances the sharing of individual ideas resulted in sharing the workload through collaborative outputs as opposed to individual outputs. Conversations that began as two individual teachers simply exchanging ideas regarding individual projects shifted to two teachers creating one joint project. A qualitative case study (Reynolds, 2009) approach examining one particular middle school site was used to understand the process involved in developing an effective PLC and then how PLCs use student data for planning instructional practices that will increase the academic achievement of all students. The goal was to identify reoccurring patterns among the characteristics of an effective PLC. Collaboration supports consistency in instructional materials and classroom policies (Reynolds, 2009). Teachers in Reynolds's (2009) research articulated the benefits of collaboration to include consistency for students, "the ability of the staff to get together and figure out how best to make sure all the kids get the same education." Teachers explicitly stated that collaborating with colleagues improves their teaching by enabling consistent teacher outputs that result in consistent student learning experiences. The output desired from collaboration could include a common set of standards or an agreed upon curriculum. Mis (2009) conducted a school-year long observational case study focused on how middle school teachers use common planning time as members of content specific professional learning communities and interdisciplinary teams. Faculty responses from Mis's observational case study (2009) suggest that they collaborate to develop agreed upon curriculum, "[t]he purpose of each PLC was to align its curriculum to best meet the needs of the students within the content area and to design strategies to strengthen

students' content knowledge" (p. 91). Collaborating on joint products, or outputs, is not only a rationale for collaborating expressed by teachers, but is also a step educators can take to ensure students receive consistent high-quality instruction.

Collaboration benefits include sharing ideas and resources and creating outputs for the classroom, resulting in increased productivity for all members of the collaborative group. Teachers are not duplicating the efforts of their colleagues when they share resources and ideas by participating in cooperative learning groups, and therefore they can generate more ideas and outputs in the same amount of time as if they worked alone, resulting in increased productivity.

Environmental Factors Relating to Collaboration

Factors that encourage collaboration. Factors from outside the PLC that encourage collaboration include supportive school leaders (Reynolds, 2009), well-established PLCs (Mis, 2009; Moston, 2008), and teacher characteristics (Mis, 2009; Moston, 2008). If the school culture supports collaboration, teachers are more inclined to collaborate. In Reynolds's (2009) qualitative case study evidence of the support from the school administrator from the start of the school year included teacher interview responses recalling the first meeting with their new principal: "He had a meeting with all of the teachers before he started and said, 'You know, we are going to do collaboration at the school. That is non-negotiable.' So, whatever form that was going to take, we did not know but knew that this was an expectation that he was giving the whole staff" (Reynolds, 2009, p.62). The teachers at the school site in Reynolds' case study, Robinson Middle School, worked with the administration to create time during the day

for collaboration, a late start every Wednesday morning. The administration provided additional support by offering substitute teachers to cover classes so teachers could meet more if they need to. Teachers were very receptive to this and often took advantage of the substitutes so that they could meet as a team and collaborate. In this environment it is clear that collaboration is a part of the school culture established by the administration.

Well-established PLCs stem from teachers working together to agree on a straightforward and common mission, while ensuring that every student is academically successful (Moston, 2008). A well-established PLC encourages collaboration because PLCs and collaboration thrive on the same aspects: agreed-upon community values and goals that emphasizes better learning and teaching (DuFour, 2004), group accountability for the learning of all students (Moston, 2008), professional development to improve teaching (Mis, 2009; Reynolds, 2009), shared leadership, teamwork, and both group learning and individual learning (Mis, 2009; Reynolds, 2009).

Research has identified characteristics of faculty who are contributing members of a PLC or ideal partners in collaboration (Mis, 2009; Moston, 2008). These characteristics include the ability to think critically and problem solve, good communication skills, role models who share knowledge, a positive outlook, individuals who make decisions based on their values, and respect for multiple points of view. Collaborative groups composed of ideal members are a mentally pleasant place, include everyone, make learning and teaching enjoyable, encourage students to use all of their talents, thrive on real-world contexts for instruction, enable faculty to help students set target goals, and encourage students to be in charge of their own learning (Moston, 2008). Strong school leadership,

supportive PLCs, and teachers that think critically, share ideas, and respect colleagues encourage collaboration.

Factors that discourage collaboration. Unfortunately, many factors can discourage teachers from collaborating. Time constraints (Clement & Vandenberghe, 2000; Mis, 2009), teachers' and schools' holding onto tradition (DuFour, 2004; Reynolds 2009), and school culture and colleagues' attitudes (Cizek, Fitzgerald, & Rachor, 1996) inhibit collaboration among educators. Each of the factors that discourage collaboration includes aspects of teacher characteristics. For example, time constraints address teachers' perceptions of how their time is valued; tradition recognizes that veteran teachers are more inclined to resist change, and punitive attitudes of colleagues is a significant aspect of school culture.

Time. Time constraints placed on teachers can discourage collaboration. Collaboration is influenced by individual teachers' desire to maximize their planning time during the day. Teachers will be less likely to spend planning time with colleagues if they feel their time is not valued by their colleagues. Time is limited and lack of value for time by colleagues is an issue that can prevent collaboration (Clement & Vandenberghe, 2000; Mis, 2009). A comment from Clement's and Vandeberghe's research illustrates the isolation felt due to lack of time: "Also, my colleagues were very busy. They didn't have the time to help me. So I had to solve my problems on my own" (Clement & Vandenberghe, 2000). The school-year long observational case study conducted by Mis (2009) focused on how teachers use common planning time as members of content specific PLCs and because it has been shown that misuse of time can

influence desire to continue to collaborate this case study is a critical link between teacher collaboration beliefs and collaboration practices. Analysis of the PLC events suggest that while meetings did address productive topics, such as unit planning; resources sharing; creating common assessments; discussions about students; school related issues; and testing and standards, meetings also misused time by engaging in non-academic talk (Mis, 2009). Non-academic discussion shows a lack of respect for the group members' time. Planning time is limited and conversation that occurs should benefit the group if it is to be perceived as a valuable use of time. The math PLC consists of three 8th grade teachers who meet twice a week for an average of 30 minutes. Of the six observed meetings three of the meetings involved non-academic discussions about family, personal health, and weekend activities (Mis, 2009). During five of the observed seven meetings with the language arts PLC teachers engaged in non-academic talk (Mis, 2009). The three person science PLC meetings were frequently off track with non-academic talk occurring during five of the seven meetings (Mis, 2009). Discussion about equal contributions and fairness of work load among PLC members along with discussion about personal lives was frequent (Mis, 2009) in the observed PLC meetings. When colleagues' time is wasted during meetings it can decrease the desire to attempt to collaborate.

Tradition. The previous design of the school day and traditional values of education held by teachers and administrators can encourage isolation. Teachers often walked into their classrooms and shut their doors to their colleagues. Time was not traditionally built into the school day for teachers to collaborate. Teachers often went

without interacting with their colleagues throughout the day with the exception of social discussion at lunch (DuFour, 2004). Teachers who have experienced the old isolated model of education are often the most resistant to the collaborative movement. Resistance to the culture of collaboration existed mostly among veteran teachers who felt threatened, as if they were being told what to do and their professional expertise and experience were being ignored (Reynolds, 2009). Teacher interviews in Reynolds' (2009) research also suggest that the desire to be independent lead to teachers not wanting to change past teaching practices. The tradition of autonomy in schools holds roots and can slow down the adoption of a collaborative environment

School culture and teacher attitudes. School culture, often influenced by teacher characteristics, can discourage collaboration. Significant school culture factors include not only an environment that does not encourage teachers to establish common ground, but also an environment that is punitive in nature. If the culture is not conducive to collaboration teachers are less likely to engage in collaborative activities. School culture includes the attitudes and actions of the members of the community, in this case, teaching colleagues. Often teachers felt they had no choice but to work in isolation. This form of autonomy is evident in the following comment,

> When I started my career I really didn't know how to teach math. I didn't have the training for it. So, in the beginning I had to find out how to teach it. I needed some help. If you're only a beginner, it's difficult to get some help (Clement & Vandenberghe, 2000, p. 89).

McMillan and Nash (2000) conducted 45 minute face to face interviews with 24 secondary mathematics and English teachers in different schools within the same district. The purpose was to analyze teacher grading practices to create a model explaining the factors that influence the individual decision making process. The findings show that some of the characteristics in a school culture are not conducive to collaboration, such as isolated grading practices. Teacher comments in McMillan's research suggested that they believed grading was left to the individual teacher and that teachers need not use the same grading practices across classrooms (McMillan & Nash, 2000). By not using the same grading practices across classrooms teachers create roadblocks to collaboration because they eliminate common ground. A critical element to collaboration involves consensus building, and if teachers use consistent classroom policies then they have taken a significant step towards collaboration by establishing a consensus (DuFour, et al, 2005). Lack of consensus discourages teachers from collaborating; enabling teachers to start with common ground could make collaboration easier.

A punitive school culture can instill fear of collaboration in educators. Teachers expressed concern about being judged by their colleagues if they shared difficulties they encountered or need help (Cizek et al., 1996; Clement & Vandenberghe, 2000). The fear of being doubted as competent professionals hindered the teachers' willingness to ask for help (Clement & Vandenberghe, 2000). Teachers can be anxious about sharing data with their colleagues if the data reflects that their students are not doing as well as their colleagues' students. Collaboration rests on sharing of both strengths and weaknesses and that requires a certain level of comfort and support among team members. Further

support is evident in the findings from Cizek's, Fitzgerald's, and Rachor's (1996) research concluding that fifty-two percent of teachers did not know the grading practices of their colleagues; consequently teachers are not sharing their grading practices with their colleagues. This shows a clear reluctance to collaborate and it is explained by an anecdotal comment from a teacher that indicates that keeping grading practices private is common especially if teachers feel they might be judged by their colleagues, "shaping the kids' minds is more important than averaging tests and quizzes. . .[my philosophy is] unorthodox and I am a bit nervous to share this with the administration or other teachers" (Cizek et al., 1996). Teachers are clearly reluctant to share their shortcomings with colleagues because they fear being criticized.

Assessment

Assessment is often broken down into diagnostic, formative, and summative. Brown (2004), an assessment researcher, describes assessment as "any act of interpreting information about student performance, collected through any of a multitude of means or practices" (p. 304).

Diagnostic assessment. Diagnostic assessment gauges a student's current knowledge for the purpose of designing a suitable program of studies (Reeves, 2007; Popham, 2003). Diagnostic assessments are also commonly referred to as pre-assessments because they provide information about students' prior skills before instruction (Popham, 2003). Diagnostics assessments occur prior to instruction and can be used to design instruction or determine course placement for students.

Formative assessment. Definitions of formative assessment stem from the foundational definitions provided by Paul Black (1998), Dylan Wiliam (1998), Beverley Bell (2001), and Bronwen Cowie (2001). Black and Wiliam (1998) define formative assessment as "activities undertaken by teachers. . .that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes *formative assessment* when the evidence is actually used to adapt the teaching to meet student needs" (p. 140). Black and Wiliam (2009) have added to their original definition of formative assessment, describing formative assessment as "practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited" (p.10). Instruction refers to any activity that is designed to encourage learning. Decisions can be made by teachers, peers, or the learner. Formative assessment does not have to change the intended classroom action to be considered effective; it can provide evidence and support for already planned activities as well as alter the intended instructional plan. Formative assessment encompasses all activities undertaken by students/teachers that provide information to be used as feedback to modify the learning/teaching activities in which they engage. Additionally, formative assessments occur while students are in the process of learning and can be formal or informal measures. Formal formative assessment activities might include students completing a ten question multiple choice science assessment the day after doing a science lab, or, students turning in a portfolio of their

writing work in English. Informal formative assessment might include a teacher posing a direct question about the content to the class of students during a science lab activity, or, an English teacher providing feedback during an in class writing activity. A useful metaphor provided by Forbes (2007) relates assessment to a garden, "If we think of our children as plants, summative assessment is the process of *measuring* the plants. Formative assessment is equivalent to feeding and watering the plants appropriate to the plant needs, directly affecting their growth" (p. 73). Formative assessment includes the use of feedback to inform instruction; high frequency of assessments and grades from formative assessment are used to inform students and teachers about learning.

***Feedback*.** Feedback is an essential component of formative assessment. Feedback, as used in the classroom, refers to a response from the instructor (or peer) that provides information on the learners' progress towards their learning goal (Popham, 2003; Reeves, 2007). Examples of feedback include teacher comments on a student math test that identify the step in the math problem where a calculation error occurred, or, a teacher's comments on a student essay that ask for clarification about main ideas, or, a teacher's comment on a student multiple choice science test that explains why an item was marked wrong and gives direction on where to find the correct answer. Feedback differs from grading because the teacher response provides information that enables students to learn from their mistakes. Bell and Cowie (2001) consider feedback critical to formative assessments as evidenced by their explicit description "[assessments that] provide teachers and students with feedback. The teachers can use the feedback to revise their classroom practices, and the students can use the feedback to monitor their own

learning." (p. 538). Bell and Cowie (2001) used multiple data collection techniques such as interviews, surveys, and observations to evaluate science teachers' use of formative assessment. Ten secondary teachers volunteered to participate in the research and 114 students were interviewed and the analysis of their responses informed the definitions Bell and Cowie developed.

Perera, Lee, Win, and Wijesuriya (2008) conduct research to support the idea that formative assessment is only effective if formative feedback is used consistently and immediately. A mixed methods approach using surveys and focus group questions was used to determine students' perceptions and expectations of feedback from their teachers and teachers' perceptions of feedback they use (Perera et al., 2008). Four hundred and seven students and fifty-one faculty members participated in the data collection. Seventy-five percent of the teachers indicated that they give feedback regularly to students; however only 55 percent of students indicated that they received regular feedback from teachers (Perera et al.,2008). Teachers and students recognize that work completed online and through written assessments receive irregular feedback (Perera et al., 2008). Students consistently indicated they want suggestions from their teachers on how to improve whether it is through reflective questioning or written feedback or oral feedback. Very few teachers were providing suggestions and opportunities for reflective questioning in the form of feedback; in fact, only sixteen percent indicate they provide reflective questioning. Teacher comments in Perera's research include, "the feedback for our assigned independent reading online topic was grossly inadequate. We had no idea why half the batch got really low marks. [Students felt that] during feedback,

justification for the grade should be given" (p. 396). The consensus is that formative assessment occurs during the unit of instruction and prior to moving onto the next topic; therefore feedback is a unique component that maximizes effectiveness when provided; however, implementation is not consistent.

Frequency of assessment. Assessment is formative when data is used to guide instruction and inform learning and timing is critical in ensuring data is available in time to make decisions before the instructional unit is over (Black & Wiliam, 1998). In general, frequent can range from daily to weekly to monthly. One-hundred and forty-three K-12 teachers were administered a survey regarding assessment practices (Cizek et al., 1996). Findings suggest the frequency in which teachers administered minor assessments did not vary significantly based on school setting, gender, or years of experience, with seventy-five percent of teachers indicating they administered minor assessments weekly (Cizek et al., 1996). Maclellan's (2001) research describes student and faculty perceptions of assessment. Surveys were administered to students and faculty at the university level to determine why assessment was taking place and how useful the assessments were for students and teachers. Results showed that assessment was not carried out frequently enough to be considered formative in nature; ninety-seven percent of students and eighty-six percent of faculty indicated that assessment is most frequently carried out at the end of a unit (Maclellan, 2001). These practices prevent assessment from being used to modify teaching in response to student needs. It is clear that high frequency of assessment is associated with student improvement (Black & Wiliam, 1998) and that not all teachers are frequently assessing students.

Grading practices. The method for grading assessments strongly influences whether or not they enable teachers and students to make data-based instructional decisions. If assessments enable data-based timely instructional decisions then they are considered formative. If grades assist teachers or students in making instructional decisions then the grading practices suggest the assessment is formative. When grades are used as a means to rank students or hold students accountable they miss out on their most influential benefits (Reeves, 2007). Ninety percent of students indicated they would like an explanation to the grade received so that they could understand the criteria, essentially students are explicitly asking for formative assessment. Yet only thirty-eight percent of teachers indicated that they explained grades (Perera et al, 2008). In Maclellan's research eighty-five percent of faculty indicated that work is given a summative grade frequently (Maclellan, 2001). Grading practices have the power to transform non-formative assessment into formative assessments, but are inconsistently implemented in classrooms.

Formative Assessment Examples

Assessment types that are considered formative could include tests identified as formative assessments or simply would be the practice of using an assessment in a formative manner. The manner in which an assessment is used can distinguish a ten question summative test from a ten-question formative test. While the very same questions items could be used on both a formative test and a summative test it is the use of the test that determines if it is in fact formative. Examples of formative assessment include: formal assessments (Bol, Stephenson, O'Connell, & Nunnery, 1998), informal

assessments (Bol, et al, 1998), observational assessments (Bol et al., 1998), performance tasks (Stiggins & Bridgeford, 1985; Bol et al., 1998), teacher created assessments (Stiggins & Bridgeford, 1985), and alternative assessments (Bol et al., 1998). Formal assessments generally refer to traditional assessments employed in a traditional testing environment and explicitly identified as an assessment (Popham, 2003). Teachers use both formal and informal assessments in the classroom and do not feel tied to only one type of assessment (Bol, et al, 1998). Observational assessments are designed to monitor students as they learn in a variety of settings, performing many activities, and using a range of skills (Popham, 2003, 2006). Performance tasks are similar to observational assessments because they are designed to observe students while they face problem situations that mirror real life (Popham, 2003). Observational assessments and performance tasks are being used in the manner the experts have labeled formative. Teachers responded to a questionnaire in the Stiggins & Bridgeford research (1985) addressing their levels of use for assessment type, concern with assessment types, and implementation of performance assessment. Almost all participants indicated use of spontaneous performance tests; ninety-five percent responded that they use spontaneous performance assessments. Eighty percent of those using spontaneous performance assessments reported a comfortable use level or above (Stiggins & Bridgeford, 1985). Assessment practices findings from a four-part questionnaire administered to 893 teachers in 34 elementary schools, middle schools, and high schools showed that teachers used observational methods and performance tasks most frequently (Bol et al., 1998).

Assessments being used in a formative manner include: using assessments to triangulate information to ensure students can demonstrate their understanding in as many ways as possible (Bol et al, 1998) and to evaluate teaching (McMillan & Nash, 2000). McMillan's and Nash's (2000) analysis showed that teachers' assessment practices included using assessments to triangulate data. Teacher responses indicated that they varied assessment types to accommodate student differences and to allow for multiple ways to demonstrate understanding, "some students do better on paper than they do orally, some students do terrible on paper but you know they know it so you have to come up with a way to say show me what you know" (McMillan & Nash, 2000, p. 10). Based on the case study carried out by McMillan and Nash (2000), it is evident teachers use assessment to modify their instruction. Teachers' comments on the lesson revision process indicate that it is a task done frequently that refines their teaching based on the needs of the students. "You modify everything. If everybody fails the test then I modify because I have done something wrong" (McMillan & Nash, 2000, p. 25). Assessment is being used in a formative manner when students are given the opportunity to demonstrate understanding and refining teaching.

Formative Assessment Benefits

Formative assessment is beneficial to teaching and learning because it enables teachers to reflect on their teaching and adjust as necessary and it allows students to diagnose their strengths and weaknesses so that they can learn to learn from their mistakes and take charge of their learning resulting in the narrowing of the achievement gap. Formative assessment enhances learning gains significantly, especially in low

achievers (Black and Wiliam, 1998), possibly because formative assessment enables misconceptions to be addressed before they turn into deep set beliefs. Traditionally, successful students are high achievers because they understand how to correct their own mistakes, while unsuccessful students fall farther behind because they never learned the critical process of correcting their own mistakes (Ainsworth & Viegut, 2007). Formative assessment is capable of reducing the achievement gap while raising the achievement for all learners because of its success with low achievers. The powerful benefits of formative assessment can be realized if we adopt a "culture of success" (p. 142) where we believe all students are capable and focus feedback on specific attributes of student work that can be improved. The benefits of formative assessment extend to individual teachers and individual students, but also empower unsuccessful students as a population to learn from their mistakes thereby narrowing the achievement gap. As evidenced by Forbes (2007) and Brown (2004) teachers hold a positive view of the formative assessment process and as evidenced by Reeves (2007), Popham (2003), Black and Wiliam (1998), and Marzano (2007) education researchers assert that formative assessment improves instruction and learning.

Factors Related to Formative Assessment

Outside factors that encourage formative assessment. Teaching beliefs aligned with the principles of formative assessment encourage use of formative assessment. Teacher beliefs are essentially the personal philosophy of education that guides each teacher and informs their practice. Experience as a teacher and education coursework help inform each teacher's belief system. Professional experience was a

frequent justification for grading decisions. Teachers explained that they know what works for their classroom (McMillan & Nash, 2000). The following teacher statement illustrates the importance of individual teacher philosophy on the decision making process, "my philosophy of education is run by Dewey. The more you practice something the better, the more proficient you become with that skill" (McMillan & Nash, 2000, p. 9). Teaching philosophies built around wanting students to be successful and giving students the benefit of the doubt were common as the following quote exemplifies: "Everybody takes the quiz but the way I record the grade is only the good grades. If you get a B or better then I don't record it" (p. 9). Teaching philosophies focused on student understanding used assessment to check for student understanding, "You want to know, what have they really learned or can they apply it. . .to get a more realistic grade of what the student really does know about the material. . .my philosophy is I am trying to get them to show me what they know, not trick them into showing me what they don't know" (p. 10). Teaching philosophies are clearly one influence on classroom instructional decisions. This prompts the question, what are the other influences on instructional practice that cause formative assessment to not be widely and completely implemented when it so clearly aligns with many teaching philosophies.

Barriers. It would be easy to draw conclusions from practice and correlate use or non- use of a classroom practice with a teacher belief if everything implemented inside classrooms was completely decided by the individual teacher. Teachers in public school have no control over student characteristics in their classroom, and while they might have a grading practice in mind, they must account for inadequate home environments, district

and state policies, and time constraints (McMillan & Nash, 2000). Home environments, specifically student absenteeism and parental support, can discourage teachers from using grading practices they believe in because they must accommodate student needs (McMillan & Nash, 2000). Statewide learning standards and tests influenced teachers' decision regarding the increased use of multiple choice question items in their assessments (McMillan & Nash, 2000). District grading policies contribute to the disconnect between teacher beliefs regarding classroom assessment and implementation of classroom assessment. Teachers comments from McMillan's (2000) research indicate that it is frustrating to accommodate a district wide policy; "I am finally getting things right after 30 years, and they told me I couldn't do things" (p 18). Parents are the final external factor influencing grading decisions. Teachers want to be able to justify their grading decisions to parents and often strive to have sufficient number of grades to articulate their point to parents (McMillan & Nash, 2000). In Forbes' research (2007) it was shown that teachers did not provide written feedback to students in their notebooks. Teachers commented that lack of time was the main roadblock for providing written feedback to students (Forbes, 2007; Karp & Woods, 2008). Tension between the ideal grading practices and the realities of classroom environments that force teachers to compromise are evident by comments such as, "You know and I know in an ideal world, you let each child move at his own pace. But, then when you're saying, okay we have the objectives to cover this year, you have to keep on pace with that" (McMillan & Nash, 2000. p.11). Teachers must contend with student factors, district policies, and time restraints when making instructional decisions.

Consistency in implementation. The attempt by teachers to use formative assessment and their self-perception that they use formative assessment suggests that even if not implemented fully, it is a practice that is commonly agreed upon as valuable. One aspect of assessment that is formative in nature involves providing clear learning targets for students. The objective of formative assessment is to determine what students know so that instructional decisions can be made, therefore it is important that students know what they are being asked to demonstrate. Only fifty-four percent of students responded in Maclellan's (2001) survey that they were frequently assessed against explicit criteria, while eighty-one percent of faculty believed that they were using explicit criteria frequently. Not using explicit criteria causes students to view assessment as a guessing game, meaning students are unclear as to what to do to achieve the desired standard (Reeves, 2007). In research done to analyze the alignment between expert recommendations and teacher implementation on assessment dimensions consistency between teacher practice and expert recommendations on communicating grading methods to students was evident (Stiggins et al., 1989). This research shows there are some teachers who not only perceive they use explicit criteria for grading, but also actually implement it, thereby further validating this aspect of formative assessment as a valuable instructional practice. The following formative assessment dimensions showed a discrepancy between teacher practice and expert recommendations in Stiggins, Frisbie, and Griswold's research (1989): daily written assignments a method for obtaining grading data, amount of grading data gathered, and quality of grading data. Nine out of fifteen teachers indicated that they use daily written assignments as summative grades

more often than formative grades, contradicting the research on the power of formative assessments. Using the daily written assignments as summative assessments meant that teachers were not collecting enough data from the daily written assignments assessments to determine if students were ready to advance to the next instructional unit. As discussed by Bol et al. (1998), Popham (2003), and Stiggins (1995) variety and frequency of assessments enable teachers to gather accurate data in time to alter instruction and thereby make the assessment process formative. Teachers indicate that formative assessment is a tool for improving student achievement, but they do not all act on that and include it in their practice (Forbes, 2007). Expert recommendations and teacher attempts to implement aspects of formative assessment support the notion that it is a valued instructional process even if not widely adopted, but in need of refining so that the disconnect between perception and reality can be addressed.

Beliefs and Values about Formative Assessment

The word assessment often triggers negative responses from educators even though formative assessment has substantial benefits to classroom instruction. Both formative assessments and summative assessments can be structured as formal tests. Formal formative assessments can look similar to formal summative assessment in format because the significant difference between the two tests is the how teachers use the results and that is not often readily visible. For example, a teacher could use a ten-question multiple choice test as a formal formative assessment if administered during the unit and if the results are used to plan instruction for the same unit. The very same ten-question multiple choice test can be used as a formal summative test if it is administered

at the end of the unit and the results are used to simply rank students. Formative assessment is sometimes mistakenly associated with summative assessments and externally imposed state assessments by teachers and stakeholders causing formative assessment to be viewed in a negative light. The tendency for summative assessments mass produced by states and textbook companies (Popham, 2006) to address low-level thinking and emphasize quantity over quality and thereby encouraging route memorization has impacted implementation of formative assessment because a formative assessment might look similar to an externally mass produced summative assessment and therefore be viewed as not instructionally beneficial.

Negative views of assessment. Even with all the research showing the benefits of formative assessment some teachers still hold a negative view of formative assessment specifically, or associate their negative view of standardized tests with all types of assessment. Either way, this could explain why formative assessment is not uniformly adopted and embraced by all teachers. Teachers are still uncomfortable sharing learning targets with their students as evidenced by the following statement and sharing rubrics with students, "he would be able to unfairly have the answers to this test" (Forbes, 2007, p. 99). This clearly contradicts the spirit of formative assessment. Brown administered a 50-item survey to 525 New Zealand primary school teachers on teacher conceptions of the four generalized purposes of assessment teachers and found that that while teachers indicated that they believe assessment makes schools accountable, they do not believe assessment makes students accountable (Brown, 2004). Maclellan (2001) supports the negative view of assessment with his finding that both students and faculty indicated the

most common purpose of assessment was to grade or rank students. This is quite disturbing considering the assessment research strongly shows that if assessment is simply used to rank students we lose the most powerful benefits of assessment (Black & Wiliam, 1998; Black & Wiliam, 2009; Perera et al., 2008; Stiggins, 2004). Teachers indicated they were concerned about losing instructional time to create and deliver teacher created tests. Negative views of assessment exist and while some of these negative views are specific to formative assessment it is not clear what aspect of formative assessment is viewed as negative and is influencing the view of the entire process to the degree that implementation is affected.

Common Formative Assessment

Common formative assessment is a relatively new term in education and therefore has few established definitions. The origins of the term common formative assessment can be traced back to the professional learning community movement literature; in 2005 Richard DuFour used the term common formative assessment to describe the assessments used in PLC planning (DuFour, et al, 2005). DuFour, Eaker, and DuFour (2005) use the analogy of a health club to describe common formative assessment. Members of a health club might weight themselves diligently and frequently, like formative assessments, but until they incorporate other factors like diet and exercise they might not improve their health. Using the health club analogy, one can see that health improvements result from analysis of the scale results and collaboration between nutritionists and personal trainers, much like student learning requires the analysis of more than scores. Common formative assessments enable teachers to compare their instruction to others and evaluate the entire

learning process, not just scores. Common formative assessments are defined by DuFour, Eaker, DuFour, and Many (2006) as "an assessment typically created collaboratively by a team of teachers responsible for the same grade level or course. Common formative assessments are used frequently throughout the year to identify (1) individual students who need additional time and support for learning, (2) the teaching strategies most effective in helping students acquire the intended knowledge and skills, (3) program concerns—areas in which students generally are having difficulty achieving the intended standard—and (4) improvement goals for individual teachers and the team." Ainsworth (2006) define common formative assessment as "assessments for learning that are collaboratively designed, administered, scored, and analyzed by team members." The general consensus among the measurement experts is that common formative assessments are both collaborative and formative; teachers work together to design, administer, and analyze the assessments so that they can refine their instruction using data.

Benefits

Students and teachers both benefit from the use of common formative assessment. Students are given the power to make decisions in their learning. Teachers are able to make data informed instructional decisions so that learning actives are specific to the needs of the student. Common formative assessments benefit teachers and students by enabling teachers to reflect on their teaching, by diagnosing student strengths and weaknesses, and by dividing the workload for teachers.

Reflective teaching. Teaching is also made easier because common formative assessments provide a basis for comparison so that teachers can reflect on their teaching. Comparison of data with colleagues enables teachers to determine if students are struggling because of curriculum, instructional style, or student issues (DuFour, et al, 2006; Ainsworth & Viegut, 2006). Common formative assessments also enable teachers to predict how well their students and school will do on state accountability tests, thereby enabling teachers sufficient information to adjust instruction prior to the state tests (DuFour, et al, 2006; Ainsworth & Viegut, 2006).

Student strengths and weaknesses. Students benefit from the implementation of common formative assessments with an increase in achievement, consistent instruction differentiated to their style, and correction of misconceptions. Evidence from Douglas Fisher's and Nancy Frey's book, *Checking for Understanding,* (2007) suggests that implementation of common formative assessment improves student achievement. Fisher and Frey (2007) analyzed the elementary math scores, middle school writing scores, and high school history scores of three public schools in California. The data shows that increase in student scores in all three subjects correlated with the introduction of common formative assessments. As use of common formative assessments increased, so did test scores for a three-year period (Fisher & Frey, 2007). Common formative assessments provide regular and timely feedback to teachers, enabling teachers to address misconceptions sooner. This ensures students only move forward in the learning process with the correct understanding instead of building new knowledge on misconceptions (Ainsworth & Viegut, 2006). Common formative assessments enable students to have

their individual needs met while ensuring that students have equal access to the best curriculum, resulting in increased achievement for students across the grade level.

Dividing the workload. One challenge educators face is the overloaded curriculum (Reeves, 2007). Marzano (2003) analyzed the national and state standards and determined that it would take 23 years to address all the standards that have been established. Establishing a viable curriculum is a daunting task if taken on in isolation because teachers would have to communicate their individual choices to subsequent teachers, requiring teachers to address groups of students with very different background knowledge. Common formative assessments enable teachers to establish a realistic curriculum by working together on assessments clarifying the curriculum, establishing consistent priorities, establishing common pacing guides, and deciding which standards to omit from the curriculum (DuFour, et al, 2006; Ainsworth & Viegut, 2006). Clarifying the curriculum as a part of common formative assessment ensures that interpretation of the meaning of the standards is consistent. Consistent priorities are also established by working together on common formative assessments because teachers determine together their priorities in the standards. Common pacing guides help teachers reach a consensus on the meaning and significance of the standards and thereby create a viable curriculum (DuFour, et al, 2006). Teachers do not have to duplicate the work of their grade level colleagues when common formative assessments are used. Without common formative assessment teachers are completing the same task without pooling resources. Common formative assessments are built around the same curriculum across classrooms, ensuring all students have access to the same content. This allows schools to provide more

resources to support struggling students because the assessments will identify groups of students struggling in the same area and the school does not need to duplicate their intervention efforts (DuFour, et al, 2006).

Literature on common formative assessment is still at a conceptual stage because the idea is relatively new. The purpose of this study is to describe teacher characteristics as it correlates to collaboration beliefs, collaboration practices and rationales for using common formative assessments. Teachers who use formative assessment, collaboration, and common formative assessment have instructional practices that result in increased student achievement. It has also been found that all three of these practices are difficult to implement fully and are underused by educators. This study is examining educators' beliefs and practices in order to explain this discrepancy. These practices are relatively simple compared to other teaching concepts that require years of schooling, and if it were simply about a skill, collaboration and common formative assessment would be more highly used.

This study is driven by the following research questions:

1. What is the nature of the relationship between Teacher Collaboration Beliefs and Teacher Collaboration Practices and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships?
2. What is the nature of the relationship between Teacher Collaboration Beliefs and Teacher Perceptions of Common Formative Assessment and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships?
3. What is the nature of the relationship between Teacher Collaboration Practices and Teacher Perceptions of Common Formative Assessment and do Teacher

Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships?

4. What is the nature of the relationship between Assessment Factors and Teacher Perceptions of Common Formative Assessment and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships?
5. What do teachers value about common formative assessments?
6. How do teachers perceive the relationship between common formative assessment and collaboration?

CHAPTER 3. METHODS

The purpose of this study was to examine how Teacher Collaboration Beliefs (TCB), Teacher Collaboration Practices (TCP), Assessment Factors (AF), and Teacher Perceptions of Common Formative Assessment Practices (TPCFA) relate to each other, and if Teacher Background Characteristics (TBC) play a role in any of these relationships. Teacher Collaboration Beliefs (TCB) refer to the views held by teachers about collaborating with their teaching colleagues. TCB are the perceptions and opinions classroom teachers form over time about working with their colleagues in collaborative teams. Teacher Collaboration Practices (TCP) refer to the self-reported information that suggests whether or not teachers are collaborating; this includes teachers directly stating their collaboration habits and also includes conclusions drawn from the survey responses that suggest collaboration occurs or does not occur. TCP are the self-reported teacher habits relating to frequency and content of collaboration meetings. Assessment Factors (AF) include teacher perceptions of assessment use and teacher self-reported assessment values as well as teacher reported rationales for using aspects of assessment. AF are the opinions teachers hold about the assessment tools and activities they use to assess their students. Teacher Perceptions of Common Formative Assessment Practices (TPCFA) refer to the self-reported teacher beliefs about their own use of common formative assessment. This chapter describes the research methodology including a description of

the study participants, the instrumentation, data collection procedures, and data analysis procedures.

The use of common formative assessments is still relatively new and not fully investigated in the research. A search of relevant data bases, ERIC, PsycINFO, and Dissertation Abstracts, using the descriptors of "PLC assessment," "common formative assessment," "common assessment," and "learning community assessment" yielded limited results. In addition to the database search, a hard-copy search of relevant journals, including Education Leadership, Educational Assessment, Teaching and Teacher Education, and Journal of Research in Science and Teaching, yielded limited results. An ancestry search of references from relevant articles also yielded limited results. This mixed method study illuminated relationships among the following: Teacher Collaboration Beliefs (TCB), Teacher Collaboration Practices (TCP), Assessment Factors (AF), Teacher Perceptions of Common Formative Assessment Practices (TPCFA), and if Teacher Background Characteristics (TBC) played a role in any of these relationships. Figure 1 shows the relationships this study examined.

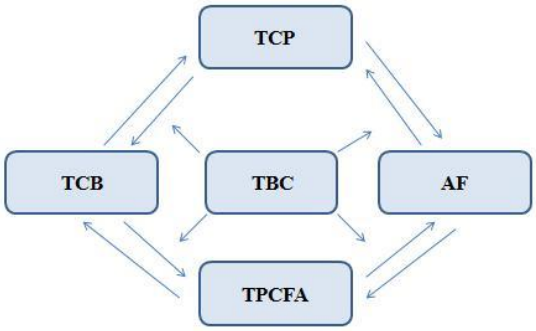

Figure 1. Hypothesized relationships examined by analyzing data from the survey and semi-structured interview protocol. The arrows around the outside show the connections between TCP, AF, TPCFA, and TCB. The arrows connecting the TBC to the outside arrows represent the examination of the connections between TCP, AF, TPCFA, and TCB.

Study Setting and Participants

The settings and participants were deliberately selected, a purposeful sample, because they could provide information about their experiences with collaboration and common formative assessment. A purposeful sample is used when the researcher aims to understand current phenomena and needs a sample from which the most can be learned (Maxwell, 2005). The two schools purposefully selected for this research have both been using a PLC model and common formative assessments for 5 years, as reported by administrators from both schools. This population was selected because the teachers have been implementing common formative assessments for 5 years and have had the time to form an opinion on aspects that they appreciate about the process as well as suggest improvements. The common formative assessment model adopted by both schools follows the guidelines outlined by DuFour, Eaker, DuFour, and Many (2006). Time to collaborate is built into the school day by both administrations. Both school settings provide 45 minutes twice a week for PLC members to meet. During the PLC meeting the PLC leader, the teacher responsible for organizing the meeting, identifies the tasks needing group input. The tasks addressed often include common assessments, instructional activities, grading policies, and homework policies. Both school sites use the same online formative assessment tool to administer assessments to students. The two schools are a part of the same school district, and the school district has a top down mandate from the superintendent requiring that all teachers participate in professional learning communities (PLC) and use common formative assessments. Opportunity to use common formative assessment is also high at these two schools because the governing

school district has a common curriculum district-wide, enabling professional learning communities to start with a consensus on what to teach. Both schools' administrators have implemented the same PLC model and used the same research to inform their practice. School administrators have authored two presentations at a state superintendent conference and the National Middle School Association (NMSA) conference about professional learning communities--Leadership and Assessment: Using Formative Assessments to Facilitate Learning Communities In your School and Developing and Sustaining Learning Communities in K – 12 Schools. (Author information withheld to maintain anonymity). The target population included 76 middle school (7^{th} and 8^{th} grade) English, history/social studies, mathematics, and science teachers because these teachers are required to participate in professional learning communities. All 76 English, history/social studies, mathematics, and science teachers at the two middle schools were invited to complete the online survey.

Roosevelt Middle School's (a pseudonym) mission statement communicates a philosophy built on professional learning communities and explicitly addresses PLCs in the mission statement, "[Roosevelt] Middle School has adopted the philosophy of creating a community of professionals (PLC) that focuses on student learning through best practices and formative assessment" (school website, 2010). Student enrollment during the 2009-2010 school year at Roosevelt Middle School was 807, and included 11 percent of students considered of limited English proficiency, 7 percent of students eligible for free and reduced lunch, and 95% of students participating in the school-based

gifted program (the school has successfully piloted an 'Algebra for all' program that resulted in 95 percent school-based gifted program participation because Algebra at the middle school level is only designed as an honors course. In addition to Algebra all content areas switched to honors courses so the school could implement an honors curriculum school-wide; this included all team taught special education courses as well). During the 2009-2010 school year Roosevelt Middle school had 4 full time administrators and 63 full time teachers. Roosevelt Middle School has met annual yearly progress (AYP) every year and is fully accredited based on state test results. Student pass rates on the state tests are consistently above 95 percent in grade 7 English, grade 7 history, and grade 7 mathematics, grade 8 English, grade 8 history, grade 8 mathematics, and grade 8 science reporting categories.

Creek Valley Middle School (a pseudonym) explicitly states that professional learning communities and formative assessment are built into the school philosophy with the following statement:

> We will help students achieve the intended outcomes of the curriculum by working collaboratively to develop instructional strategies and operational best practices that advance the vision of the school. Therefore, we will: develop and/or review curriculum maps within our departments that clarify what all students will know and be able to do, identify the criteria for subject mastery, and provide for a unified scope and sequence of instruction…evaluate instructional practices on the basis

> of course grades, formative assessment data, and standardized test results. Use this information to discuss and share teaching strategies with our colleagues that produce the desired academic results (school website, 2010).

Creek Valley Middle School student population during the 2009-2010 school year included 867 students with 10 percent of students considered limited English, 11 percent of students were eligible for free and reduced lunch, and 69 percent of students participated in a gifted program. During the 2009-2010 school year Creek Valley Middle school had 4 full time administrators and 82.7 full time teachers. Creek Valley Middle School met annual yearly progress (AYP) every year and is fully accredited based on state test results. Student pass rates on the state tests were consistently above 90 percent in grade 7 English, grade 7 history, and grade 7 mathematics, grade 8 English, grade 8 history, grade 8 mathematics, and grade 8 science reporting categories.

At both school sites teachers are teamed in PLCs based on both the grade level they teach and the content that they teach. This creates four PLCs in each grade level: 7th grade history, 7th grade mathematics, 7th grade English, 7th grade science, 8th grade civics, 8th grade mathematics, 8th grade English, and 8th grade science. The administration designates one teacher as PLC leader for each PLC. The PLC leader coordinates the PLCs meetings and communicates with the administration. The administration makes every effort to plan teachers' schedules so PLC members have the same planning period during the day. The administration requests that PLCs meet 2 to 3 times a week and most

PLCs are able to meet during their common planning time during the school day. The PLC model implemented at both of the school sites requires teachers to implement common assessments every eight weeks as mandated by the school administration. It is the intention that the teachers co-design the assessments, implement assessments in the same week, and analyze data together following the assessments so that data-based instructional decisions can be made. The intended design is that teachers meet for 45 minutes to plan the assessment and the instructional activities that will be used to address the assessment concepts. Teachers then engage in instructional activities. Following instruction, 5 to 7 weeks later, all teachers assess students using the assessment they co-designed weeks earlier. The PLC members then collectively analyze the results from the assessment to determine student strengths and weaknesses, instructional strategies that work, and pacing of instruction (School administrators presentation slides from an area conference).

Study Variables

The primary variables this study examined were teacher collaboration beliefs (TCB), teacher collaboration practices (TCP), assessment factors (AF), teacher perceptions of common formative assessments (TPCFA), and teacher background characteristics (TBC).

Collaboration beliefs and practices. Collaboration beliefs and practices examined were sharing, outputs, and productivity. The term sharing includes the sharing of ideas, data, and resources among teachers in the PLC. Sharing is an important

component of collaboration that can be difficult for teachers (Clement & Vandenberghe, 2000). The term outputs encompasses teacher created assessments, rubrics, lesson plans, and learning activities. Outputs were included because research shows that these are important pieces of evidence that collaboration has occurred and a primary function of professional learning communities (DuFour, 2004). The term productivity includes time on task during meetings, teacher reporting of benefits, and meeting organization and was included because research has shown that sometimes opportunities to collaborate are squandered (Mis, 2009; Reynolds, 2009).

Assessment. Variables relating to common formative assessment include assessment factors (AF) and teachers perceptions of common formative assessment (TPCFA). These variables include evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, dividing the workload, and fulfilling administrative requirements. Evaluating teaching is one possible benefit from assessment; teachers can use assessment results to determine the strengths and weaknesses in their instruction by looking at where wrong answer choices group (Popham, 2003; Ainsworth & Viegut, 2006). Another benefit of assessments is that the results can be used to diagnose student strengths and weaknesses; teachers can determine what areas individual students and the class as a whole can improve upon (Popham, 2003; Ainsworth & Viegut, 2006). One benefit to common formative assessment is that teachers can implement instructional strategies their colleagues share during collaborative meetings. Assessment results from individual teachers can provide data to support the strategies used during instruction of the topic assessed, with the data evidence teachers

can more easily share instructional approaches with colleagues (Ainsworth & Viegut, 2006). Another benefit to common formative assessment is sharing the workload among teachers; teachers have additional support developing lesson plans, designing assessments, and evaluating results (Ainsworth & Viegut, 2006). The aspects of evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload were chosen because they are necessary for common formative assessment to occur (Ainsworth & Viegut, 2006) and also are identified as aspects teachers are sometimes resistant to implement (Clement & Vandenberghe, 2000; Reynolds, 2009). The assessment variables that are important to examine include assessment factors, those ideas that relate to teacher assessment use, and teacher perceptions of common formative assessment, those variables related to teachers views on use of common formative assessments.

Teacher background characteristics. The variable, teacher background characteristics (TBC), includes the selected characteristics of gender, age, grade level taught, subject area taught, years experience, career switcher status, and education. Research has examined teacher beliefs about assessment (Cizek, et al, 1996; McNair, Bhargava, Adams, Edgerton, & Kypros, 2003) and collaboration (Reynolds, 2009) in relationship to gender and findings suggest that gender could be a significant unit of analysis when examining values of collaboration factors and common formative assessment aspects. Age has been examined in previous professional learning community research (Reynolds, 2009) and has shown that the factors most commonly limiting collaboration are present in veteran teachers and because veteran teachers tend to

be older, age was included in this study. Grade level taught has been associated with different levels of productivity within professional learning communities; 6th grade and 7th grade teachers have higher correlations between professional learning communities and outputs (Graham, 2007). Subject matter has also been researched as a factor contributing to effectiveness of professional learning communities; a case study comparing professional learning communities in one school found the social studies professional learning community to be the most on task (Mis, 2009). Years of experience and age have been grouped together in research studies to describe veteran teachers, and it has been found that veteran teachers might be more resistant to collaboration and change in assessment practices than new teachers (Reynolds, 2009; Cizek et.al, 1996). This leads to the question of how career switchers would fit into this model. They represent the older population, while also representing new teachers without many years experience teaching.

Research Design

The purpose of this mixed method study was to examine how Teacher Collaboration Beliefs (TCB), Teacher Collaboration Practices (TCP), Assessment Factors (AF), and Teacher Perceptions of Common Formative Assessment Practices (TPCFA) relate to each other and if Teacher Background Characteristics (TBC) play a role in any of these relationships. Using a parallel mixed methods design, this study examined middle school teacher perceptions and use of collaboration and formative assessment. Mixed methodology is "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or

language into a single study" (Johnson & Onwuegbuzie, 2004, p. 17). Mixed methods research allows multiple approaches to be used in answering research questions.

A parallel mixed methods design was used to collect both quantitative data and qualitative data. A parallel mixed methods design was used because the strengths of the qualitative data, providing explanations and details, offset the weakness in the quantitative data, closed-ended questions that provide less detail. Additionally, in a parallel mixed methods design the strengths in the quantitative data, over 70 teacher participants, offset the weaknesses in the qualitative data, only ten selected participants. The strength of the parallel mixed methods design is that it capitalizes on the strengths of both quantitative and qualitative research (Greene, 2007; Creswell, 2008). Both qualitative and quantitative data were collected.

The initial quantitative data collection phase consisted of administering an informational survey to middle school teachers so that TBC associated with TCB, TCP, AF, and TPCFA could be examined. The researcher created survey, Beliefs and Practices of Collaboration and Common Formative Assessment (BPCCFA), was sent to invited participants. Survey research designs involve administering a survey to a sample of people to determine their attitudes, opinions, behaviors, or characteristics (Creswell, 2008). The survey instrument is a useful tool for generating and collecting primary data in the social sciences because it allows for anonymity, which will encourage more candid responses. Survey research is a useful approach when attempting to describe trends and correlate variables (Creswell, 2008). Survey responses can be quantified for empirical support and identify trends for further analysis (Babbie, 2003). The survey administered

in this study, BPCCFA, provided data about teacher background characteristics (TBC), teacher collaboration beliefs, teacher collaboration practices, assessment factors (AF), and teacher perceptions of common formative assessment (TPCFA). This study used a survey design because the aim of this study was to examine "current attitudes, beliefs, opinions, or practices" (Creswell, 2008, p.389) through data collection at one point in time.

The qualitative phase of the research involved a semi-structured interview with ten teachers selected out of the 23 teachers who responded in the survey that they were willing to participate in the interview. Teachers were selected so that a sample across the teacher background characteristics was represented.

Open ended questions were asked during the interview so that the participants could create the response unconstrained by the researcher's views (Creswell, 2008). The interview data provide information that cannot be directly observed because the survey addresses not only frequency of collaborative activities, but also opinion regarding the collaborative activities. This qualitative component enabled examination of relationships that emerged from the data and can either contradict or support the quantitative findings.

Instruments

BPCCFA Survey. The quantitative phase of data collection utilized a researcher-created survey, BPCCFA (found in Appendix A). The survey was designed to assess teacher demographic and teacher background characteristics as well as self-reported TCB, TCP, AF, and TPCFA. The background questions were used to collect the TBC of the sample and were closed-ended questions. The BPCCFA survey was used to collect

TCB, TCP, AF, and TPCFA information by obtaining teacher perceptions of use and beliefs towards collaboration and common formative assessment using closed-ended questions with Likert scale 4-point response and multiple choice responses. Items on the BPCCFA Survey that have Likert responses are one-dimensional, participants either have more or less agreement with the assessment or collaboration statement (Creswell, 2008). A scale with four options requires participants to decide if they identify more with agree or disagree; participants do not have the option of remaining neutral (Creswell, 2008). This forced choice scale was selected because previous research suggests that omitting the neutral categories improves the interpretation of the responses (Chang, 1994; Maydeu-Olivares, Kramp, García-Forero, Gallardo-Pujol, & Coffman, 2009). The BPCCFA survey addressed TBC, TCB, TCP, AF and TPCFA aspects explicitly and through analysis of self-reported activities.

Teacher background characteristics. The teacher background characteristics (TBC) represented in this study were identified through survey responses. The selected characteristics that were important to examine included gender, age, grade level taught, subject area taught, years experience, career switcher status, undergraduate major, and highest level of education. These teacher background characteristics were selected because each has been linked to teacher beliefs about collaboration and/or assessment in previous research (Cizek, et al, 1996; McNair, et al, 2003; Reynolds, 2009; Graham, 2007; Mis, 2009). The BPCCFA survey addressed teacher characteristics in the first eleven multiple choice questions.

Collaboration beliefs and practices. The hypothesized important features of Teacher Collaboration Beliefs (TCB) and Teacher Collaboration Practices (TCP) this study examined included sharing, outputs created, and productivity, and they were addressed in the BPCCFA survey by asking teachers to select answers to multiple choice questions. TCB and TCP both include the same features because they both address collaboration. However, TCB refers to teacher opinion about the practice of collaboration, while TCP refers to how teachers use collaboration. The TCB and TCP of sharing includes the sharing of data, ideas, and resources and was addressed by questions regarding awareness of department-wide policies. The BPCCFA survey addressed sharing by asking about policies that colleagues would be aware of if they were engaging in sharing. The survey includes explicit questions about sharing, which directly asked if teachers were comfortable sharing data with colleagues and if teachers look forward to exchanging ideas and data with their colleagues. The BPCCFA survey asks multiple choice questions about comfort working on outputs together. The survey was designed so that participants communicated their beliefs about group created outputs and their perceptions about the process creating outputs. The BPCCFA survey included multiple choice questions about participants' beliefs and perceptions of practice regarding productivity in a collaborative environment. Table 1 shows the mapping of the survey questions to the hypothesized variables on collaboration.

Table 1

Collaboration Beliefs and Practices Instruments

Aspect	**Survey Question Number**	**Key Idea**
Sharing	24-28, 38-40	Awareness of colleagues' practices
Outputs Created	35-37	Assessments, rubrics, grading policies, and pacing guides jointly created
Productivity	29-34	Save time, create more outputs in the same amount of time

Assessment. The BPCCFA survey addressed AF and TPCFA by asking multiple choice questions. Hypothesized aspects that influence teacher value of common formative assessment include evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload. Question 22 on the survey asked participants to identify which of the above aspects of common formative assessment they found beneficial. Survey questions addressing evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload mapped to question 22. Questions 12-15 and 38 addressed using common formative assessment to evaluate teaching; responses indicated if teachers use assessments to reflect on their strengths and weakness and refine their instruction. Questions 13-18 addressed using common formative assessments to diagnose student strengths and weaknesses; responses addressed using assessments as a tool for targeting instruction toward student needs. Questions 19, 21, and 41-43 attended to using common formative assessments to implement new instructional strategies; responses indicated using assessments as a starting point for sharing successful instructional approaches with colleagues. Questions 19-21 and 35-37 addressed dividing the workload when using common formative assessments; responses indicated if teachers job share more because of the structure common formative assessments provide. The questions that map to question 22 asked participants to identify aspects of common formative assessment that they opt to use, and if they indicated in question 22 that an aspect was beneficial then the questions that mapped to the selected answer choice were

examined to ensure they indicated that they also use that aspect. Table 2 shows the mapping of hypothesized aspects of AF and TPCFA to the survey questions.

Table 2

Assessment Factors and Perceptions Instruments

Aspect	**Survey Question Number**	**Key Idea**
Evaluate teaching	12-15, 22, 38	Reflect on instructional errors
Diagnose students strengths and weaknesses	13-18, 22	Design instruction for specific student learning needs and sharing the data with students
Implementing new Instructional strategies	19, 21-22, 41-43	Using effective strategies, based on data, colleagues share
Dividing the workload	19-22, 35-37	Contributions from members are valued and used

Semi-structured interview. The qualitative instrument used in this study was a researcher-developed semi-structured interview question protocol. Semi-structured interviews were used because they provide the opportunity for new questions to be asked during the interview as a result of responses to previous questions (Creswell, 2008). The questions were open-ended and assessed teachers' beliefs and perceptions as they relate to collaboration and common formative assessment.

Teacher background characteristics. The semi-structured interview protocol addressed the influences, experiences, and motivations at the heart of teacher collaboration and common formative assessment. The open ended questions in the interview were designed to elicit responses about TBC. It was anticipated that teachers would speak about how their grade level taught, subject area taught, classroom experience, previous work experiences and education experiences influenced their approach to collaboration and uses of common formative assessment.

Collaboration beliefs and practices. The interview protocol asked participants about their views on the hypothesized aspects of sharing data and ideas with their colleagues, their outputs created, and their perception of the productivity of collaboration sessions. The interview protocol incorporated questions aimed to elicit responses not only about what teachers choose to collaborate on, but also why they made theses selections. The information extracted from teacher responses was intended to explain why the collaborative intent of PLCs, a research supported strategy, is not being fully adopted (DuFour, 2004; DuFour, Eaker, & Dufour, 2005).

Assessment. Hypothesized aspects of AF and TPCFA that are important to understand include evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload. The interview specifically addressed participants' uses of common formative assessment and their opinion of the strengths. It was anticipated that responses would speak to the hypothesized aspects of evaluating teaching, diagnosing students' strengths and weaknesses, implementing new instructional strategies, and dividing the workload. The interview protocol included a question asking teachers to provide examples of formative assessment and common formative assessment so that it could be determined how teachers use formative assessment with the collaborative factor present in common formative assessments. Responses to this question enabled a comparison between using formative assessment and common formative assessment which provided information on values regarding common formative assessment aspects. Participants were also explicitly asked their opinion on common formative assessment and these responses were compared to the examples participants provided when asked to explain how they use common formative assessment.

Having participants provide their own definition and examples ensured that each respondent is not responding to their interpretation of the terms in the question, but that responses are based on the same interpretation of terms in both the survey and the interview. Interview responses were used to support survey responses and ensure participants are aligned with their understanding of terms and responding to the same interpretation. Research shows that collaboration and common formative assessment

benefit instruction (Ainsworth & Viegut, 2006; DuFour, Eaker, & Dufour, 2005; DuFour, 2004; Reeves, 2007) but are underused by teachers (Graham, 2007; Popham, 2003; Mis, 2009); the answers to these interview questions can potentially explain any discrepancy that exists, considering implementation does not require significant additional knowledge or skills.

Data Collection Procedures

BPCCFA Survey. All content teachers at the two selected schools were invited to participate in the study. Emails were sent to all 76 of the middle school science, mathematics, social studies, and English content area teachers at the two middle schools asking them to respond to the question protocol. Excellent rapport with the two site-based administrators was leveraged for a mutually beneficial situation. The school administrators were eager to have the data from this study and were willing to support the research by creating time during the school day for the teachers to complete the survey. The two schools selected for this study have been consistently asked by the district to model their PLC process to visiting teachers and administrators from other schools in the district, and have given their time to furthering PLC use across the county numerous times. Teachers at the selected schools were often asked to complete surveys relating to their practice and should not have viewed this survey request as out of the ordinary. Each school administrator designated time during the school day to complete the survey and eliminating one less reason not to complete the survey. Content teachers were targeted because these teachers participate in professional learning communities. Teacher participants were emailed an invitation to complete an online survey; the email contained

a link to the survey. The survey was administered through the online website SurveyMonkey (www.surveymonkey.com). All content teachers at both schools were eligible for a tangible award, a Starbucks gift card in the amount of $10. Teachers did not have to complete the survey or surrender their anonymity to be entered into the drawing; all teachers that were invited to participate were entered into the drawing. Winning was not dependent on completing the survey, but the potential to win was designed as an incentive to complete the survey. Teacher participants meet twice a week with their PLC as mandated by the school-based administrator. Both administrators waived the meeting requirement for one day so that teachers could use this time to complete the survey. Informed consent was collected with the survey response. Participants were given a copy of the consent form, attached to the survey email, for their records. The participants did not sign and return the form, instead they clicked that they had received it and continued with the survey. Survey data was collected via the George Mason University College of Education and Human Development Survey Monkey account. The survey required about 30 minutes of the participants time. When a response was received, the responses were entered into a database using SPSS and were assigned a number and pseudonym that assures anonymity of the participant. This method allowed the researcher to keep track of response rate, but not to attach responses to any information about identity. Participants were assured: "While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect [the] confidentiality [the transmission]" (Baynard, HSRB application, 2010).

After completing the survey the teachers were prompted to provide their email address if they were comfortable being contacted for a follow-up interview.

Semi-structured interview. After the BPCCFA survey was completed, ten additional teachers were asked to participate in a 45 minute semi-structured interview. The ten teachers selected to participate in the interview were chosen from the survey responses because they indicated that they were willing to be interviewed and they represented a variety of TBC. Participants were selected so that a sample across the TBC was represented in the ten interview participants (Table 11). Participants were asked questions from the semi-structured interview protocol. Confidentiality was maintained by assigning the participant a pseudonym. Participants selected for a follow-up interview had the option of consenting to audio recording. The audio taping took place during the one hour follow up interview in a private conference room at the participants' schools. The tapes were kept secure in the researcher's locked office in a locked file cabinet. Only the researcher had access to the tapes. The tapes were destroyed after one year.

Trends were identified by examining participant data without identifiers because the group was the unit of analysis. Patterns were identified within the group and teachers were tracked by number rather than name so that participants could be distinguished. Interview data was entered using a pseudonym. Because characteristics of the group were the target of inquiry, not the individual teachers, the use of pseudonyms was for organizational purposes only. The information being sought during the interview included TBC, values toward common formative assessment, and teacher perceptions of the relationship between collaboration and common formative assessment.

Data Analysis Procedures

Descriptive statistics, including frequencies, were used first to describe the collective responses of the teachers and identify any groupings of interest. Both school settings were merged together for analysis because they have the same collaboration and common formative assessment model and because professional learning community meetings are structured in the same way and the same frequency. TBC, TCB, TCP, AF, and TPCFA were described using a frequency analysis. The frequency analysis showed which ideas are highly valued and described the sample population.

Before conducting an exploratory factor analysis (EFA) two pre-screening tests were used, Mahalanobis distance test and Bartlett's spherecity with Anti-image matrix. Mahalanobis distance test was used to prepare the data for further analysis (Mertler & Vannatta, 2009). Bartlett'spherecity test was performed to test the null hypothesis that the correlation matrix was not significant. An anti-image matrix was used to further explain Bartlett's test. Using SPSS 17.0 an exploratory factor analysis was used to identify which hypothesized aspects of collaboration and assessment grouped together. Exploratory factor analysis was used to simplify the variables on the survey by identifying a smaller number of underlying beliefs. Exploratory factor analysis is especially useful in survey research because each question alone would not provide the full picture of the respondents beliefs toward the topic, but when examined together the respondents belief can be easily understood. There was no previous theoretical model to suggest what factors might emerge; therefore the EFA was used to explore the data structure (Green & Salkind, 2007). The variables identified as having a common

underlying structure were grouped together to create a new variable for each participant, a factor score. Exploratory factor analysis was composed of three tests; Kaiser's Rule, Scree Plot, and Principles Component Analysis (Mertler & Vannatta, 2009). During analysis the data was rotated and the rotated component matrix was used to identify where the variables grouped. Following the exploratory factor analysis an analysis of variance (ANOVA) was used to compare the means for the factor scores between teacher background characteristics (TBC).

Qualitative analysis involved open coding, axial coding, and selective coding the interview data and then checking for alignment to the components identified in the quantitative data. Grounded theory research informed the qualitative analysis (Strauss and Corbin, 1998). Specifically, a systematic procedure was followed using open coding, axial coding, and then selective coding (Strauss and Corbin, 1998). Interviews with the ten selected teachers were held at the teachers' respective schools. Interviews were recorded and then transcribed. The interviews were then read in entirety and researcher memos, notes about tentative ideas, were made during the initial reading of the interviews (Maxwell, 2005). During a second reading of the interviews meaningful ideas were highlighted. The highlighted ideas were then named, open coding, and grouped together to form topical groups. Each identified topical group was matched with supporting quotes. Axial coding was used to identify the major groups; the topics that make everything else exist. Then selective coding was used to collapse the groups into categories. (Strauss and Corbin, 1998).

Following the analysis of the quantitative and qualitative data, features of the qualitative data processes and quantitative data outcomes were compared to determine if results support or contradict each other. Quantitative analysis using SPSS 17.0 was used to evaluate relationships among TCB, TCP, AF, TPCFA and if TBC play a role in any of these relationships. Qualitative coding with NVIVO software organized interview responses that addressed any mismatch or confirmed alignment between ideas that are highly valued in survey responses. The qualitative and quantitative data were merged and all variables were compared individually and by group; TCB, TCP, AF, and TPCFA were compared to each other, as well as each aspect of TCB and TCP being compared to each aspect of AF and TPCFA. The proposed analysis is shown in Table 3.

Table 3

Proposed Analysis of Collaboration and Common Formative Assessment

	Sharing	Outputs	Productivity
evaluating teaching			
diagnosing students' strengths and weaknesses			
implementing new instructional strategies			
dividing the workload			

CHAPTER 4: RESULTS

This mixed methods study sought to describe teachers' beliefs and practice of peer collaboration and their opinion of using common formative assessment. Both qualitative and quantitative responses were analyzed to address the six research questions, 1) What is the nature of the relationship between Teacher Collaboration Beliefs and Teacher Collaboration Practices and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships? 2) What is the nature of the relationship between Teacher Collaboration Beliefs and Teacher Perceptions of Common Formative Assessment and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships? 3) What is the nature of the relationship between Teacher Collaboration Practices and Teacher Perceptions of Common Formative Assessment and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships? 4) What is the nature of the relationship between Assessment Factors and Teacher Perceptions of Common Formative Assessment and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships? 5) What do teachers value about common formative assessments? 6) How do teachers perceive the relationship between common formative assessment and

collaboration? This chapter first presents the quantitative survey results, which include descriptive statistics, frequencies, and exploratory factor analysis. The qualitative results are then discussed, including the interview population, coding results, and themes identified. Finally, the quantitative and the qualitative results are examined together using mixed methods parallel analysis.

Quantitative Results

Descriptive statistics. The BPCCFA survey link was emailed to the school administrators on October 11, 2010. School administrators emailed 76 content teachers requesting they complete the survey. The survey was left open for the teachers to complete from October 11, 2010 to November 18, 2010. During the first week of the survey, both administrators waived a meeting requirement so that teachers could use school hours to complete the survey. Twice during the open survey period the school administrators emailed the faculty to remind them to complete the survey. Forty-four responses that indicated a willingness to participate in research were returned before the survey was closed. The BPCCFA survey consisted of three sections: background information, common formative assessment information, and collaboration information. The background information section collected responses related to teacher background characteristics (TBC). The common formative assessment section collected responses related to Assessment Factors (AF) and Teacher Perceptions of Common Formative Assessment Practices (TPCFA). The collaboration information section collected responses related to Teacher Collaboration Beliefs (TCB) and Teacher Collaboration Practices (TCP). Teacher background characteristics represented in the survey include

gender, career switcher status, age, and teaching experience. Eight males responded to the survey and 36 females responded to the survey, yielding a 58% return rate. The survey results relating to TBC are displayed in Figure 2, 3, and 4 below.

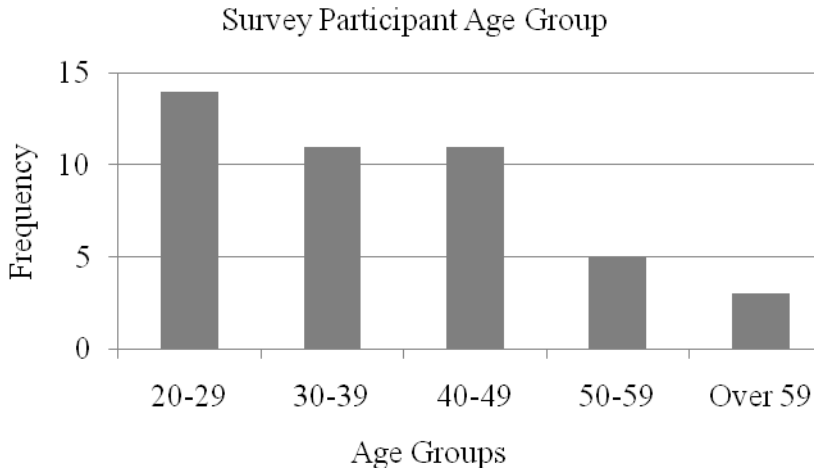

Figure 2. Age demographic information on the survey participants.

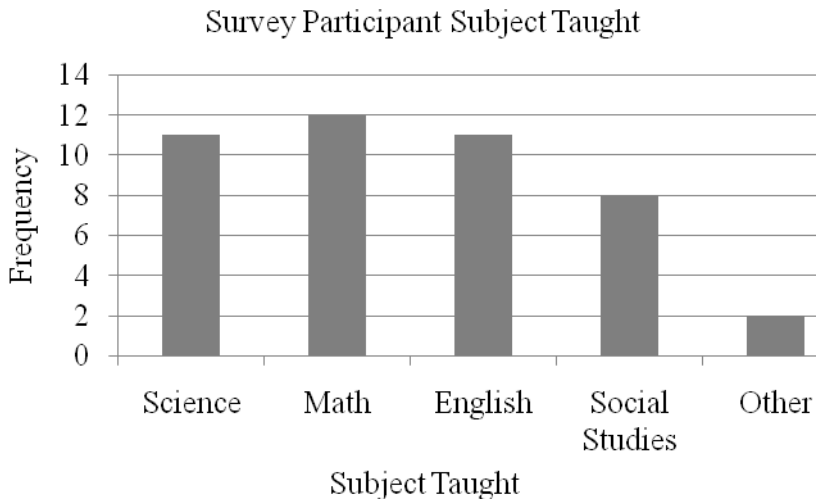

Figure 3. Subject taught by the survey participants.

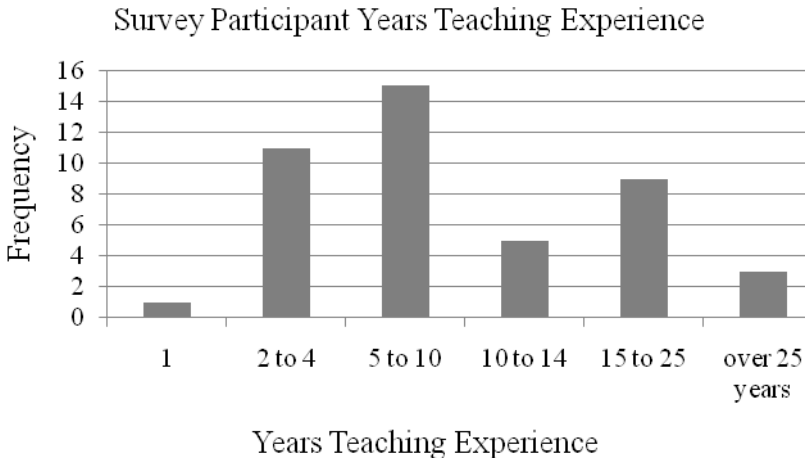

Figure 4. Years of teaching experience of the survey participants.

The survey participants represent a varied sample of age, experience, grade level and subject area taught. The majority of the survey participants have between two and ten years and fifteen and twenty-five years experience teaching. The majority of participants have been career teachers, meaning they entered the profession with less than five years experience in any other profession.

The BPCCFA survey results relating to Assessment Factors (AF) and Teacher Perceptions of Common Formative Assessment Practices (TPCFA) are shown in Figures 5, 6, and 7. Common formative assessments were operationalized at the school sites through Professional Learning Communities (PLC), therefore the results relating to PLC are relevant to AF and TPCFA.

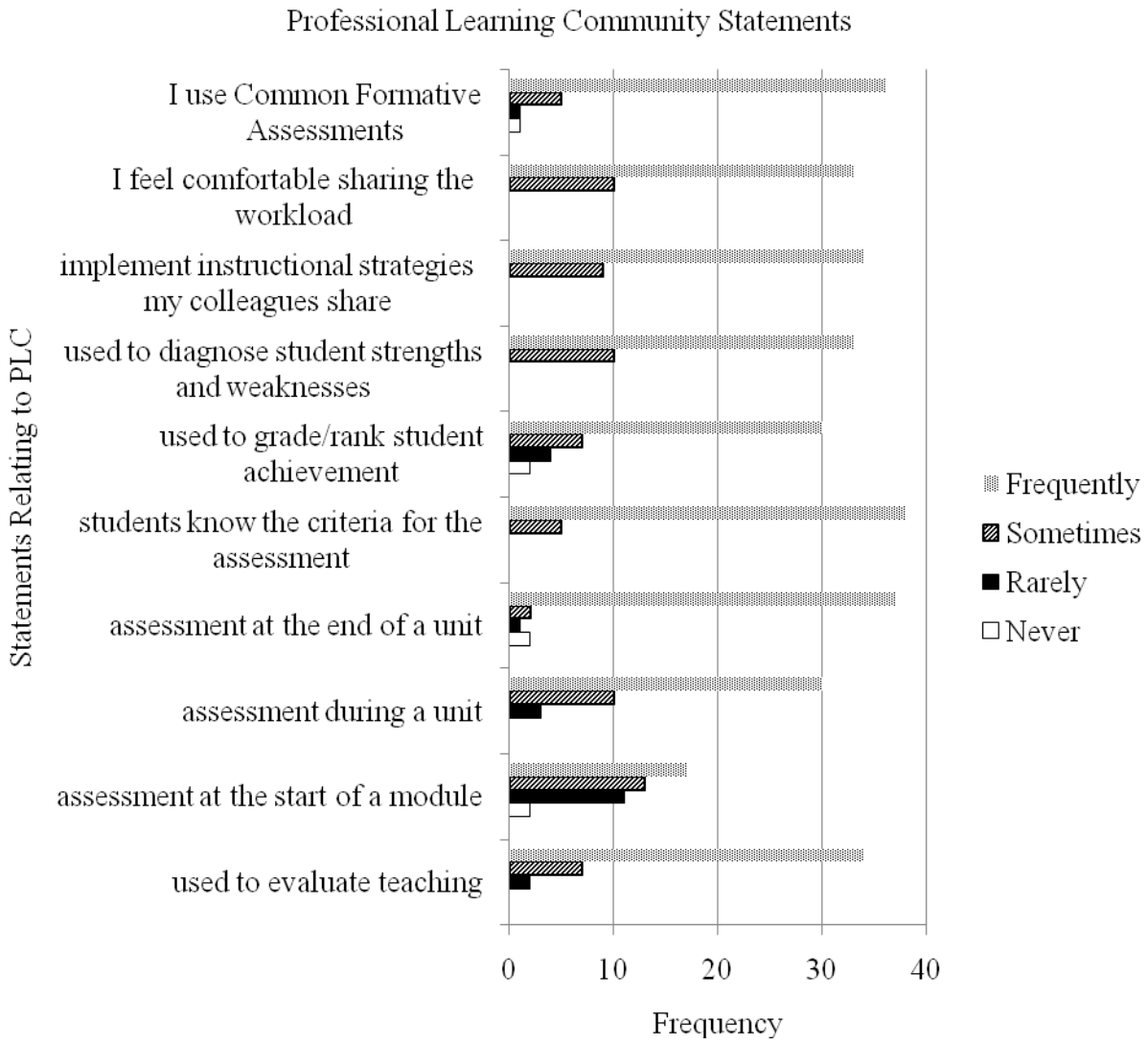

Figure 5. Survey responses regarding statements about common assessment, PLC procedures, and teacher opinions relating to PLC. The figure show the frequency teachers reported using assessments and strategies developed during PLC meetings.

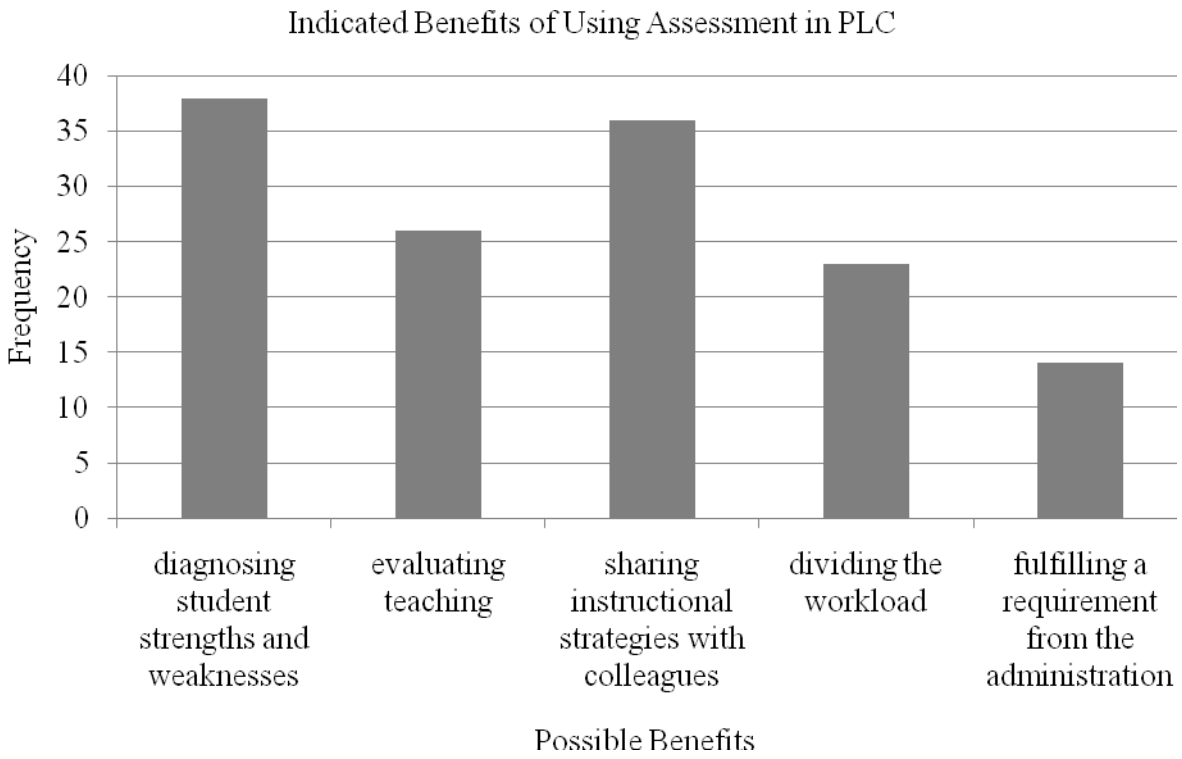

Figure 6. Survey responses regarding benefits of using common assessment. The figure shows the teacher identified beneficial outcomes of collaboration. Survey participants were asked to select all the outcomes they believed to be beneficial.

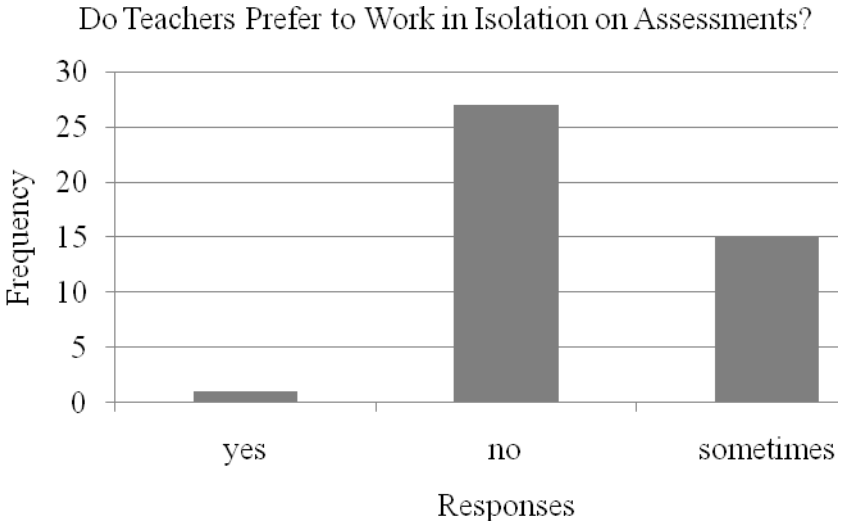

Figure 7. Survey responses regarding teacher preference for working in isolation on common assessments.

Survey responses regarding assessment factors (AF) and teacher perceptions of common formative assessment practices (TPCFA) indicated teachers frequently use common formative assessment to diagnose student strengths and weaknesses, grade students, and evaluate teaching. Additionally, teachers indicated that they frequently assess students at the beginning, middle, and end of instructional units. Survey responses indicated that teachers perceive diagnosing student strengths and weaknesses and sharing instructional strategies as the two biggest benefits of using common formative assessment. Responses suggested that most teachers do not prefer to work in isolation on assessments. BPCCFA survey results regarding teacher collaboration beliefs (TCB) and teacher collaboration practices (TCP) are presented below in Figure 8, 9, 10, 11, 12, and 13.

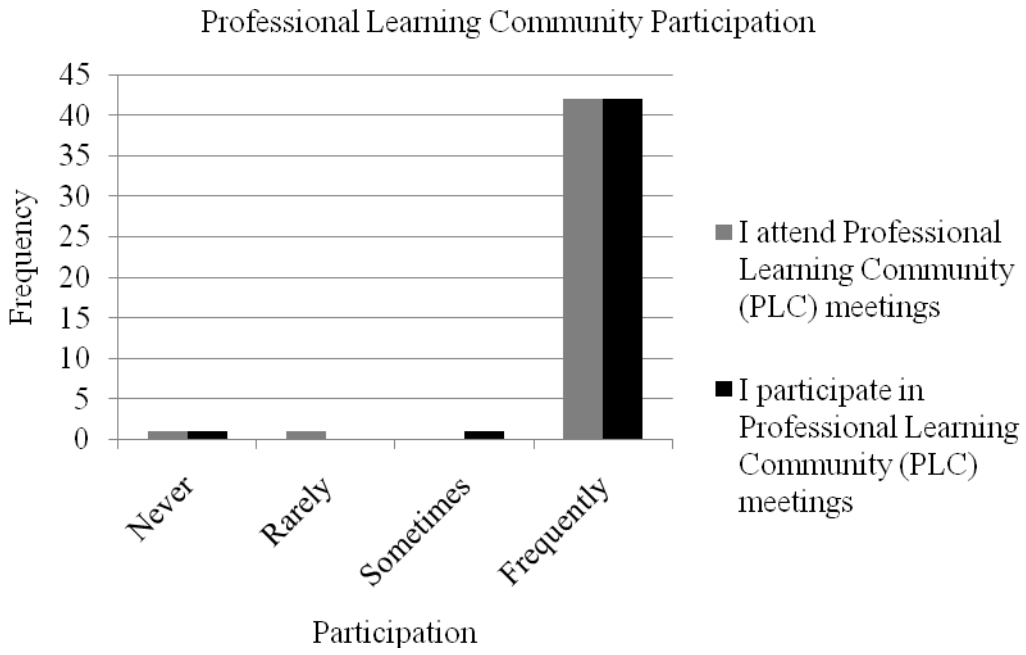

Figure 8. Survey responses regarding teacher participation in PLC meetings.

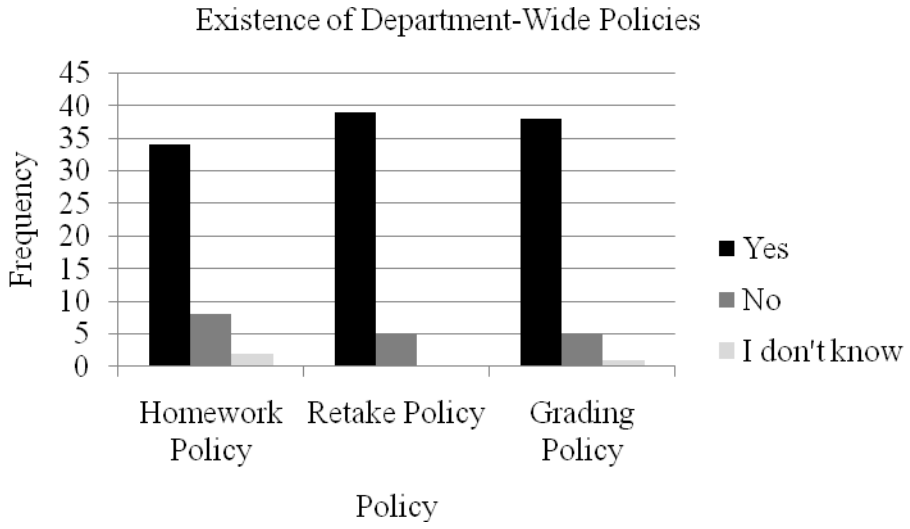

Figure 9. Survey responses regarding teacher knowledge of department-wide policies. Consensus on the existence of department-wide policies suggests alignment or discussion exists.

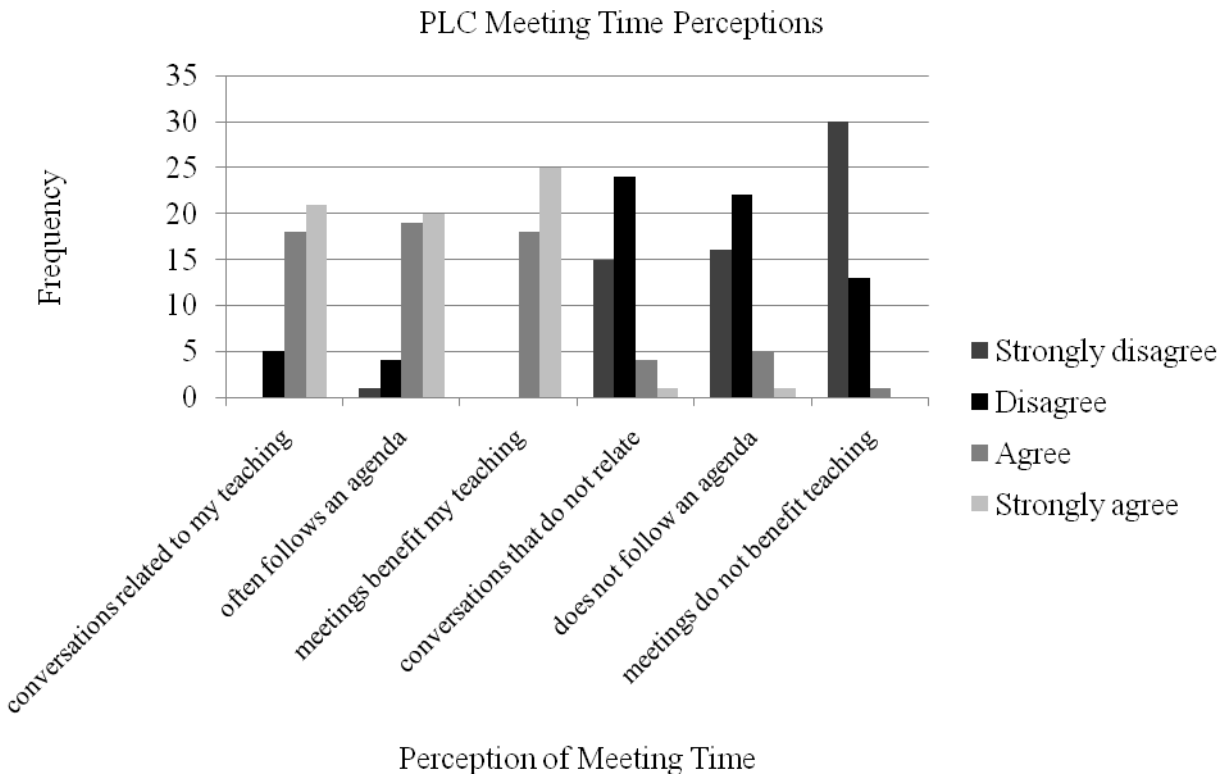

Figure 10. Survey responses regarding uses of PLC meeting time.

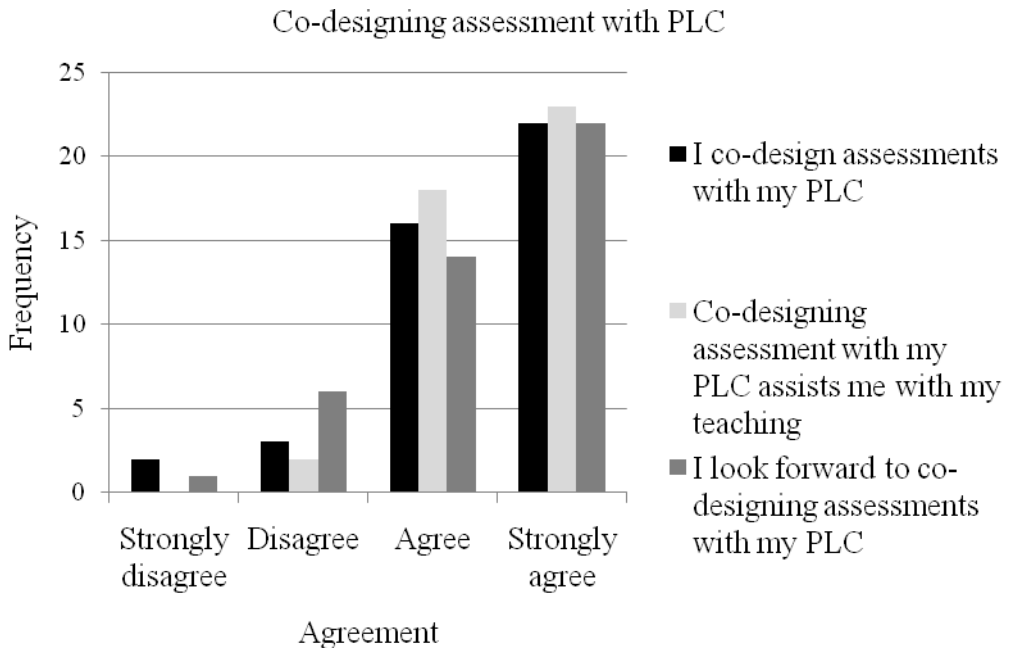

Figure 11. Survey responses regarding co-designing assessments. The majority of responses suggest that teachers view co-designing assessments as beneficial to teaching.

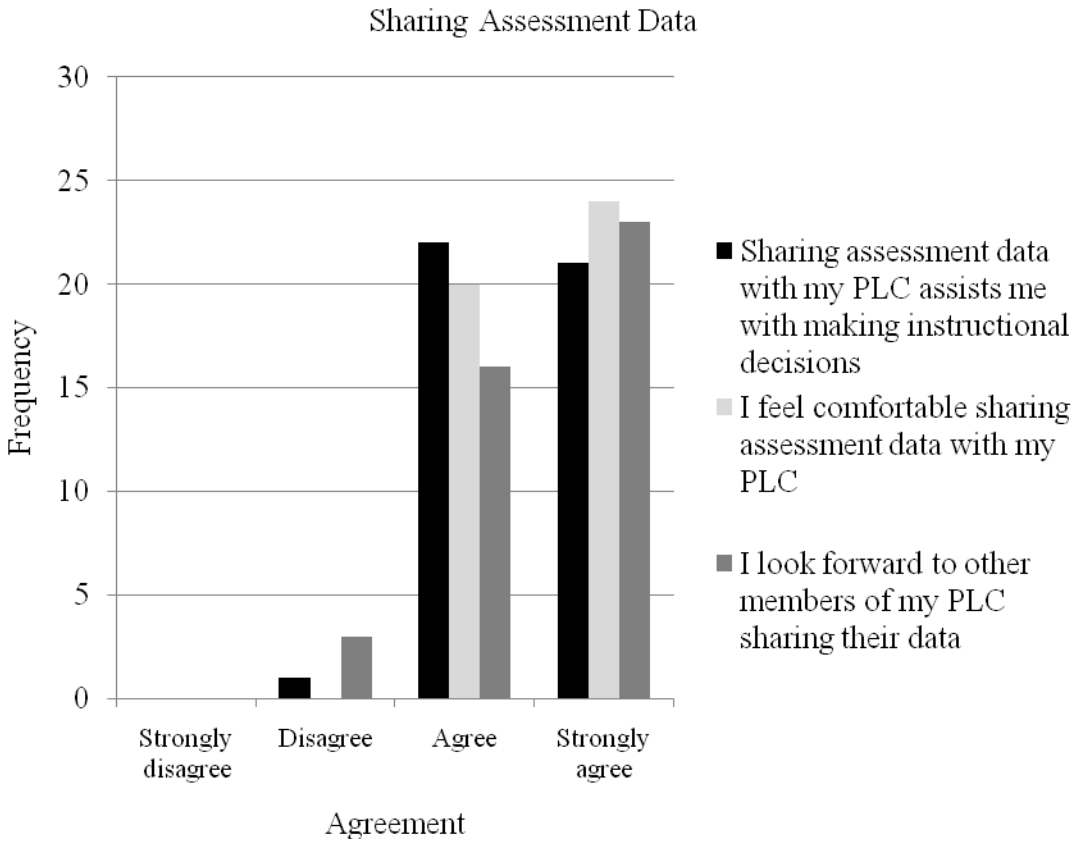

Figure 12. Survey responses regarding sharing data. The majority of responses indicate a strong agreement that sharing data benefits instruction.

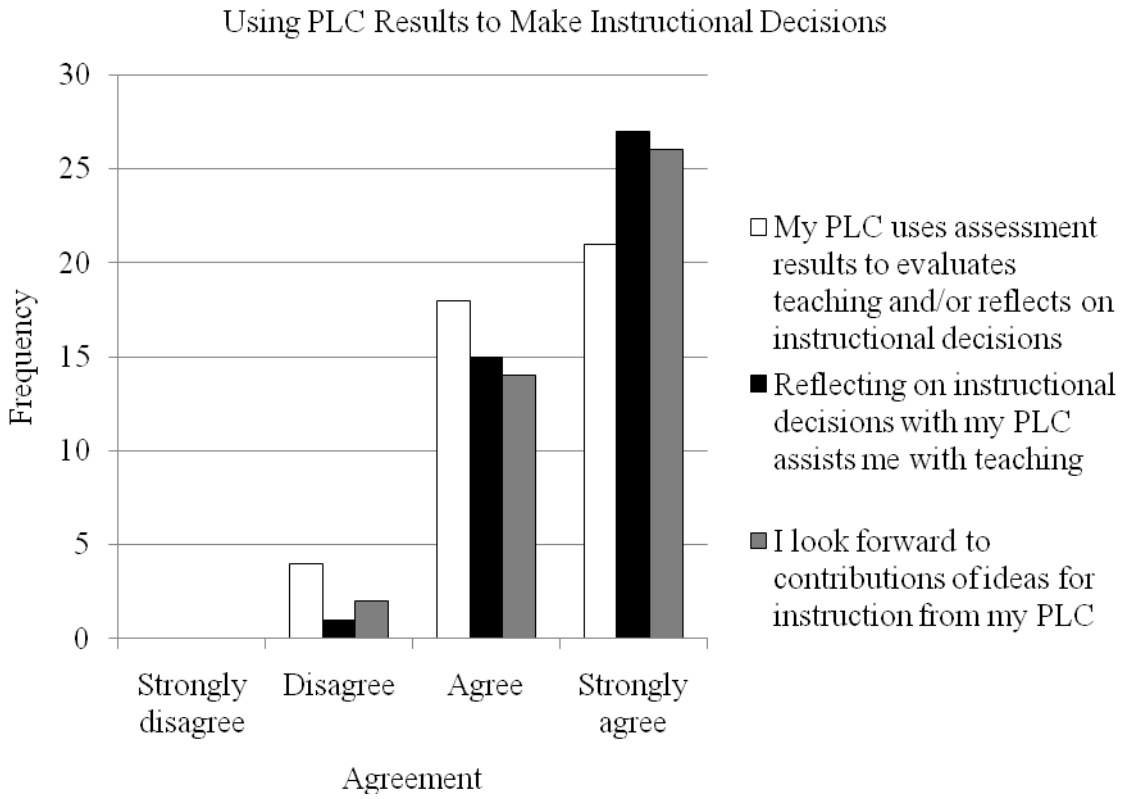

Figure 13. Survey responses regarding making instructional decisions based on data. The majority of responses suggest that PLCs use assessment results to evaluate teaching and this assists with teaching.

The results from the BPCCFA survey relating to TCB and TCP suggested that teachers frequently attend and participate in PLC meetings. Teacher responses indicated that department wide policies are in place. Most teachers indicated that PLC meetings are relevant and beneficial to their teaching. The majority of responses suggested that teachers enjoy co-designing assessments with their PLC and enjoy sharing data with their PLC colleagues. The majority of responses indicated that teachers find collaborating with their PLC beneficial to making instructional decisions.

AF, TPCFA, TCB, TCP analysis results. An exploratory factor analysis (EFA) was used to summarize correlations among data. The research questions sought to understand AF, TPCFA, TCB, and TCP. The EFA identifies correlations among survey items so that it can be determined if the items measure AF, TPCFA, TCB, and TCP. The EFA explains correlations among variables by identifying shared components, or factors. Each question from the survey is viewed as a single component and the factor analysis showed if components grouped together (Mertler & Vannatta, 2009). The components will group with other components that tended to have the same variances in responses. To ensure the accuracy of the exploratory factor analysis, two tests were performed. The Mahalanobis distance test, was used to determine if outliers existed. Bartlett's test of sphericity and KMO were used to ensure that components were sufficiently intercorrelated to conduct an exploratory factor analysis (Mertler & Vannatta, 2009). Following the exploratory factor analysis (EFA) an analysis of variance (ANOVA) was used to compare the means between the teacher background characteristics (TBC). The

TBC of gender was compared using an independent samples t-test because only two populations exist for that TBC.

Pre-analysis data screening. The Mahalanobis distance test resulted in a new variable, MAH_1, which was tested using chi-squared criteria. Outliers were indicated by chi-square values that were significant at $p < .001$ with 44 degrees of freedom (44 is the sample size). The critical value of chi-squared at $p < .001$ and $df = 44$ is 78.75. Therefore, cases with a MAH_1 greater than 78.75 are considered outliers (Mertler & Vannatta, 2009). The highest MAH_1 value in the data is 37.87, therefore no outliers were identified using the Mahalanobis distance test.

Bartlett's test of sphericity (Table 4) tests the null hypothesis that no correlation exists among components in an exploratory factor analysis. Failing to reject the null hypothesis would suggest the variables have nothing in common and therefore inappropriate to conduct a factor analysis (Mertler & Vannatta, 2009). In addition, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy greater than .6 indicated that shared variance between variables is sufficient to conduct a factor analysis ($KMO = .677$).

Table 4

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.677
Bartlett's Test of Sphericity	**Approx. Chi-Square**	171.749
	df	45
	Sig.	.000

The anti-image matrix (Table 5) provides a more detailed view of the strength of the sample for analyses. The diagonal of Table 5 shows that all but two of the coefficients are greater than .60, and all but one correlations spread from that line are greater than a negative .40. The item "Participate (PLC) meetings" is the weakest item in the anti-image matrix, with a correlation of .34. "I participate in Professional Learning Community (PLC) meetings" also had the lowest loading on both the factors retained as shown in Table 7, the loading on Factor 1 was -.16 and the loading on Factor 2 was .44. The item "Jointly creates CFA" was the only other item that did not have a correlation higher than .60, with a correlation of .48.

Table 5

Anti-Image Matrix

	1	2	3	4	5	6	7	8	9	10
1	.621[a]	-.326	.077	-.450	-.215	.042	.165	.240	-.201	-.047
2	-.326	.625[a]	-.619	.103	-.244	-.245	-.188	.123	.184	-.060
3	.077	-.619	.710[a]	-.113	.288	.025	-.007	-.049	-.015	-.198
4	-.450	.103	-.113	.482[a]	.180	-.167	-.089	-.154	-.216	.406
5	-.215	-.244	.288	.180	.340[a]	-.144	-.210	-.075	.169	-.012
6	.042	-.245	.025	-.167	-.144	.848[a]	.058	-.300	-.257	-.012
7	.165	-.188	-.007	-.089	-.210	.058	.706[a]	-.152	-.357	.190
8	.240	.123	-.049	-.154	-.075	-.300	-.152	.778[a]	-.003	-.236
9	-.201	.184	-.015	-.216	.169	-.257	-.357	-.003	.689[a]	-.718
10	-.047	-.060	-.198	.406	-.012	-.012	.190	-.236	-.718	.667[a]

Key

1= We design and implement CA

2= Used to diagnose student strengths and weaknesses

3= Implement strategies my colleagues share

4= Jointly creates CFA

5= Participate (PLC) meetings

6= PLC meeting time is related to my teaching

7= PLC meetings benefit my teaching

8= Co-designing assists

9= Sharing assists with decisions

10= Comfort sharing data

The pre-data analysis screening tests suggested that the data was strong enough to continue with the exploratory factor analysis, recognizing that "Participates (PLC) meetings" and "Jointly creates CFA" are weak and should be viewed with caution.

Exploratory factor analysis. The exploratory factor analysis (EFA) consisted of three mandatory tests and one optional test. The three mandatory tests include: 1) Kaiser's Rule, 2) Scree Plot, and 3) Principles Component Analysis. The fourth test, Residuals Test, was not required for this data because Kaiser's Rule and the Principles Component Test both showed more than 1 component. Factors were restricted to two. The data was also rotated to produce a rotated component matrix. The survey contained 43 items, which translated into 43 variables. All 43 items were analyzed using descriptives. To increase the accuracies of the exploratory factor analysis the number of variables analyzed should be no more than 10 because the sample size is 44, allowing four samples per variable (Mertler & Vannatta, 2009).

Exploratory factor analysis was conducted to evaluate any underlying common components for the measures on the following 10 survey variables: *We design and implement CA, Used to diagnose student strengths and weaknesses, Implement strategies my colleagues share, Jointly creates CFA, Participate (PLC) meetings, PLC meeting time is related to my teaching, PLC meetings benefit my teaching, Co-designing assists, Sharing assists with decisions,* and *Comfort sharing data.* Factors were restricted to two to force loadings and limit components being retained. Three criteria were used to determine the appropriate number of components to retain: eigenvalue, scree plot, and variance. The results of the eigenvalue show that 4 components are valued greater than

1, and therefore should be retained (Table 6). However, the first two components seem more stable than the second two components. The first two components have eigenvalues of 3.82 and 1.53.

Table 6

Initial Eigenvalues

Component	**Total**	**% of Variance**	**Cumulative %**
1	3.818	38.178	38.178
2	1.525	15.249	53.427
3	1.160	11.601	65.028
4	1.066	10.658	75.686
5	.755	7.546	83.232
6	.635	6.355	89.587
7	.407	4.067	93.654
8	.309	3.089	96.743
9	.206	2.065	98.807
10	.119	1.193	100.000

The scree plot suggests that 2 components are shown before the graph levels off, and therefore should be retained (Figure 14). The principles component analysis suggests that the first component accounts for more than 38% of the variance and the second component accounts for 15% of the variance, combined these two account for 53% of the variance (Table 6). Because the factors were restricted to two the Eigenvalues, Scree Plot, and Principles Component Analysis essentially confirm the forced loadings, and two components were retained.

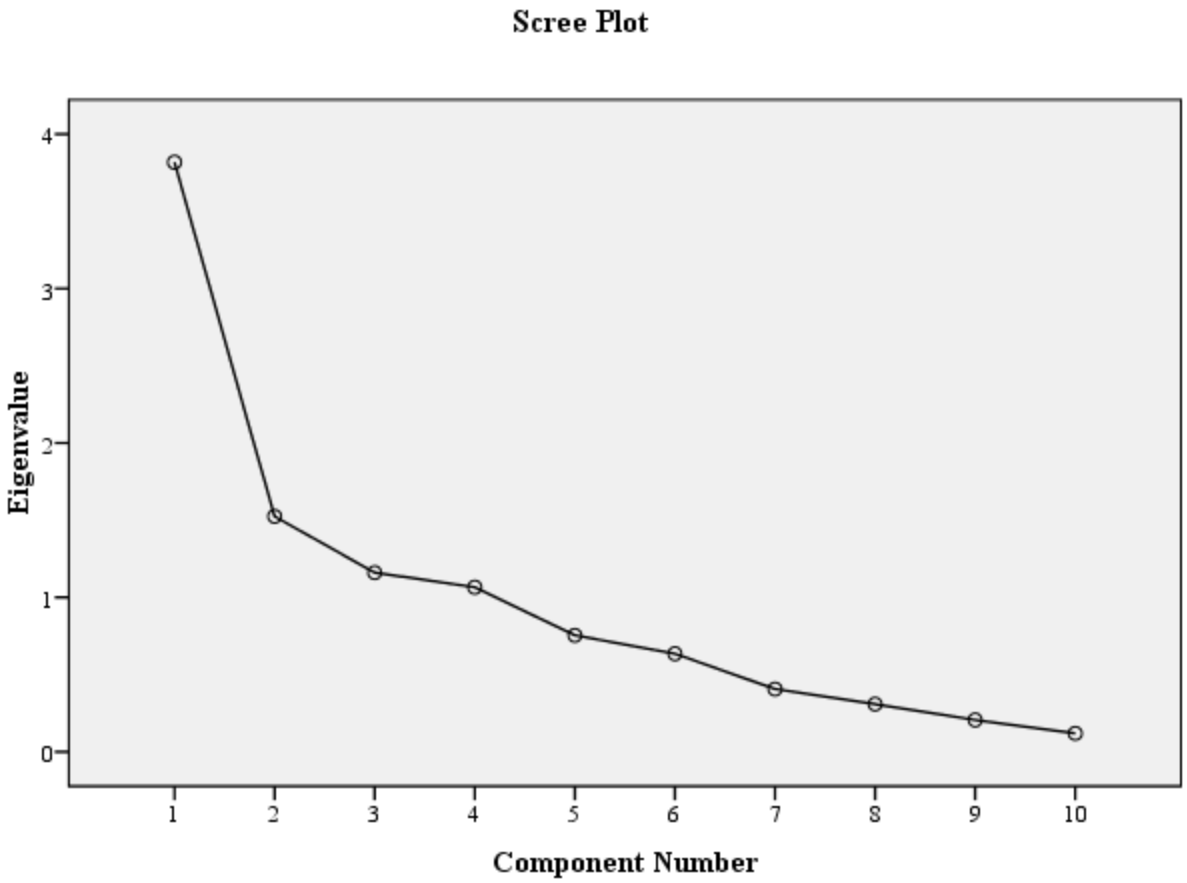

Figure 14. Scree Plot of Eigenvalues for survey data. Two components appear before the graph starts to level off, showing that two components were retained for the data.

Rotated component matrix. The rotated component correlation matrix (Table 7) was used to identify which variables shared common components, two common components were identified. Two underlying factors were identified and the variables were sorted into two groups based on the loading of the identified underlying components. Component 1, also factor 1, was named Sharing Benefits Instruction and Component 2, also factor 2, was named Assessment Informs Instruction.

Table 7

Rotated Component Matrix

	Component	
	1	2
Sharing assessment data with my PLC assists me with making instructional decisions	.875	.132
I feel comfortable sharing assessment data with my PLC	.863	.012
Co-designing assessment with my PLC assists me with my teaching	.751	-.155
PLC meeting time is often devoted to conversations related to my teaching	.708	.320
I implement instructional strategies my colleagues share	.562	.432
PLC meetings benefit my teaching	.489	.255
we design and implement CA that are used to evaluate teaching	.134	.801
used to diagnose student strengths and weaknesses	.323	.734
jointly creates Common Formative Assessments that I use	.154	.521
I participate in Professional Learning Community (PLC) meetings	-.159	.440

Component 1, Sharing Benefits Instruction, includes the variable relating to sharing through collaboration and the resulting benefits to instruction. The variables are correlated because they all have the same underlying focus on feelings about the benefits of PLCs to instruction. Component 2, Assessment Informs Instruction, includes variables relating to uses of assessments to inform instruction. The variables are logically connected because they all have the same underlying focus on assessments informing instruction. Essentially, Component 1 addresses the benefits of sharing and Component 2 addresses the benefits of assessments. Factor scores were then computed for each participant. Bartlett's approach was used because only the shared factors affect the factor score (DiStefano, Zhu, & Mîndrilă, 2009).

Independent samples t-test. The resulting factors scores' means on the two identified components, 1) Sharing Improves Instruction and 2) Assessment Informs Instruction, were compared based on selected teacher background characteristics (TBC). The gender TBC and career switcher status TBC only contain two populations, male or female and yes or no, and were therefore compared using an independent samples t-test. The independent samples t-test evaluated the differences in means between males and females on Component 1, Sharing Informs Instruction, and Component 2, Assessment Improves Instruction. In both components for males and females the differences were considered to be not statistically significant (t (41) = 0.42, p = .680 and t (41) = 0.50, p = .620). The independent samples t-test evaluated the differences in means between teachers who entered the teaching profession after previous careers (career switchers) to those who entered the teaching profession without previous careers (non-career switcher)

on Component 1 and Component 2. Both components for career switchers and non career switchers were not statistically significant (t (41) = 0.82, p = 0.418 and t (41) = 1.88, p = 0.067).

Analysis of variance. The analysis of variance (ANOVA) compares the means between more than two groups on a single variable. A one way ANOVA was used to compare TBC as they relate to Component 1 and Component 2. The TBC of age group, grade level taught, subject area taught, and teaching experience were evaluated with each of the two components, Sharing Improves Instruction and Assessment Informs Instruction. Views on Component 1 did not differ significantly across age group, F (4, 38) = .54, p = .706, grade level taught, F (2, 40) = 0.11, p = .893, subject area taught, F (4, 38) = 1.41, p = .250, and teaching experience, F (5, 37) = 0.58, p = .717. Views on Component 2 did not differ significantly across grade level taught, F (2, 40) = 2.04, p = .144, subject area taught, F (4, 38) = 0.42, p = .794, and teaching experience, F (5, 37) = 1.15, p = .350. Views on Component 2, Assessment Informs Instruction, did differ significantly across age groups, F (4, 38) = 2.67, p = .047 (Table 8).

Table 8

Descriptives by Age Group for Assessment Informs Instruction

					95% Confidence Interval	
	N	**Mean**	**Std. Deviation**	**Std. Error**	**Lower Bound**	**Upper Bound**
20-29	14	51.0293	7.69693	2.05709	46.5852	55.4734
30-39	11	49.8559	11.92970	3.59694	41.8414	57.8704
40-49	11	52.1285	5.03869	1.51922	48.7434	55.5135
50-59	4	53.2951	7.14197	3.57098	41.9306	64.6596
over 59	3	33.5271	18.40332	10.62516	-12.1893	79.2435
Total	43	50.0000	10.00000	1.52499	46.9225	53.0775

Tukey post-hoc comparisons (Table 9) of the five age groups indicate that the over 59 group (M =33.53, 95% CI [-12.19, 79.25]) gave significantly lower value ratings than the 20-29 group (M = 51.03, 95% CI [46.59, 55.47]), p = .040, and the 40-49 group (M = 52.13, 95% CI [48.74, 55.51]), p = .030. Comparisons between the over 59 group and the remaining two groups, 50-59 group and the 30-39 group, were not statistically significant at $p < .05$.

Table 9

Multiple Comparisons Assessment Informs Instruction

			Mean			95% Confidence Interval	
	(I) Age group	**(J) Age group**	**Difference (I-J)**	**Std. Error**	**Sig.**	**Lower Bound**	**Upper Bound**
Tukey	**20-29**	30-39	1.17344	3.74193	.998	-9.5399	11.8868
		40-49	-1.09916	3.74193	.998	-11.8125	9.6142
		50-59	-2.26577	5.26537	.993	-17.3408	12.8093
		over 59	17.50223*	5.90862	.040	.5855	34.4190
	30-39	20-29	-1.17344	3.74193	.998	-11.8868	9.5399
		40-49	-2.27260	3.96009	.978	-13.6106	9.0654
		50-59	-3.43922	5.42258	.968	-18.9644	12.0860
		over 59	16.32879	6.04914	.073	-.9903	33.6478
	40-49	20-29	1.09916	3.74193	.998	-9.6142	11.8125
		30-39	2.27260	3.96009	.978	-9.0654	13.6106
		50-59	-1.16661	5.42258	1.000	-16.6918	14.3586
		over 59	18.60139*	6.04914	.030	1.2823	35.9204
	50-59	20-29	2.26577	5.26537	.993	-12.8093	17.3408
		30-39	3.43922	5.42258	.968	-12.0860	18.9644
		40-49	1.16661	5.42258	1.000	-14.3586	16.6918
		over 59	19.76800	7.09324	.060	-.5404	40.0764
	over 59	20-29	-17.50223*	5.90862	.040	-34.4190	-.5855

30-39	-16.32879	6.04914	.073	-33.6478	.9903
40-49	-18.60139*	6.04914	.030	-35.9204	-1.2823
50-59	-19.76800	7.09324	.060	-40.0764	.5404

Factor Scores. The two identified factors, Sharing Benefits Instruction and Assessment Informs Instruction, from the rotated component matrix were transformed in SPSS to create factor scores for each participant. Factor score 1, Sharing Benefits Instruction, is a score for each participant on their view of the five combined variables that all correlate because of the same underlying component. Factor score 2, Assessment Informs Instruction, is a score for each participant on their view of the four variables all correlated because of the same underlying component. The factor scores represent each individual's responses on the identified factor. The only significant findings, p=.047, on the factors scores were among the over 59 age group (Table 10) on the Assessment Informs Instruction factor scores (M=33.53, SD=18.40). The variance among all other TBC (gender, career switcher, teaching experience, and subject area) was not significant.

Table 10

Means for Age Group on Factor Scores

Age group		**T_SharingBenefits**	**T_AssessmentInforms**
20-29	Mean	50.4357	51.0293
	Std. Deviation	11.34468	7.69693
30-39	Mean	48.4044	49.8559
	Std. Deviation	7.67592	11.92970
40-49	Mean	48.4216	52.1285
	Std. Deviation	11.43231	5.03869
50-59	Mean	51.8039	53.2951
	Std. Deviation	8.48254	7.14197
over 59	Mean	57.1995	33.5271
	Std. Deviation	9.70206	18.40332

Qualitative Results

Interview selection. Six female teachers were selected and four male teachers were purposefully selected. Three teachers representing the 20-29 age bracket were selected, two teachers representing the 30-39 age bracket were selected, three teachers representing the 40-49 age bracket were selected, and two teachers representing the over 59 age bracket were selected. Three of the teachers selected were identified as career switchers. Three teachers selected had between 2-4 years teaching experience, four teachers had 5-9 years experience, two teachers had between 15-25 years experience, and one teacher had over 25 years teaching experience (see Table 11).

Table 11

Teacher Background Characteristics Represented in Interviews

Name	Gender	Age	Grade	Content	Years Teaching	Career Switcher	Undergraduate Degree
Ellen H	female	40-49	7th	science	5-9 years	yes	minored in content I teach
Molly M	female	20-29	7th	English	2-4 years	no	major in content I teach
Bob M	male	30-39	8th	science	5-9 years	yes	major in content I teach
Mary W	female	over 59	7th	math	over 25 years	no	majored in education
Annie L	female	40-49	8th	math	5-9 years	yes	other
Randy W	male	20-29	7th	math	2-4 years	no	major in content I teach
Martha M	female	20-29	7th	social studies	2-4 years	no	minored in education
Molly K	female	over 59	7th	science	15-25 years	no	major in content I teach
Mark L	male	40-49	7th	math	15-25 years	no	other
Ethan T	male	30-39	7th	English	5-9 years	no	majored in education

Interviews were scheduled with teachers via email. Interviews were conducted at each of the schools in the teachers' classrooms December 2-9, 2010. Interviews lasted between 45 minutes and 1 hour. All interviews were tape recorded. The protocol for the semi-structured interviews can be found in Appendix B.

Data results. Grounded theory design informed the qualitative data analysis. Grounded theory is used to generate a theory based on current data to explain the action of a population (Strauss and Corbin, 1998). A systematic procedure for coding qualitative data was adopted for this study. The systematic procedure involved three cycles of coding: open coding, axial coding, and selective coding. Open coding involved indentifying the initial coding categories by broadly grouping the data. Axial coding involved identifying the main codes from the created open codes and organizing the remaining codes around the main ideas. Selective coding involved identifying themes from the codes to explain the data (Strauss and Corbin, 1998). The open codes this study identified are show in Table 12. The axial coding with selected quotes exemplifying the code from the data is shown in Table 13. The identified themes from the selective coding are shown in Table 14.

The major code categories include *PLC meeting time, get along on a personal level, struggling students, online tests, change assessments, time, influence, culture, designated roles, personal teaching style, big picture, data discussions, grading, concerns,* and *sharing students*. The major code categories of *PLC meeting time, education, change assessments, influence,* and *data discussions* contain smaller sub-codes detailing ideas related to the major code (see Table 12).

Table 12

Open Codes Identified for this Study

Codes		
1 PLC Meeting Time	**7 Influence**	**12 Data Discussions**
a) Punctual	a) Student Learning	a) Test
b) Focused	b) Administration	b) None
c) Email	c) Professional Development/Readings	c) Strengths/Weaknesses
d) Multiple Preps	d) Consistency	d) Re-teaching/Teaching
e) Want More Big Idea Planning	e) County/District/State	e)Anxious
f) Want More Meetings	f) Student Ability	f) Off-Task
g) All Have Equal Say	g)Parental	**13 Grading**
h)Don't Meet Just to Meet	h) Enjoy Collaborating	**14 Concerns**
2 Get along on a personal level	i) Previous Work/Previous Teaching	**15 Sharing Students**
3 Struggling Students	j) Previous Negative PLC	
4 Online Tests	k) Improves Teaching	
5 Change Assessments	l) Share Workload	
a) Better Assessment Type	**8 Culture**	
b) Multiple Choice	**9 Designated roles**	
c) Motivation	**10 Personal Teaching Style**	
6 Time	**11 Big Picture**	

Results from the qualitative coding that are of interest include 29 mentions of the *get along on a personal level* code, 12 mentions of the *better assessment type* code, 16 mentions of *administration influence* code, five mentions of the *parental influence* code, nine mentions of the *personal teaching style* code, and 13 mentions of the *concerns* code (see Table 12). The *get along on a personal level* code was identified in all 10 interviews. Each participant spoke to how well the PLC "meshed" (Ethan T) or explained, "we all get along really well" (Mark L). Martha M enthusiastically expressed that, "it is just our personalities, we all mesh, we are willing to listen to what each other has to say." The *better assessment type* code was identified in 8 of the interviews. Participants expressed an interest in changing the current assessment type used in their PLC, wanting "more smaller quantitative assessments more frequently" (Molly) or "in an ideal world I would have a portfolio assessment, that would accumulate work throughout the unit and then a final activity that is less traditional tests and more analytical" (Ellen H). The 16 mentions of the *administration influence* code were distributed across seven interviews. The *administration influence* code most often addressed the school improvement plan and the opening faculty meeting discussion about teacher test scores. The five mentions of the parental influence code addressed the perception parents have of classroom practices, "that way you don't have the whole stereotype of students, 'oh he is the harder grader' you don't have parents complaining" (Randy W). The nine mentions of the *personal teaching style* code refer to individualized teaching styles as exemplified by Martha M, "the reality is we are all different teachers and we do teach some things differently. I might emphasize one part of history, and that is just how history is; you

kind of connect to different things based on your background." With the majority of the codes reflecting positive statements regarding PLCs it is important to note the 13 responses identified by the *concerns* code. Concerns ranged from schools being too reliant on numbers (Bob M and Molly K), to meetings being dominated by one individual (Ethan T), to the time consuming format of online tests (Ellen H). The major codes identified were collapsed into four themes. The themes and the collapsed codes they include are shown in Table 14.

Table 13

Characteristic Evidence of Codes for Interviews

Code (Frequency)	**Representative Quote**
1. PLC Meeting Time	
a. Punctual (5)	• Making sure you are on time and present so we can get things done. (Annie L)
b. Focused (7)	• We know what to expect (Molly M)
c. Email (8)	• We send out an email to everyone . . .'on this quiz I got this correct, this is what I saw wrong' (Randy W)
d. Multiple Preps (3)	• Two members have to go meet with another PLC, I wish there were more, I wish there was a way we could teach more things without having more than two preps--PLCs. That is the way things go (Mary W)
e. Want More Big Idea Planning (5)	• We don't get to talk about bigger things, like we run out of time. . .you know, bigger things—like the entire year as a whole, discussing the standards, thinking and learning and things like that (Molly M)
f. Want More Meetings (5)	• What I don't like is that we don't do as much assessment and common planning(Ethan T)
g. All Have Equal Say (2)	• All have equal say in the agenda and discussion, she just puts the agenda together. (Mary W)

h. Don't Meet Just To Meet (6)	• She will check with us via email and ask if there is anything we need to discuss and if everyone is ok with not meeting then we won't meet. (Annie L)
2. Get along on a personal level (29)	• We get along very well and can easily do things together, I have worked with one of them all four years and the other 3 years, we understand the system (1 Randy W)
3. Struggling Students (3)	• Independently for students if they are not doing well. If they are doing well then maybe we don't jump in as fast. (Molly M)
4. Online Tests (14)	• We do the online multiple choice, with some short answer common assessments every 4 to 6 weeks. .. (Bob M)
5. Change Assessments	
a. Better Assessment Type (12)	• I would rather do more assessments that require thought process, other than just knowing—I would rather move up on Bloom's taxonomy. Testing is done now, as unfortunate as it is; it is just on the bottom levels of Bloom's. (Martha M)
b. Multiple Choice (4)	• Kids are not motivated by multiple choice tests. (Bob M)
c. Motivation (3)	• Back to DC if I told students they wouldn't count for their grade, I wonder if they would be motivated to do them (Molly)
6. Time (10)	• Time, time with creating, time with grading, and instructional time. I am saying I don't have time (Ellen H)
7. Influence	

a.	Student Learning (5)	• You get to see how the students are learning before they take whatever final assessment you have designed. Especially if you want students to master all concepts.(Molly K)
b.	Admin (16)	• For example, as a school we were brought together at the beginning of the school year and the administration showed us dots of where we were, well here is 7th grade English and everyone is looking, and one teacher was a little bit lower, so how do you not feel bad (Ethan T)
c.	PD/Reading (8)	• Required to read 15 fixes for grading (Molly M)
d.	Know Other Teachers Are Doing/ Consistency (13)	• I would like to know what goes on in the other classrooms and I like to make sure I am teaching the same things. I think as long as you are teaching the same information and it is not a completely different class, then either way works. (Martha m)
e.	County/ District/State (15)	• Make sure on pace with the county, retaining basic knowledge and skills the county does random county assessments two or three times a year and we compare how they did compared to what the county is expecting. (Randy W)
f.	Student Ability (5)	• My students are pretty low (Mark L)
g.	Parental (5)	• The fact that she assigns homework doesn't affect me, but then a parent will call and ask "why is there so much homework in science?" And I can't answer them or explain. (Ellen H)
h.	Enjoy	• Those teachers wanted to work collaboratively so that they could

	Collaborat-ing (8)	bring their students up to the same level (Mary W)
i.	Previous Teaching/ Previous Work (16)	• At the charter school I taught at, up until teaching here, I thought the most collaborative teaching could be [was to have] English department meetings every two weeks after school, they were really intense. (Molly M)
j.	Previous Negative PLC (5)	• We don't deal with the conflict or the problem directly (Ellen H)
k.	Improves Teaching (2)	• Its sharing good ideas, good strategies, again reflecting on your practice and improving your practice (Mary W)
l.	Share Workload (5)	• We divvy up the work (Annie L)
8.	Culture (10)	• But here we just think it is normal, but we are actually, apparently, leading this way of looking at things differently (Ethan T)
9.	Roles/Responsibility (10)	• One person does a little less than the others, but in general that other person has more structure so they kind of lay the foundation and then the others rearrange things. (Randy W)
10.	Personal Teaching Style	• I have my own style and my own ways of doing things. So math, science, and social studies, at elementary, we were really just on the

(9)	same ball, we were doing the same things the same units all of that stuff—it just made sense. But, we all agreed that language arts was just going to be different, we had different style, but we knew what we were doing and we could give and take (Ethan T)
11. Big Picture (5)	• The online CFA are the big picture. Understanding a specific theme, like in the outsiders, as opposed to big picture understanding theme in general (Ethan T)
12. Data Discussions	
a. Test (7)	• We go over it, and when we have time as a PLC to look at how well certain parts of the test performed we do deal with those questions—it has to go across the board, not specific to one teacher. (Molly K)
b. Teaching And Re-teaching (9)	• If it was formative then we go back into our classroom and review those skills again (Mark L)
c. Strengths Weaknesses/Compare (10)	• They help pinpoint areas of strengths and weaknesses. (Mary W)
d. None (2)	• So far we haven't done any discussing what to do. We were told there would be more "your students did well on this", but we haven't had that discussion yet (Molly M)
e. Anxious (5)	• I do now. But, it was a big risk as the seasoned member of the staff—I was nervous the first couple of times. (Mary W)
f. Off Task (6)	• We are all a little ADD, we get off track very easily (Martha M)

13. Grading (8)	• Grading is the most difficult part of teaching (Molly M)
14. Concerns (13)	• But, also really just not showing us anything we don't already know. I mean think about it, our students were doing really well before we had to do assessments all the time, but now they same "oh look at the correlation between all the assessments they do and how well the students are doing." What is it they say? Correlation is not causation. I just think especially with the time spent designing, we should just save teachers time (Bob M)
15. Sharing Students (5)	• We also support each other, the other day, one of the algebra teachers couldn't stay after so she sent her kids to us for after school review, so we all did a retake the next day. (Annie L)

Table 14

Themes identified in the interviews

Theme	**Open Codes and Axial Codes (A, B, C, etc)**
Procedural	• PLC Meeting Time: A) Punctual, B) Focused, C) Email, D) Multiple Preps, F) Want More Meetings • Online Tests • Time • Influence: B) Administration, E) County/District/State, H) Parental, J) Share Workload • Designated roles • Data Discussions: B) None, F) Off Task • Grading
People	• Get along on a personal level • Culture • Data Discussions: E) Anxious
Conceptual	• PLC Meeting Time: E) Want More Big Idea Planning, G) All Have Equal Say, H) Don't Meet Just To Meet • Change Assessments: A) Better Assessment Type, B) Multiple Choice, C) Motivation • Influence: C) Professional

	Development/Readings, D) Other Teachers Are Doing, G) Consistency/Same Page, I) Enjoy Collaborating, J) Previous Teaching, K) Previous Work • Big Picture • Concerns
Inside The Classroom	• Struggling Students • Influence: A) Student Learning, B) Student Ability, I) Improves Teaching • Personal Teaching Style • Data Discussions: A) Test, C) Strengths/Weaknesses, D) Teaching/Re-Teaching • Sharing Students

Qualitative Themes

The interviews were open coded, axial coded, and then selective coded. The open codes of interest identified in this research include: *PLC meeting time* (e. *want more big idea planning), get along on a personal level, influence* (b. *administration*, d. *consistency*, g. *parental), concerns, and sharing students*. The open codes of interest each fall into one of the four identified themes: *procedural, people, conceptual, and inside the classroom*.

Procedural. The *procedural* theme refers to codes relating to processes or action steps required to carry out the tasks of teaching. The core code of *influence* has two sub-codes relevant to the *procedural* theme organized under it. The *administration influence* code and the *parental influence* code are the most interesting codes in the procedural theme because both administration and parents influence teachers' collaboration on procedural aspects of teaching. The interview findings suggest that teachers would choose to collaborate regardless of the administration's requirement, and are frustrated by the administration micromanaging how collaboration is operationalized. The improved ease with parental communication as a result of consistent policies is a beneficial outcome of collaboration, not the driving force.

The *administration* code is interesting not only because of the high number of mentions, 16, but also because of the message conveyed that the administration influences how teachers collaborate, but it is not the primary reason for collaborating. Four mentions of a negative influence suggest the role of the administration is not always

positive. Molly and Ethan, both 7th grade English teachers, mentioned an administrative tactic employed at the beginning of the school year,

> As a school we were brought together at the beginning of the school year and the administration showed us dots of where we were, well here is 7th grade English. And everyone is looking, and one teacher was a little bit lower, so how do you not feel bad? (Ethan T)

Molly K, a 7th grade science teacher, and Martha M, a 7th grade history teacher, both discuss the pressure applied by the administration, "the pressure sometimes for these numbers, I was immediately told the numbers on the standards and in the same breath told you can do more, you have a 99% pass rate, you can get 100%, is anyone ever really happy?" (Molly K) and as Martha M explains, "when you are given a lot of pressure to use online assessments, it is not convenient, I guess" (Martha M). The interview responses suggested the administration has the power to influence teaching practices, and sometimes the influence leaves the teachers dissatisfied. The remaining comments relating to the *administration influence* code suggest that this influence simply encourages and directs teachers to a practice they would choose to participate in regardless of the pressure from the administration, "I am required to, the administration pops in. But, I think I would be doing it anyway" (Molly M). Ellen H expressed similar sentiments, "being directed to it [PLC] was the biggest influence, but it [PLC] was always something I wanted to do" (Ellen H). The administration influences how collaboration is operationalized in the schools, mostly to the frustration of the teachers,

especially considering this population would choose to collaborate even if it was not required.

The mention of the *parental influence* code is important, not because of the number of mentions, but because of the uniqueness of the statement. Parental influence on collaboration is not discussed in previous research, even though parental influence on grading decisions is discussed in previous research (McMillan & Nash, 2000). The mentions of the *parental influence* code during the semi-structured interviews extends the previous research that suggests communicating with parents influences grading practices because grading practices were examined as an individual activity and now data suggests that parental communication also influences collaborative practices. McMillan & Nash (2000) suggest that as autonomous teachers attempting to formulate a grading policy the anticipated reactions of parents influenced the teachers' decision making process. The same benefit from collaborating on classroom policies, improved communication with parents, was expressed by the teachers during the semi-structured follow-up interviews. The five mentions of *parental influence* are spread across three interviews. Parental influence was not hypothesized as a beneficial outcome, so the outcomes of the interviews were unexpected. Randy W spoke to the benefits of collaboration as it relates to communicating with parents, "you don't have parents complaining—'oh in this class they got this grade and in your class'—you have a unified answer, a unified way" (Randy W). Ellen H mentioned frustration with a PLC member who was assigning different homework, "'then a parent will call and ask why is there so much homework in science'?, and I can't answer them or explain." The importance of being aligned with

colleagues so that communications with parents are less confrontational is an important factor that has been overlooked in previous PLC research.

People. The *people* theme includes codes directly relating to the thoughts, ideas, and human characteristics of the teachers. The codes included in the *people* theme are *get along on a personal level*, *culture*, and *data discussions (anxious)*. *Get along on a personal level* includes ideas relating to the importance of enjoying their PLC colleagues outside of a working relationship. The *culture* code refers to ideas about establishing a unified school approach to collaboration. The anxious code includes the notion that sharing test data is uncomfortable. The theme involving people has one code of importance because of its frequency; *get along on a personal level*. *Get along on a personal level* was the most mentioned code, 29 mentions, and the only code mentioned in all ten interviews. The *culture* code and *data discussions anxious* code are also organized under the people theme because culture and comfort sharing depending on the people involved, specifically it depends on the ability to get along on a personal level with the people involved. Participants spoke of the importance of getting along with PLC members as a critical element of successful PLCs, "you are supposed to be collaborating and getting along, and if that relationship becomes antagonistic then the PLC collaboration will fall apart" (Ellen H).

In addition to the *get along on a personal level* code, the *people* theme includes the *culture* code and the *data discussion (anxious)* code. While the *culture* code and the *data discussions (anxious)* code do not have the same high frequency that the *get along on a personal level* code does, they do support the *get along on a personal level* code

because teachers overwhelmingly stated the importance of getting along with colleagues on a personal level when establishing a relaxed culture built on collaborating. Teachers' ability to get along on a personal level paves the way for establishing a culture free from the anxiety that can be associated with sharing. Teachers responded that collaborating feels natural in their current school and the culture of collaboration is strong, this corresponds to the statements about getting along with PLC members because if people express they get along then it is logical for those individuals also to perceive the culture of sharing to be adopted school-wide, their positive feelings about getting along would lead to a perception of a culture of sharing because sharing is easier if people are at ease with each other. The teachers that responded they were anxious sharing clarified the anxiety only existed in the early stages of the PLC. As PLC members become closer as a group, establishing a culture of sharing, they get along better and felt more comfortable sharing. It is evident that the theme of *people* was represented throughout the interviews by the codes of *get along on a personal level*, *culture*, and *data discussion* (*anxious).*

Conceptual. The *conceptual* theme includes codes relating to mental concepts, specifically concepts relating to instruction and education. The three codes of interest categorized under the conceptual theme include: 1) *PLC meeting time* (*want more big idea planning*, 2) *influence (consistency),* and 3) *concerns*. The *want more big idea planning* code includes the desire teachers expressed to use PLCs to accomplish more than daily tasks. For example, using PLC time to plan a summer enrichment program for struggling math students would be considered "big idea planning." The *consistency* code refers to the desire to participate in PLCs so that instruction across the grade level was

similar. The c*oncerns* code includes ideas expressed during the interview that cause the teachers to worry about the outcomes of participating in PLCs. Five codes for wanting to use PLC time for "exploring big ideas" (Mary W) or "talking about bigger things" (Molly M) were identified across four interviews. This was interesting because it extends beyond the beneficial outcomes of PLCs originally identified in the research, dividing the workload and improved instruction (Ainsworth & Viegut, 2006), to include the generation of bigger conceptual ideas. The *influence (consistency)* code was identified 13 times in eight interviews. This was worth noting because of the high frequency and also because it addresses the essential purpose of a PLC, aligning instruction so that all students have access to instruction based on data informed instructional decisions (Ainsworth & Viegut, 2006; Black & Wiliam, 1998; Fuchs & Fuchs, 1986; Fontana & Fernandes, 1994; Graham, 2007).

The code for *concerns* is interesting because while it was mentioned 13 times, it only occurred in six of the ten interviews. Bob M mentioned concerns four times, the highest frequency in any interview. However, his concerns revolved around the reliance on numbers and the unrealistic expectations of the administration, not on negative outcomes of collaboration or PLCs.

> I mean, think about it, our students were doing really well before we had to do assessments all the time, but now they say 'oh look at the correlation between all the assessments they do and how well the students are doing.' What is it they say? Correlation is not causation. I could give my kids pineapple everyday and say 'hey look they eat pineapple

> everyday and score really well on the [state test].' It isn't the pineapple; they would have done well anyway. I just think especially with the time spent designing, we should just save teachers time.

While teachers did express concerns with aspects of the PLC process, it is evident the concerns are limited to specific elements of the process, not the idea of collaboration or common assessment.

The *want more big idea planning* code, *change assessment type* code, and the *concerns* code are organized under the *conceptual* theme. The *big idea planning* and the *concerns* codes are organized together because the concerns expressed by the teachers interfere with teachers accomplishing big idea planning. The concerns expressed focus on a fear of emphasizing or relying too much on testing and student scores from assessments. The time occupied discussing and planning assessments and scores could be used for big idea planning. The frustration with score reliant discussions not only distracts from other means of assessing students, but also detracts time from accomplishing something teachers truly want to do, big idea planning. The *change assessment type* code is organized with the *big idea planning* code and the *concerns* code because the current emphasis on multiple choice assessments contributes to the concerns expressed and prevents big idea planning.

Inside the classroom. The *inside the classroom* theme includes concepts directly relevant to the individual teachers' classrooms, and includes *the sharing students* code, which means teachers instruct students not on their official roster; *strengths and weaknesses* code, which means teachers use data to identify strengths and weakness in

instruction; *data discussion* code, which means teachers discuss student test score and other data collected; and *influence (improves teaching*) code, which means teachers are motivated to collaborate because collaboration improves their teaching. They are all organized under the inside the classroom theme because each code represents a concept directly related to classroom practices.

Sharing students refers to teaching students across the grade level, regardless of on whose official roster they appear. The *sharing students* code was mentioned five times in four interviews. This is significant because it represents an essential tenet behind PLCs, teachers collaborating for the common benefit of all students (Mis, 2009; Reynolds, 2009). As Martha M explains,

> I will teach my students, then the next day I will take Jay's students, then Dave's students, then Diana's students. Likewise, Jay does a lesson, his switches every year, his was railroads, so he did his lesson on the transcontinental railroad, uh, Dave dresses up as a cowboy and does a cattle drive in the locker commons, Diana has a lot of material on native Americans, so we all just do the same lesson 4 days in a row [and teach everyone in the grade level].

Martha M's PLC allows each teacher to capitalize on their classroom teaching strengths and students benefit from the specialized instruction because they get to experience each teachers' strongest instructional activity.

The codes for *strengths and weaknesses*, *data discussion* and *influence* (*improves teaching*) are organized under the *inside the classroom* theme because

they identify collaborative actions with direct benefits to the classroom. Teachers are motivated to collaborate so that they can improve student ability and then teachers engage in data discussions on the strengths and weaknesses of teaching. The codes for *influence(student learning)* and *sharing students* are organized together because teachers that indicate student learning as a motivation are going to support that with the action of putting student learning as the first priority. Teaching colleagues' students, regardless of whose roster the students officially are listed on, shows that teachers are prioritizing learning for all students over focusing only on their official classroom. Additionally, *sharing students* and discussing *strengths and weaknesses* connect because during discussions of strengths and weakness teachers can identify their strengths as instructors and divide the instructional tasks across the grade level. As, explained by Martha M,

> We will get together, sometimes, look over the results. It is gives us an opportunity, if Jay's kids do really well in an area we can ask him what he did and then use his resources. Likewise, if I see my kids did poorly, I know that is my weakness, I can go to another teacher and say, 'hey, how did you teach this?' So, we can compare our teaching with the common assessments we can go through and see where our strengths and weaknesses are and pull off of everyone's strengths.

Dividing the instructional tasks based on sharing of strengths and weaknesses allows all students to benefit from the best instruction possible because teachers are able to teach their strengths.

Mixed Methods Parallel Analysis of the Quantitative and Qualitative Findings

The parallel examination of the quantitative and qualitative findings suggests that the quantitative components are supported by the qualitative codes. The frequency, by participant, of the axial code occurrences as they relate to the two components is shown in Table 15. The axial codes are organized under each of the two components. The *struggling students* code, *concerns* code, *personal teaching style* code and *time* code were not useful in explaining why teachers responses grouped into either Component 1 or Component 2 and were therefore not organized under either component.

Table 15

Responses of Axial Codes

	Ellen	Molly M	Bob	Mary	Annie	Randy	Martha	Molly K	Mark	Ethan
Sharing Improves										
Sharing				X	X	X	X			
Students										
Influence	X	X	X	X	X	X	X	X	X	X
PLC Meeting	X	X	X	X	X	X		X	X	X
Time										
Culture	X				X		X	X	X	X
Get along on a	X	X				X	X	X	X	X
personal level										
Roles	X		X			X		X	X	
Assessment										
Informs										
Data	X	X	X	X	X	X	X	X	X	X
Discussions										
Change	X	X	X	X			X	X	X	X
Assessment										
Grading		X				X		X		
Online Tests	X		X	X	X	X	X	X	X	X
Big Picture			X						X	X

The axial codes included under Component 1, Sharing Improves Instruction, include codes related to the sharing of ideas, resources, and workload: *sharing students, influence, PLC meeting time, culture, get along on a personal level, designated roles.* The *sharing students* code is included in Component 1 because this often refers to the opportunity for teachers to specialize in a topic and teach that topic across the grade level. The sharing of students benefits instruction because it allows teachers the opportunity to develop a single instructional activity deeply, as opposed to developing numerous instructional activities superficially. The *influence* code is included in Component 1 because it includes the influences of *enjoy collaborating*, *consistency*, *improves teaching*, and *share the workload*; these influences all involve the desire to collaborate and the enjoyment in collaborating. The *PLC meeting time* code was included under Component 2 because teacher responses during the survey coded as *PLC meeting time* focused on the positive factors associated with collaborating as a PLC, such as "we meet when we really have something productive to work on and discuss" (Ethan T). The *culture* code is included under Component 1 because teacher interview responses spoke to the culture of sharing established through PLC participation, "I just couldn't imagine not having a PLC. It would be weird not to [have a PLC]" (Martha M). The *get along on a personal level* code is included under Component 1 because the teachers overwhelming discussed the importance of get along on a personal level in successful sharing, "you have to be really careful, because you are supposed to be collaborating and getting along, and if that relationship becomes antagonistic then the PLC collaboration will fall apart" (Ellen H). The designated roles code was included under Component 1 because when sharing was

discussed in the interviews the teachers often explained that having designated responsibilities facilitated easier sharing, “They bring their gifts and talents from other areas” (Molly K).

The axial codes included under Component 2, Assessment Informs Instruction, include codes related to the beneficial instructional outcomes of using assessment. The codes included in Component 2 are *data discussions, change assessment, grading,* and *big picture.* The code *Data discussions* is organized under Component 2 because the mention of data discussions occurs when teacher participants implement classroom assessments and evaluate the data from the assessments. The code *change assessment* is organized under Component 2 because by indicating a desire to alter assessments teachers are also indicating that they use assessments, to change something one must have first used it. The *grading* code is organized under Component 2 because grading involves communicating assessment results to students, parents, and external stakeholders. The *big picture* code is organized under Component 2 because during the semi-structured interview teachers mentioned the value in assessments “identifying the big picture, what the majority understand” (Bob M).

Summary of Research Findings

The quantitative results from the factor analysis suggest that components group together based on an underlying structure. The two components that were found to be responsible for the underlying correlation between variables were Component 1, Sharing Benefits Instruction, and Component 2, Assessment Informs Instruction. The results of the independent samples t-tests and the analysis of variance tests show, that with the

exception of age on Component 2, teacher background characteristics (TBC) do not play a significant role in teacher views on Component 1 and Component 2. Teachers across the TBC indicate they view sharing as a means for improving instruction and assessment as a means for informing instruction.

The qualitative results suggest that the degree to which teachers get along on a personal level was a key idea in each of the interviews, with 29 mentions of *get along on a personal level*. Interview data also suggest that better assessment type, administration influence, parental influence, personal teaching style, and concerns were key ideas across the interview data. Teachers report that sharing and assessment benefits occur outside structured PLC meetings.

A parallel mixed methods examination of the quantitative and qualitative results suggests that 11 of the fifteen identified codes can be organized under Component 1 and Component 2. This suggests that the quantitative findings from the BPCCFA survey are supported by the semi-structured interview responses. The codes and the BPCCFA survey responses support the identification of Component 1, Sharing Improves Instruction, and Component 2, Assessment Informs Instruction. Teachers indicate that the practices of collaboration and assessment benefit instruction.

CHAPTER 5: CONCLUSION

The purpose of this mixed-method study was to examine how Teacher Collaboration Beliefs (TCB), Teacher Collaboration Practices (TCP), Assessment Factors (AF), and Teacher Perceptions of Common Formative Assessment Practices (TPCFA) relate to each other, and if Teacher Background Characteristics (TBC) play a role in any of these relationships. Data were collected using two instruments: 1) the BPCCFA Survey was administered to 44 middle school content area teachers and 2) the semi-structured interview protocol was administered to ten of the BPCCFA Survey participants.

This chapter begins with an interpretation of the quantitative findings from the research. Next the both the quantitative and the qualitative findings are discussed as they relate to each research question. The chapter concludes with implications for practice and recommendations for future research related to collaboration and common formative assessment. Finally, the limitations are discussed.

Quantitative Discussion

The quantitative analysis of the survey items suggests that teachers value sharing and assessment, but are unclear about items relating to PLC meeting participation and jointly creating assessments. The anti-image matrix shows a weakness with the items regarding PLC meeting participation and jointly creating common formative assessments.

It is suspected that those items on the survey represent the administration's requirement of attending weekly meetings and of creating joint assessments. The remaining survey items suggest that teachers value the practice of collaborating and value assessment data. This means that teachers do not let some of the negative aspects associated with PLCs alter their positive view of the collaboration and assessment benefits. Therefore, the weaknesses in these two items combined with the strengths in the other items suggest that teachers enjoy collaborating, but do not enjoy attending required meetings or creating required assessments. The interviews show that many of the PLC accomplishments occur over email and are not a part of the structured meeting, such as sharing students and resources, therefore the requirement to attend weekly meetings is an unnecessary nuisance because teachers can accomplish their favorite aspects of collaboration without meeting. The middle school teachers in this study taught five out of seven 45 minute class periods a day, leaving 90 minutes of planning time each day. Often the teachers must use this limited time to meet with parents, grade student work, attend grade level meetings, or substitute for other classes. Therefore planning time is highly valuable and teachers do not want to give up what planning time they have left to attend an unnecessary meeting. "Sharing students" is a favorite aspect of sharing and it refers to the practice of providing instruction for colleagues' students. This is often operationalized through after school review, where one teacher stays after school and all students in the grade level report to him/her for review. Sharing students can also occur during regular school hours, where the most likely scenario occurs when teachers specialized in a topic or instructional approach and had students sent to him/her for

instruction. Teachers who value sharing students and resources do not necessarily reap these benefits during a meeting. Essentially, the benefits of sharing and assessments can occur outside of meetings, so the item asking about meetings could be interpreted in different ways, depending on the understanding of how sharing occurs and how assessments are created. Because of the weakness with the PLC meeting item and a lack of research available on PLCs in middle schools, an empirical argument can be made to support the factors, but this variable should be investigated further to determine the relationship with the Sharing Improves Instruction component or the Assessment Informs Instruction component.

TBC as they relate to each component. The two components identified account for the four hypothesized factors addressed in the BPCCFA survey. Analysis of TBC and the two components showed that little variance across TBC existed. Before conducting an analysis of variance (ANOVA) the original research questions were restructured to account for the two components retained. The original research questions were written assuming that TCB, TCP, AF, and TPCFA were separate constructs. The survey was created to address all four of these concepts, but the exploratory factor analysis showed the survey items measured only two components Sharing Benefits Instruction and Assessment Informs Instruction. The Teacher Collaboration Beliefs (TCB) and Teacher Collaboration Practices (TCP) measured the same concept, sharing, which is represented by component 1, Sharing Benefits Instruction. Assessment Factors (AF) and Teacher Perceptions of Common Formative Assessment (TPCFA) measured the same concept, assessment, which is represented by component 2, Assessment Informs Instruction. This

is shown in Figure 15. An analysis of variance was used to compare the means for teacher background characteristics (TBC) on the two components. Because the TBC of gender only has two groups an independent samples t-test was used to compare the means between males and females.

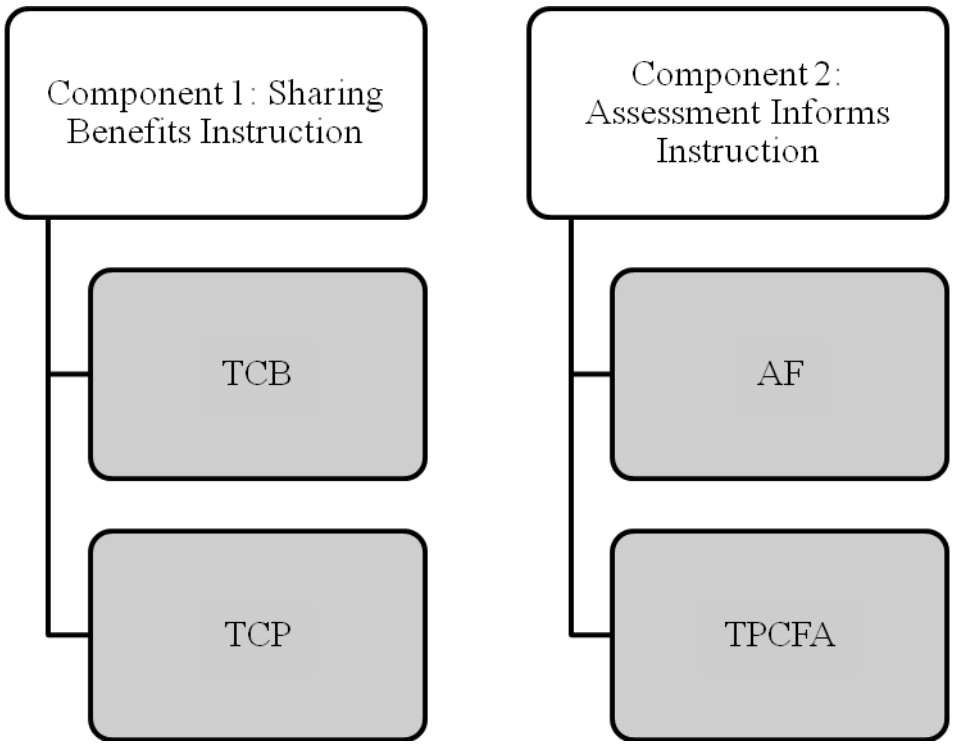

Figure 15. The reorganization of the original factors with the components identified in the exploratory factor analysis.

The two components identified were examined for variances based on TBC. The findings from the ANOVA showed that the only statistically significant findings relate to age group on Component 2, Assessment Informs Instruction. The findings from the qualitative interviews show that the majority of common formative assessments are carried out in the classroom using an online assessment tool. The ANOVA showing that the older age group of teachers believes less that assessment informs instruction is corroborated by research from Marc Prensky (2007) which shows that teachers in the older age group are often less familiar with technology and younger teachers have an easier time with technology. The Tukey post hoc comparisons show that the only significant difference between age groups is the over 59 compared to the 20-29 and 40-49 age groups, even though the over 59 group has a lower mean score, (M=33, SD=18.40), on Component 2 than all the groups. The sample size was not large enough to determine if the other differences between means were truly significant. Further examination between age groups with a larger sample size could explain these differences more. Technology can be a barrier to effective implementation. If an online assessment system is the primary tool for assessing students, then teachers not familiar with the technology, such as the over 59 age group identified in the analysis, are going to be more resistant to using assessment, even if they believe it to be beneficial.

Discussion

Teachers at the two school sites all indicated they belong to a PLC and benefit from participation in their PLC, but do not necessarily view meetings as the best method for collaborating. Teachers identify many beneficial outcomes of PLCs, especially

improvements to instruction through sharing and assessments. Teachers reported enjoying the benefits from refining their teaching through data discussions, sharing students, collaborating on unified communications with parents, and the feeling of collegial support from getting along well with PLC members. Participants indicated that they feel their individualized approaches are merged well with the group needs and that they are able to maintain their individuality while still collaborating as a group. This is important because teachers are highly educated and informed decision makers who still want the power use their expertise and experience to make classroom decisions. Being able to merge individualized styles with collaborative approaches is more than just enabling teachers to design individualized lessons, it sends a message that they each have valuable opinions and expertise that should be used. While concerns about over testing do exist, mainly over relying too much on test scores, they are overshadowed by the act of collaborating. The data suggested that teachers at the two school sites participate in PLCs because of an administrative requirement to attend PLC meetings, but would choose to participate regardless of the requirement. Participation can be observed in many different forms, including communicating throughout the day via email. Attending meetings is not the only measure for PLC participation, suggesting that teachers should be allowed to choose how and when to collaborate. By letting teachers determine their method for collaborating both their time and their professional expertise are valued, thus encouraging a positive view of collaboration. The two school communities have been working with each other using the PLC model for more than five years; they value

collaboration and have worked together to establish the most effective method for implementing collaboration in their schools.

Research questions revisited. The original research questions were written anticipating that TCB, TCP, AF, and TPCFA were four separate components. However, the empirical research from the exploratory factor analysis shows only two components: sharing improves instruction and assessment informs instruction. The six research questions revisited in light of the exploratory factor analysis are restructured into four research questions: 1) What is the nature of the relationship between Sharing Improves Instruction and Teacher Background Characteristics (age, gender, teaching experience, work experience, and education)? 2) What is the nature of the relationship between Assessment Informs Instruction and do Teacher Background Characteristics (age, gender, teaching experience, work experience, and education) play any role in these relationships? 3) What do teachers value about sharing? 4) What do teachers value about assessment? The restructured research questions are addressed by examining how TBC varied for each component and the general consensus from the teachers on sharing and assessment. The qualitative codes identified in the interviews were organized under each of the components (Table 15) to explain why teachers indicated that they valued sharing and assessment.

Teacher values about sharing. Sharing can be observed throughout the school day as teachers attend meetings, exchange emails, and engage in impromptu hallway discussions. Teachers attend up to five meetings a week, three meetings with their PLC and two meetings with their interdisciplinary team. Sharing during PLC meetings can

include discussing the latest assessment results, co-designing the next assessment, exchanging instructional activities for the next unit, or refining previous instructional activities. The PLC members arrive at the meeting knowing the topics of discussion, because in most instances an email was sent early in the day outlining the agenda. Teachers email each other throughout the day with questions about instruction, ideas for instructional activities, or requests for additional materials (Martha M). During email exchanges teachers receive almost instantaneous responses from their colleagues, in time to alter daily instructional activities if necessary.

Results from the BPCCFA Survey suggest that teachers value sharing data, assessment ideas, conversations, and instructional strategies with colleagues because these aspects of sharing recognize that each teacher is a competent professional with valuable expertise, provide social support, and maximize teachers' time. The quantitative analysis yielded Component 1, Sharing Improves Instruction, based on the high frequency of BPCCFA survey responses indicating a favorable view of sharing. The qualitative interview codes that were organized under Component 1 include *sharing students, influence, PLC meeting time, culture, get along on a personal level, designated roles* because each of these codes helps explain why teachers value sharing. Sharing will be more valued if it saves time and empowers teachers as decision makers. Teachers will value a practice more if they are given ownership over some of the aspects and the codes for *designated roles* and *PLC meeting time* represent the aspects of sharing that teachers

can control, thereby validating their decision making abilities and reinforcing the idea that they are competent professionals with valuable expertise.

Teachers also enjoy engaging in conversations with other adults during the day, and sharing ideas, data, and resources is an excellent opportunity to be social. Previous research suggests that ideal personalities will create an emotionally pleasant collaborative team, and this was evident in the overwhelming responses about the importance of getting along with each other on a personal level (Moston, 2008). Getting along with each other on a personal level is important because teachers want to be social, and collaboration appeals to them because it is an excellent social outlet. The social aspect would not be present if the PLC team members did not get along with each other on a personal level. Teachers value sharing data and sharing instructional activities because this gives them both new ideas and validation of their current practices while enabling teachers to be social. New ideas are exchanged when teachers are excited to talk about a successful lesson, and the success is more enjoyable when others can celebrate in it. Many times at the end of the day emails will be exchanged excitedly sharing a great lesson idea from the day or teachers will drop into each other's classrooms at the end of the day to talk about how well their activity went.

The ease and frequency with which sharing can occur enables teachers to solicit feedback on instruction immediately, saving them valuable time and overcoming a consistent obstacle mentioned in previous research (Clement & Vandenberhe, 2000; Mis, 2009). And, it seems the most effective way to overcome the issue of limited time is to recognize and encourage efficient ways of communicating, such as email, and limit

meeting face-to-face if it is necessary. The code *designated roles* helps explain why saving time encourages teachers to value sharing; when roles are designated within the PLC each PLC member is able to contribute their strength to the group and it ensures that time is not wasted by having group members functioning in the same role. By reinforcing teachers decision making power, encouraging social interaction, and saving time teachers will enjoy the benefits of sharing.

Teachers' values about assessment. Teachers engage in frequent assessment throughout the school day. Often this is observed as a formal multiple choice test given using the county-wide online assessment tool. Teachers also engage in classroom formative assessments using a variety of techniques, including class-wide responses, student observations, and paper-pencil tests. But, the majority of assessment data used for instructional decisions comes from the results of the online formative assessments.

Teachers value the information gained from assessments because the teachers are aware of the research about the power of assessment, and the teachers want to use assessments during the school year to help prepare for the end-of-the-year state assessments. The quantitative analysis yielded Component 2, Assessment Informs Instruction, based on the high frequency of responses in support of assessments. The qualitative codes organized under Component 2 include *data discussions, change assessment, grading,* and *big picture* because these ideas identified in the interviews explain that teachers value assessments because it provides information that prepares them to instruct all their students.

Teachers indicated a strong understanding of the literature about the power of formative assessment through their well articulated responses and direct references to the literature, and it is because they are informed about the current research that they value assessments as much as they do. The teacher responses often referenced books about assessment, such as *15 Fixes for Grading* by Ken O'Connor. Teachers are also more inclined to value assessment because of the culture of assessment that exists at the schools, which was established through the sharing of research. Reynolds's (2009) case study illustrated the importance a school culture has on adopting collaborative practices, and the teacher responses in this study further supported the importance of a collaborative school culture. PLCs have been in place for over five years and that has given teachers the opportunity to form a common approach to assessment, and new teachers, not wanting to be the outsiders, quickly adopt the assessment practices already established.

The results from the BPCCFA Survey show that teachers use assessment to evaluate teaching and diagnose student strengths and weaknesses. Responses during the semi-structured interview support that teachers value the information gleaned from assessments because they not only provide feedback on the instructor, but also provide feedback on the learner. As explained by Ethan T,

> It is looking at assessment as not looking to catch what is wrong with the kid and then punishing them for that, but to truly try to find out what they don't understand and give them the chance to understand it and then give them the credit for understanding it whether it was when everyone else understood or not (Ethan T).

Teachers value the practice of assessment because they have adopted a culture of assessment through the reading of books like *15 Fixes for Grading*, and by using assessment, they embraced the benefits they experienced.

Sharing improves instruction and TBC. Teachers across all the TBC indicated a high level of responses that suggests consensus on sharing improves instruction. Teachers indicated that they feel comfortable sharing with their PLCs, but often the administrative measures for sharing conflict with their personal motivations for sharing. Sharing includes collaboration on assessments, discussions about data, and the sharing of instructional strategies. Sharing occurs in many different forms, including discussion over email, conversations during after-school review, and the actual sharing, or joint teaching, of students. Sharing is such an inherent part of these teachers' work day that they often exchange ideas throughout the day via email. As explained by Martha M,

> For example, I might have something on tenements that is really good for visual learners and then when I send that out, Jay might bounce back 'oh this will go really well with what you just shared.' On our own we might have one decent resource, but then once we start to share, collaboratively we have a bunch of fantastic resources that hit all the levels of learning (Martha M).

The positive view on sharing, evident in both the quantitative and qualitative data, can be explained by the equivalent job requirements for teaching across all TBC groups. All middle school English, mathematics, science, and history teachers, regardless of age, teaching experience, subject area, and gender, all have the same goal to educate the student population. All participants are working towards the same goal to raise the

achievement of all students, and therefore they are going to share resources as they work to meet their goals. Teachers are also all under the same stresses and can support each other because they understand exactly what their colleagues are experiencing. In other field's job requirements can change when a worker shifts departments or if a worker has been on the job for over 20 years. But classroom teachers, regardless of their department or years of experience, are required to accomplish the same outcomes: students capable of passing state tests and being promoted to the next grade level.

Teachers across all TBC indicated that they are not currently anxious about sharing data because they recognized the purpose for sharing data as valuable to improving instruction. This contradicts previous research indicating teachers are hesitant to share data because they fear being criticized (Cizek et al., 1996; Clement & Vandenberghe, 2000), which may be that teachers have become comfortable with assessment in the intervening years. The teachers in this study expressed some levels of anxiety about sharing assessment data, but the anxiety was mostly related to sharing data school-wide because this did not benefit their instruction and was interpreted as an accountability tactic, while sharing within their PLC was comfortable. During a school-wide meeting at Roosevelt Middle School the administration displayed a graph showing every teacher's most recent common formative assessment scores. The teacher interview responses indicated this form of school-wide sharing created high levels of anxiety and negative feelings. Previous research describes teachers' concerns about being judged by their colleagues if they shared difficulties they encountered (Cizek et al., 1996; Clement & Vandenberghe, 2000). The fear of being doubted as competent professionals hindered

the teachers' willingness to ask for help (Clement & Vandenberghe, 2000). However, the participants in this research had been collaborating in PLCs for over 5 years, and this was significant enough time to overcome the barrier of criticism present at the beginning of a collaborative endeavor. This was explained by one veteran teacher during the interviews, "I do now [feel comfortable sharing]. But, it was a big risk as the seasoned member of the staff—I was nervous the first couple of times" (Mary W). It is evident that while previous research might suggest that the fear of being criticized is a barrier to sharing, the teachers in this study do not fear sharing within their PLCs because over time they understand the overall purposes for sharing: to improve instruction, and to become comfortable with each other.

Teachers, regardless of TBC, expressed that they would participate in PLC meetings even if it was not a requirement from the administration. The administrative measures of effective sharing, such as meeting agendas, scheduled meeting times, and school-wide sharing of test scores, seem irrelevant to the benefits teachers expressed. Teachers also explained that they functioned very well prior to the administration requirements for formal agendas, "but with administration now they want it in writing 'what was your agenda at your PLC and how was each item handled.' And um, it is almost nit picking" (Molly K). Teachers clearly valued sharing and eventually became comfortable sharing within their PLC, but not necessarily in the same way administrators expect to see it.

PLCs are valued by teachers, but the administration can hinder successful implementation by not providing enough time to develop as a group and micromanaging

how the sharing occurs within the PLC. These teachers resented the administrative micromanaging of their collaborative groups which can cause negative feelings about sharing even if teachers value sharing. To improve the effective implementation of sharing teachers need to be given time to become comfortable sharing data and asking for help. Additionally, administrators should recognize that sharing might occur in a manner unfamiliar to them, but just because sharing is operationalized differently than the administration envisions does not mean that teachers are not sharing within their PLCs because teachers across all TBC value sharing, even if they express frustration with the administrative requirements associated with sharing.

Assessment informs instruction and TBC. The results from the ANOVA suggested that across all TBC, except age group, there were high differences between teacher responses and the belief that assessment informs instruction. To better understand component 2, Assessment Informs Instruction, an explanation of how common assessment is operationalized at the two schools is required. The majority of common formative assessments that are used are created and implemented using an online assessment tool. The over 59 age group had the lowest positive association with Component 2, and this could be because assessments are created and implemented using an online assessment tool. Prensky (2007) suggests that digital immigrants, those who adopt technology later in life, have a harder time using technology in the classroom.

Responses are the same across the remaining TBC because the job requirements are the same across the TBC. People asked to do the same job will have at the very minimum, similar methods for accomplishing the job, and will at least have discussions

about the best methods for meeting the requirements. End of course state assessments are used as the external accountability measure in middle school English, mathematics, science, and history. In preparation for the end of course state tests teachers in all the subject areas will use assessment data as a measure of student learning and instructional quality. In most cases teachers across the TBC (gender, teaching experience, subject area taught, and grade level taught) responded on the BPCCFA Survey that they use common assessments to evaluate teaching and diagnose student strengths and weaknesses.

To facilitate more effective use of common formative assessments teachers should be given the support to develop their understanding of the technology because the benefit to using the technology is that the data results can easily be disaggregated. Teachers in the over 59 age group should not miss out on the benefits of efficient data analysis.

Uncorroborated codes. The quantitative and qualitative data axial codes were organized under the two components, Sharing Improves Instruction and Assessment Informs Instruction. Most of the codes identified in the interviews were useful in understanding why teachers believe sharing improves instruction and assessment informs instruction. The *struggling students* code, *concerns* code, *personal teaching style* code and *time* code were not useful in explaining why teachers responses grouped into either Component 1 or Component 2. Two of the uncorroborated codes, *struggling students* code and *concerns* code, were only expressed during the interview because the participants were responding to questions asked by the researcher. And, the two other uncorroborated codes, *personal teaching style* code and *time* code, address ideas relevant

to the entire PLC process, but do not offer explanations about the components specifically.

Struggling students. Teachers mentioned struggling students during the interview because the researcher asked two questions that prompted responses about struggling students: 1) What assessments does your team collect in order to assess if students are making academic growth? 2) Does your team create academic goals for your students? These two questions were initially asked to determine how assessment was being used, but instead answers typically involved interventions for struggling students. The teachers did not communicate that significant collaboration or assessment was used to address the needs of struggling students. The two school sites selected are both high performing schools with few students at-risk of failing. The needs of struggling students did not dominate PLC discussions because at these two school sites the needs of struggling students are met in the normal course of instruction. Further research on how assessment and sharing support interventions with struggling students should be conducted at school sites with more struggling students.

Concerns. Teachers expressed concerns during the interview when responding to researcher questions relating to changing assessment practices or making changes to the PLC. Teachers minimal, 13, mentions of concerns did not relate to Sharing Improves Instruction or Assessment Informs Instruction because the teachers indicated either a hypothetical concern about sharing or a concern about administrative influence on testing. The *concerns* code neither supported nor contradicted either of the components. Teachers described their PLCs as enjoyable and beneficial, but explained they would be

concerned if they had to participate in a PLC with "mediocre people" (Mary W). The concern that the administration is establishing a reliance on test scores worries several of the teachers, but they still indicated that in the classroom they value assessments, even if they question the interpretation of test scores by some external stakeholders.

Personal teaching style. Teachers mentioned the importance of being able to still incorporate their personal teaching style into collaborative plans because they are proud of their teaching style and eager to share that they contribute. The individualized approaches teachers bring to both sharing and assessment are critical to developing teachers' sense of ownership in the PLC process. The personal code was not organized under either component because it is critical to establishing buy-in of the entire PLC process, which includes both sharing and assessment. Clement and Vandenberghe (2000) suggest that a balanced combination of autonomy and collegiality have a positive impact on elementary teachers' professional development. The findings from the BPCCFA survey and the semi-structured interviews suggest that middle school teachers also benefit from a combination of autonomy and collaboration. This is evident in the mentions of the *personal teaching style* code in the interviews and supported by the high frequency of survey responses indicating PLC participation is beneficial.

Time. The teacher discussed time because it is relevant to every aspect of teaching and is one of the biggest obstacles in instruction. The time code was not organized under either component because it could be considered an obstacle for both sharing and assessment; but, the teacher responses suggest that they have developed solutions for working around limited time. Clement and Vandenberghe (2000) and Mis (2009)

referenced time constraints as a factor that can discourage collaboration. The semi-structured interview responses support the presence of time constraints, however teachers in this study also provided solutions for collaborating despite time constraints, such as only meeting when it is necessary and meeting via email. In addition to limited time a lack of value for colleagues' time is an issue that can prevent collaboration (Clement & Vandenberhe, 2000 and Mis, 2009). The teachers in this study suggested that time was valued by colleagues with six mentions of the *don't meet just to meet* code. The notion that time is not only maximized through alternative methods of communication, but also valued by colleagues is evident by the high rate of collaboration reported.

Implications for Practice

The findings from the BPCCFA survey and semi-structured interviews suggested that teachers value sharing because it improves instruction and also value assessment because it informs instruction. It is essential for effective implementation that 1) teachers get along on a personal level with their PLC members, 2) PLC meetings should be formatted in a manner convenient for the members, 3) PLCs need time to become comfortable sharing data, and 4) PLCs still need to allow for instructional approaches individualized to each teacher.

It is important to recognize that these teacher participants indicated a strong preference for participating in PLCs; however, they also indicated overwhelmingly that getting along with their PLC members was critical to the enjoyment of participating. A PLC is much more than a weekly meeting. It is a group of teachers that get along well and support each other to accomplish common purposes with their students.

Participation is not necessarily measured by meeting attendance, as participation occurs in many ways not related to attending a meeting, such as exchanging ideas over email or in the hallway between classes. The administrative requirements should therefore not focus on a meeting requirement, but rather recognize that collaboration occurs in many ways. Teachers enjoyed the flexibility of structuring meetings in their own way, only meeting in person when necessary and sharing resources and information via email. This would allow teachers to continue to respect each other's time. As explained in previous research (Clement & Vandenberghe, 2000; Mis, 2009) and supported by the semi-structured interview responses, limited time can be a roadblock to collaborating. As described by Randy W, "We send out an email to everyone . . .'on this quiz I got this correct, this is what I saw wrong.'" Then teachers are able to find methods for sharing information and work around times that are convenient for them. Essentially, it should be recognized that a PLC functions very well when the PLC members get along and this can play out in ways beyond the administrative meeting requirement.

PLCs are a mix of the personal and the interpersonal among teaching professionals. Those teachers who participate in PLCs need to be encouraged to maintain their identity when collaborating with other teachers. PLC leaders should capitalize on each member's strengths and enable them to contribute based on those strengths. Collaboration in a PLC requires members to share ideas and resources, but does not require everyone to teach in the same style. In a collaborative PLC, participants can teach the same content and use the same assessments, but still present instructional activities in a style consistent with each one's personality. PLCs should recognize the

difference between conformity and collaboration. Conformity, matching all attitudes, beliefs, and practices to the other members, is not a necessary tenet of a productive PLC. But, collaboration, sharing ideas and resources, is critical to the enjoyment and success of a productive PLC.

Those who want teachers to work in PLCs that focus on sharing instructional practices and common assessments should encourage PLC members to form relationships built on mutual trust and respect and allow each PLC to develop their own measures for successful collaboration. Enabling PLC members to connect on a friendly level would give individuals time to develop a relationship built on trust and respect. Administrators should recognize that the model of collaboration that works for one group might not work for a different group. Therefore, administrators should be cautious when creating school-wide requirements for PLCs. Specifically, administrators should be flexible and not mandate a specific structure for meetings nor frequency requirements because PLC members find methods and time for collaborating that meet the needs of their students and their curriculum outside of attending meetings. PLC members should be given ownership over the process and they should be able to determine the group norms, expectations, and requirements. School leaders need to do more than simply assign teachers to groups. Leaders need to be aware of existing relationships between teachers and work to improve bad relationships or place teachers that do not get along well into different PLCs. Administrators need to consider who will be in each group and each members potential for developing a trusting relationship with other members. Allowing

PLC members' time to form personal relationships and the freedom to determine their own expectations will ensure that a culture of collaboration is established and maintained.

Implications for Future Research

The results of this study suggested more research is needed on the use of the BPCCFA survey instrument and on PLCs. Testing further the instrument by conducting a confirmatory factor analysis (CFA) would reveal how well the instrument does measure the two identified components Sharing Improves Instruction and Assessment Informs Instruction. Additionally, the instrument should be used with a larger population so that more items from the instrument can be analyzed. In this study the sample was only 44 teachers in two high performing middle schools, so only ten items from the survey could be analyzed, because exploratory factor analysis requires at least 4 samples per item. Increasing the sample size would also enable researchers to examine more closely the differences between the age groups on the constructs of Sharing Improves Instruction and Assessment Informs Instruction. These methodological studies should be conducted to expand on the findings in this study.

Further substantive studies with an increased sample size and a focus on PLCs in lower performing schools are needed. Increasing the size of the sample would enable researchers to determine whether the results from this study are consistent with results at schools with different demographics and varying years of experience with a PLC model. Research focusing on how PLCs work in urban schools, rural schools, and Title I schools would provide much needed insight into improving education in high need schools through teacher collaboration. Such research might discover that the two main factors in

this exploratory study may or may not be found to be as salient in other schools as they were in these two schools. Further research could then provide a more robust set of guidelines specific to the needs of each type of school that could assist administrators in facilitating the development of PLCs at their schools. Additional research with a larger more varied population of students and teachers along with research in high needs schools would provide practical data to administrators and external stakeholders to support their implementation efforts. PLCs are another of the many innovations in schools about which research has confirmed little. As features of the contemporary education and school reform landscape, much more research is needed to understand how much they contribute to educational change and the teachers' roles in making that change happen.

Limitations

This mixed methods study has quantitative limitations and qualitative limitations. The quantitative limitations of the study are the small sample size and the use of a researcher-created instrument. The qualitative limitations of this study include threats to internal validity through researcher bias (Maxwell, 2005) and the external validity, or, generalizability.

The small sample presented issues when conducting data analysis. The general guidelines for conducting a factor analysis is that sample size should be 10 to 25 times as many observations as there are variables. However, in practice factoring can be done with as little as four samples per variable. With 44 samples this meant limiting the survey

to only ten variables. The researcher created instrument relied on self-report. The limitation of self-report is that responses were from those who wanted to respond and therefore responses could be what teachers want to be perceived as thinking and doing, not what they actually think and do. To address this limitation the focus of the data analysis was on teacher perceptions, so teachers could still self-report that they are good teachers, but also provide an accurate picture of their perceptions of the PLC. The instrument was researcher created so preliminary data screening was done to ensure an exploratory factor analysis would accurately show if the survey items do in fact measure the intended concepts.

Researcher bias could be present if the researcher selects data to fit her theory or selects data that only stands out to the researcher. This limitation was addressed by using the quantitative data to support the identification of the qualitative themes and by coding responses verbatim. Themes were not rearranged to fit the quantitative components identified, instead only pertinent themes were organized under the relevant component. The teacher interview responses were coded verbatim to ensure the teacher voice was not lost, words were not substituted.

This study examined teacher perceptions and practices at two high performing schools in the mid-Atlantic region of the United States with a high SES student population; therefore a threat is posed to the generalizability of the results. This study was conducted at these two school sites because of their successful implementation of PLCs for over five years. Consequently, information on the factors relevant to the success at Creek Valley Middle School and Roosevelt Middle School may not be

transferable to other school sites in different regions with different student and teacher demographics.

APPENDIX A. SURVEY

Part I - BACKGROUND INFORMATION

Please answer the following information about yourself by selecting the answer that describes you best.

1. Gender:
    a. Female
    b. Male
2. AGE:
    a. 20-29
    b. 30-39
    c. 40-49
    d. 50-59
    e. Over 59
3. Grade level taught for majority of middle school teaching career?
    a. 6^{th}
    b. 7^{th}
    c. 8^{th}
4. Major subject area taught
    a. Science
    b. Mathematics
    c. English
    d. History/Social Studies/civics
5. How many years experience teaching the grade level indicated above do you have?
    a. This is my first year
    b. 2-4
    c. 5-9
    d. 10-14
    e. 15-25
    f. Over 25 years
6. How many years experience do you have teaching at any grade level/subject area?
    a. This is my first year
    b. 2-4
    c. 5-9

d. 10-14
e. 15-25
f. Over 25 years

7. Would you classify yourself as a career switcher, meaning you entered the teaching profession after devoting more than 5 years to another profession?
    a. Yes
    b. No
8. Which of the following best describes your undergraduate education?
    a. I majored in the content area in which I teach
    b. I minored in the content area in which I teach
    c. I majored in education
    d. I minored in education
    e. other
9. Which of the following best describes your graduate education?
    a. I am working on a graduate degree in education
    b. I am working on a graduate degree in the content area in which I teach
    c. I have a graduate degree in education
    d. I have a graduate degree in the content area in which I teach
    e. I am not working on a graduate degree
    f. Other

10. How often do you meet with your PLC, meaning you meet with other teachers to seek and share learning that enhance your effectiveness so that students benefit?
    a. More than twice a week
    b. Twice a week
    c. Once a week
    d. Less than once a week
11. How many years have you worked in a PLC?
    a. This is my first
    b. 2-3
    c. 3-5
    d. 5-10
    e. More than 10 years

PART II – COMMON FORMATIVE ASSESSMENT INFORMATION

Assessment refers to any activity designed to uncover hidden abilities, skills, or knowledge using an identifiable action. Assessment activities can be formal measures of student learning, such as written tests. Or, assessments can be informal measures of student learning, such as teacher questioning of individual students and student groups or observations of individual students and student groups.

Rate how often the following assessment statements apply to your professional learning community:

12. As a PLC, we design and implement common assessments that are used to evaluate teaching
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
13. As a PLC assessment is done at the start of a module
    a. Never
    a. Rarely
    b. Sometimes
    c. Frequently
14. As a PLC assessment is done during a unit
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
15. As a PLC assessment is done at the end of a unit
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
16. Assessments designed as a PLC enable students to explicitly know the criteria for the assessment
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
17. As a PLC assessment is used to grade/rank student achievement
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
18. As a PLC assessment is used to diagnose student strengths and weaknesses
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
19. I implement instructional strategies my colleagues share with me during PLCs
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
20. I feel comfortable sharing the workload with my colleagues during PLC meetings

a. Never
b. Rarely
c. Sometimes
d. Frequently

21. My PLC jointly creates Common Formative Assessments that I use
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently

Select as many of the options as needed to best answer the following question:

22. Which of the following is/are the most beneficial outcome(s) of using assessments in a PLC:
    a. diagnosing student strengths and weaknesses
    b. evaluating teaching
    c. sharing instructional strategies with colleagues
    d. dividing the workload
    e. fulfilling a requirement from the administration
    f. none of the above

23. Think about your experiences with formative assessments that you designed yourself and ones that were designed by the entire PLC. Do you prefer working in isolation on formative assessments?
    a. Yes
    b. No
    c. Sometimes

PART III: COLLABORATION INFORMATION

Rate how often the following occur during PLC meetings.

24. I attend professional learning community (PLC) meetings
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently
25. I participate in professional learning community (PLC) meetings
    a. Never
    b. Rarely
    c. Sometimes
    d. Frequently

26. Is there a department-wide homework policy?
    a. Yes
    b. No
    c. I don't know

27. Is there a department-wide retake policy for students?
    a. Yes
    b. No
    c. I don't know

28. Is there a department-wide grading policy?
    a. Yes
    b. No
    c. I don't know

Rate your agreement with the following statements:

Meeting Time

29. PLC meeting time is often devoted to conversations related to my teaching
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
30. PLC meeting time often follows an agenda
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
31. PLC meetings benefit my teaching
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
32. PLC meeting time is often devoted to conversations that do not relate to my teaching
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
33. PLC meeting time often does not follow an agenda
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
34. PLC meetings do not benefit teaching
    a. Strongly disagree
    b. Disagree
    c. Agree

d. Strongly agree

Designing assessments:

35. I co-design assessments with my PLC
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

36. Co-designing assessment with my PLC assists me with my teaching
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

37. I look forward to co-designing assessments with my PLC
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

Sharing Data:

38. Sharing assessment data with my PLC assists me with making instructional decisions
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

39. I feel comfortable sharing assessment data with my PLC
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

40. I look forward to other members of my PLC sharing their data
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

Instructional decisions:

41. My PLC uses assessment results to evaluates teaching and/or reflects on instructional decisions
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

42. Reflecting on instructional decisions with my PLC assists me with teaching
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

43. I look forward to contributions of ideas for instruction from my PLC
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

APPENDIX B. INTERVIEW PROTOCOL

Semi-Structured Interview Questions

Background (1 and 2)

1. What current activities influence your assessment practices?
2. What past experiences have influenced your assessment practices?
3. Would you like to change any of your assessment practices? Why?
4. What activities have influenced your collaboration practices?
5. What past experiences have influenced your collaboration practices?
6. What changes would you make to your PLC?
7. Why do you participate in PLC meetings?

Formative assessment and common formative assessment (2 and 3)

8. How would you define common formative assessment? What are examples of common formative assessment that you have used? What are examples of formative assessment that you have used?
9. What is your opinion of common formative assessment, the practice of collaborating on the design, implementation, and data analysis of assessments designed to aid teachers in planning instruction and aid students in measuring progress?
10. What is your opinion of formative assessment?
11. What are the benefits to CFA?
12. What are the weaknesses to CFA?

Collaboration (4)

13. Do you feel comfortable sharing assessment results with your PLC? Regardless of how you feel about sharing data, do PLC members share data?
14. What discussion occurs during PLC meetings about assessment results?
15. Does everyone contribute equally to the design of common formative assessments?
16. Does everyone contribute equally to the implementation of common formative assessments?
17. Does everyone contribute equally to the evaluation and analysis of common formative assessments?
18. Do you feel your time is valued by your PLC?

19. Who runs the PLC meeting?
20. What works well about how PLC meetings are run?
21. What doesn't work well with how PLC meetings are run?
22. Are there members of your team that are resistant to working in a collaborative team? If yes to that question: Why do you think that they are resistant?
23. What assessments does your team collect in order to assess if students are making academic growth?
24. Does your team create academic goals for your students, grade teams, or school? If yes: How does your team use these goals?

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CURRICULUM VITAE

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