

A CASE-STUDY OF TEACHERS' DATA USE IN ELEMENTARY SCHOOL
PROFESSIONAL LEARNING COMMUNITIES

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ABSTRACT

Federal and state accountability obligates public schools to improve standardized test scores for students in certain grades and in certain content areas from year to year. In the name of school improvement district and campus level administrators implement professional learning communities (PLCs) and set expectations for data informed instruction as initiatives to improve test scores and increase student learning. The bulk of this work falls on teachers. Collaborative professional learning and data use is difficult work, and relying entirely on standardized test scores to make decisions is not necessarily best practice. This case study of an elementary school investigated teachers' perceptions of PLC experiences and collaborative data use and whether teachers valued these practices and possessed the levels of expertise and self-efficacy to engage in this work. The study aimed to answer three research questions: What do teachers think about using data in PLC experiences to inform their instructional practices and increase student learning? How do teachers describe their level of expertise regarding data-use knowledge and skills? How can school principals know that teachers possess the confidence and self-efficacy to apply data-use strategies effectively in their daily work? In exploring teachers' perceptions about PLC experiences and collaborative data use, I hoped to gain insight into what teachers valued and what levels of confidence they had regarding this collaborative work. I chose to conduct the study at the school where I am currently the principal believing that my findings would inform my practice as an instructional leader and believing my findings would inform other principals engaged in similar school improvement practices.

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CHAPTER 1 - INTRODUCTION

For decades, educators have grappled with the increasing demands of high-stakes testing and accountability by using various forms of student achievement data and employing various manifestations of collaborative teacher teams. For example, district and school administrators often require teachers to form professional learning communities (PLCs) in an attempt to increase the efficacy of embedded professional development and solve the problems associated with student achievement and school improvement (Mandinach & Gummer, 2013). In the late 1990s, educators referred to PLCs as teacher groups focused on improving collaboration and student achievement (DuFour & Eaker, 1998). Now, as districts and schools look for ways to embed professional development, improve data use in schools, refine data-informed instruction, and increase professional collaboration, PLCs are a common and, in many instances, required component of teachers' weekly planning (Cosner, 2014).

District and school administrators expect teachers at all grade levels to use data to inform their instructional decisions and planning. District and school leaders expect teachers to work together in PLCs, use multiple sources of data, monitor student progress, and ensure student achievement (Mandinach, 2012). This is complicated work. In addition, curricula and learning objectives are vast and at times overwhelming (Marzano, 2003). Even the best, most experienced teachers become frustrated trying to cover all the required grade-level standards while still meeting the needs of students. Teachers succumb to teaching skills in isolation and become further disgruntled with poor test scores and the seeming inability of students to master all the knowledge and skills (Bambrick-Santoyo, 2012). With so many concepts and skills to cover, instructional practices can be reduced to emphasizing the required content and

curricula but neglecting to focus on all students' learning or failing to help students master foundational academic, social, and emotional skills.

Childre et al. (2009) emphasized the importance of identifying curricular priorities in employing backward design in planning. Backwards design planning requires teachers to begin with end of unit or course goals and assessments before creating weekly and daily lesson plans. This approach allows teachers to plan for key standards, encourage deeper understanding, and easily connect to other learning objectives (Childre et al., 2009). This type of planning is very technical and requires collaboration and inquiry. However, using inquiry processes to determine problems and find practical solutions with measurable and attainable indicators are not necessarily areas where teachers have received extensive training (Mandinach, 2012).

District and school leaders may require teachers to meet regularly in PLCs, use data, record minutes, use certain PLC protocols, and take on various roles—but questions remain. Do teachers really understand the rationale for this approach? Do they possess the professional knowledge and skills to use PLC “strategies” to improve and adapt their instruction and increase student achievement? Bandura (1997) found individuals' perceptions of their abilities to perform duties influenced how successful they could be. This is true of students, but Bandura (1997) and Skaalvik and Skaalvik (2007) found that this was particularly true of teachers. Teachers' perceptions of self-efficacy can have a profound influence on student success (Bandura, 1997; Skaalvik & Skaalvik, 2007). How can school administrators know for sure that teachers possess the confidence and self-efficacy to apply sophisticated data-use strategies in their daily and weekly work? Beyond this, how can school administrators support the development of self-efficacy for data use among teachers?

DuFour (2006) described professional learning communities (PLCs) as opportunities for teachers to engage in collaborative practices that could improve instruction and increase student achievement. Further, Hirsh and Killion (2009) described specific principles for transforming and improving professional development for teachers through PLCs. However, school leaders, and more important, teacher leaders, have to adopt these principles and accept that their own learning is connected to student learning and achievement. In addition, Hirsh and Killion recommended that teachers and school leaders draw on internal expertise to become data-driven problem solvers in their own schools. This is a powerful notion that teachers can become action researchers in their schools and classrooms to analyze data, adjust instruction, and solve problems while developing and increasing data capacity and self-efficacy.

I recall my first attempts at creating a PLC at my school as a young assistant principal. I invited staff to stay after school to begin discussions around positive behavior intervention and social and emotional learning. The first meeting was well attended, and I addressed the group, posed questions, and engaged in discussion. In subsequent meetings, the number of attendees consistently decreased, and by the end of the year, our PLC had all but vanished. What caused this aversion to collaborative work and learning? I know my colleagues and I wanted the same thing: for all our students to learn and succeed. Subsequently, I have worked in different schools and served in different roles, and I have seen how school and district leaders attempt to lead and maintain effective PLCs and collaborative data use among teachers. I have continued to look for ways to improve these practices because I believe that making collaborative, data-informed decisions is linked to positive student outcomes (Santangelo, 2009). However, I have witnessed how a lack of

support from teachers, school leaders, and district leaders, implementation can be challenging. As a school principal, I want to empower the teachers at our school to work together, use data effectively, solve problems, and ensure high levels of learning for all students. I want to create a supportive culture so our teachers can learn and grow professionally (Hord & Hirsh, 2009).

Ultimately, public education in its current constitution was not designed to ensure high levels of learning for all students (Muhammad, 2019). DuFour (2006) described effective PLCs as schools and districts that embrace and commit to “high levels of learning for all students, representing both the reason the organizations exist and the fundamental responsibilities of the educators working within them” (p. 11). Hord (1986) described factors and characteristics necessary within a school or organization to accomplish this type of collaborative work. When educators accept the necessity of radical changes and adopt the approaches required to ensure high levels of learning for all students, they can begin the collaborative and systematic work associated with effective professional learning communities.

Research Overview

To explore the intersection of PLCs and data use in schools, I engaged in a case-study research project, informed by tenets of action research. Practitioner action research implies that the researcher is an insider to the setting and plays an active role in the organization (Herr & Anderson, 2015). A case study is “an empirical inquiry that investigates a phenomenon in depth and within its real-life context” (Yin, 2009, p. 18). For that reason, a rich description of the setting is necessary to explain the problem and purpose of the study. In addition, the experience of a principal conducting case-study research at his school is

conducive to characteristics of practitioner action research in which the researcher is a part of the daily experiences and is invested in solving problems and improving the school (Herr & Anderson, 2015). Table 1 shows the demographic makeup of the study site.

Table 1

Demographic Information about Students and Staff at the School and in the State of Texas

	Students	Faculty/ Staff	Texas Student Averages	Texas Faculty/Staff Averages
Female	51%	91%	*	76%
Male	49%	9%	*	24%
White	15%	57%	27%	58%
African American	50%	29%	13%	11%
Hispanic	24%	14%	53%	28%
Asian	5%	*	5%	2%
Two or more races	6%	*	2%	1%
Economically disadvantaged	60%	*	39%	*

*Data not available.

The study took place at a PK-5 elementary school situated in southwest Fort Worth, Texas, beyond the zoning boundaries of Fort Worth ISD within a smaller, neighboring public-school district. The school opened in 2019 and began its inaugural year during the 2019–2020 school year. At the time of this study, the surrounding neighborhood was a new development with several phases of buildout that ranged from one to five years old. The houses were new, with prices from \$265,000 to \$350,000. There were several apartment complexes within the zoning of the school offering lower-end housing and, in some

instances, government-assisted living. The school served nearly 600 students in grades pre-kindergarten through fifth grade with over 60% from economically disadvantaged families. For that reason, the school received a nominal amount of Title I funding, which was not enough to pay the salary of an additional specialist and barely enough to pay for limited professional development for teachers and tutors for students.

The teachers and staff were all new to the school, with about two thirds coming from two other schools in the district and the other third being new to the district or coming from other schools in the district. An active Parent Teacher Association (PTA) raised money for the school and contributed by holding a number of after-school and weekend events for students and families. Because the school was new, there were no accountability ratings, but the neighboring schools all “met standard” over the previous three years and earned academic distinctions. The district received a state accountability rating of “B” for the 2018–2019 school year and experienced an overall significant gain in student achievement (up 13 points in overall accountability rating from the 2017–2018 school year). Each school in the district received an accountability rating based on student achievement, student progress, relative performance, and closing achievement gaps.

Problem Statement

The problem identified for the case study at Southwest Texas Elementary School involved the grade-level professional learning communities (PLCs) that met on a weekly basis. PLC members seemed to have difficulty aligning behaviors with research-based, best-practice principles of using data to inform and adjust their instruction. My participation and observations in PLCs over the first semester of the 2019 year suggested that teachers at this school were not able to consistently sustain PLC best practices, effectively use data to inform

instruction, remain focused on high levels of learning for all students, and engage successfully in cyclical problem solving and inquiry. For teachers trying to teach all that they have to cover in grade-level standards and Texas Essential Knowledge and Skills (TEKS), the task becomes overwhelming, and even the best, most diligent teachers can become lost in trying to do too much and cover everything (Schmoker & Marzano, 1999). Student achievement data generally suggests that teachers often struggle with covering foundational concepts and skills and, subsequently, with employing strategies to guide students to deeper understanding and mastery of concepts.

Purpose of the Study

In this study, I aimed to explore how educators perceived their efficacy and data use capacity while implementing a particular approach to collaborative data use. The study focused on the functioning of teacher teams during PLC meetings and examined three elements of effective professional learning communities. I was interested in exploring the following questions regarding PLCs and collaborative data use among teachers in schools.

- How and to what degree did teachers focus collaborative data use on student learning?
- How did teachers engage in or resist collective inquiry and problem solving?
- What were teachers' self-efficacy and professional data-use knowledge and skills?

These questions were developed into the following guiding questions for the research study:

1. What do teachers think about using data in PLC experiences to inform their instructional practices and increase student learning?
2. How do teachers describe their level of expertise regarding data-use knowledge and skills?

3. How can school principals know that teachers possess the confidence and self-efficacy to apply data-use strategies effectively in their daily work?

Evidence collected from this inquiry could inform decisions about institutional leaders' next steps and actions to support teachers to become autonomous experts who use data to discover problems and improve instruction, interventions, and student learning. These systems could improve embedded professional development and allow teachers and staff to respond to the learning needs of all students. Although PLC groups were part of a school-wide system, the focus of this study was on data use and problem solving within the PLCs, as well as on the knowledge and skills teachers need to engage in this practice effectively.

Significance of the Study

Schools with effective teacher groups capable of using multiple forms of data to identify and respond to problems and work collaboratively experience higher levels of student achievement (Cosner, 2014). DuFour (2014) reported that schools engaging in ongoing, job-embedded, collective, results-oriented PLCs experienced increased teacher and student learning. However, it is important for teachers to use PLC time for more than just planning lessons. Teachers, principals, and instructional specialists who know how to use data to inform and support decisions about instruction can find solutions to ensure that students learn what they are supposed to learn. For example, Bambrick-Santoyo (2012) described the process of educators in previously low-performing schools using data to drive instructional decisions and building data capacity in teachers and staff. Employing systematic approaches, rather than relying on teacher and principal charisma, led to students' achievement and school improvement (Bambrick-Santoyo, 2012). Through action research, teachers and educators became participants in improving these practices and capacities. One

of the most important aspects of action research is that it ensures voice and integrity to the participants, because they are involved in the inquiry and cycles of action (Herr & Anderson, 2015). They are key decision makers in how information is interpreted and used in planning next steps. In addition to illuminating barriers to success at schools, action research can also shed light on similar problems experienced by other schools in different settings (Brydon-Miller & Maguire, 2009).

In addition to studying the action-research cycles, data-informed problem solving, and increased data-use capacity among teachers, I hoped to gain insight into PLCs and data-use improvement. Studying teachers' perceptions of collaborative data use and PLCs could provide insight into next steps for data use and PLC improvement. It is important for school leaders to consider their teachers' perceptions of data use and PLC expectations when determining next steps for improvement (Hord & Hirsh, 2009). It is important for school leaders to involve teachers in the processes designed to improve data use and PLC practices (Cosner, 2014). Failing to include teachers in the improvement process undermines the principles of collaborative data use (Bertrand & Marsh, 2015).

Conclusion

Based on the core values, mission, and vision developed by teachers and staff at the beginning of the year, the staff members of this school established a belief that through professional learning and collective responsibility, all students would learn at high levels. However, this was difficult work and required a degree of professional knowledge and skill. I was interested in discovering how teachers engaged in that work, especially in terms of collaborative data use and collective problem solving. Gaining this knowledge will help me support teachers as they refine their practices and behaviors in a professional learning

community. Further, this study will inform other school leaders in examining and improving their own collaborative and collective practices. To this end, this kind of study—attentive to both context as well as to the issues the research identified as important factors in advancing data-rich PLC work—could prove useful for researchers and district leaders. To set the stage for the study, in the following chapter, I review relevant literature regarding collaborative data use in schools and teacher self-efficacy. In Chapter 3, I describe the design and methods of the study, including a rich description of the school improvement systems that existed at the school at the time of this study. In Chapter 4, I report the findings, and Chapter 5 is a discussion of the findings.

CHAPTER 2 – REVIEW OF THE LITERATURE

The purpose of this chapter is to review relevant literature related to data use (with attention to data use of teachers in PLCs), practitioner action research, teacher self-efficacy, action research as a reflective practice, sense making, and organizational theory. Because teachers are required to do more than just plan and teach weekly lessons, the information in this section provides insight into previous research and findings that might help teachers improve their PLC practices. In addition, the literature discussed outlines the evidence base for the study.

School Improvement Practices

I address the following topics because they are essential ingredients in a well-functioning PLC focused on school improvement. Depending on where teachers are within curriculum units or collaborative problem-solving cycles, they may engage in these practices with varying levels of expertise.

Data-Informed Instruction

Using data to inform and adapt instructional practices in schools is a widely accepted practice considered by most educators as an essential ingredient for student achievement and school success (Mandinach & Gummer, 2013). Bernhardt (2016) described analysis of four main kinds of data for understanding the entire school experience so educators can fully assess the school's impact on student achievement: demographic, perceptual, student learning, and school processes data. Studying multiple measures and triangulating different data sources helps educators identify problems and root causes while eliminating confounding symptoms that educators inadvertently mistake as problems. Mandinach (2012) defined teachers' ability to use data to inform instruction as *data literacy*. Employed

effectively, data literacy allows educators to differentiate instruction to accomplish multiple goals, including meeting student needs, formulating hypotheses about student learning, considering multiple sources of data, modifying instructional practices, working in data teams, incorporating student work, focusing on student learning outcomes, considering all students, and drilling down to gain a deeper understanding of student learning (Mandinach & Gummer, 2013).

Although data use and data-informed instruction are popular topics in schools today, how can teachers and school leaders know what types of data to use or what data-use processes to implement? Schildkamp and Kuiper (2010) described the data-use process and data-driven decision-making field as relatively new and based exclusively on student-achievement data. Far too often, school leaders have required teachers to use assessment data to drive instructional decision making without providing teachers with adequate professional development or creating a school-wide system for collecting and using multiple measures of data to inform and adjust instruction (Wayman et al., 2012). Bambrick-Santoyo (2010) described data-driven instruction as a philosophy based on the idea that schools should constantly focus on one question: Are our students learning? Based on this approach, Bambrick-Santoyo asserted that data-driven schools would adopt four key principles for creating a school-wide system consisting of rigorous interim assessments, data analysis, action, and data-driven culture. In order to implement these principles effectively, schools need a system and methodology to facilitate data-informed instruction as well as a professional development model conducive to adult learning and teacher buy-in.

Although teachers and school leaders are compelled to assess and monitor standardized student-achievement data aligned to specific academic standards and

accountability requirements, effective teachers know the importance of collecting and using formative and authentic forms of data to determine student learning and inform instructional decisions (Schildkamp, 2019). However, Jimerson (2015) wrote that data-informed practice is more than just analyzing standardized test scores and test preparation. When teachers observe and collect multiple forms of data and use that information to engage collaboratively in inquiry and problem solving, they are able to create action plans and put professional knowledge into practice. Hudesman et al. (2013) found that using a daily system of formative assessments consistently leads students to higher achievement.

In addition, positive student and staff culture is essential for a successful data-informed instructional system. Strong school cultures are not necessarily the result of charismatic leadership or strict discipline policies; positive school cultures result from careful and intentional implementation of research-based practices and systems—“they come from the careful development of habits that build a strong staff community” (Bambrick-Santoyo, 2012, p. 191). Schools with positive cultures have a clear vision and mission so the teachers and staff understand exactly what is expected of them and know what the organization is attempting to accomplish. Further, schools with positive cultures consist of committed educators who embrace cultural diversity and work to build equity, thus empowering all students, family members, staff members, and stakeholders. Smith et al. (2017) described a hierarchy for building and integrating equity into school culture, consisting of “physical integration, social-emotional engagement, opportunity to learn, instructional excellence, and engaged and inspired learners” (p. 3-4). When educators focus on these principles for equity in education, the resulting positive school culture facilitates learning and educational excellence, creating a place in which students, staff, and other stakeholders can be proud of

their schools, thereby fostering “a sustainable, positive school climate fosters youth development and learning necessary for a productive, contributing, and satisfying life in a democratic society” (Smith et al., 2017, p. 69).

Bambrick-Santoyo (2010, 2012) detailed a system for data-driven instruction and an adult learning plan for ensuring effective professional development. According to this system, four components comprise the data-driven system: assessment, analysis, action, and culture. First, an effective formative assessment system involves ongoing, real-time data, interim assessments, and curriculum units and instruction aligned to the assessments (Hudesman et al., 2013). The system includes interim assessments developed with teachers and aligned to standards with a specific interim assessment calendar (Bambrick-Santoyo, 2010). Second, deep analysis of the interim assessment data should include questions, standards, individual student results, and whole class-level analysis with all teachers following each assessment consistently (Bambrick-Santoyo, 2012). Analysis also involves test-in-hand analysis with teachers and instructional leaders reviewing student errors (Bambrick-Santoyo, 2012). Third, once effective analysis takes place, teachers work in teams or with the principal to develop an action plan for adjusting instruction with new strategies and specific timelines for implementation.

The final piece of the system involves culture. Bambrick-Santoyo (2010) contended that properly implemented data-driven instruction does not require buy-in because the ensuing success creates buy-in and improves school culture. The school calendar prioritizes interim assessments, data analysis, professional development, and action planning above all other things in the school year. In a school with strong student and staff cultures, nothing is more important than learning (Bambrick-Santoyo, 2012). Bambrick-Santoyo (2010) provided

an implementation rubric and other detailed protocols for implementing the data-driven instruction system. With data-driven instruction, all teachers and staff focus on the learning and progress of all students throughout the year. Moreover, with an effective system in place, learning aligns with standards in terms of both rigor and specificity (Black & Wiliam, 1998).

Data-driven instruction is an important component of effective school reform; however, teachers working in isolation are not able to maximize their data-use capacity. Cosner and Peterson (2003) discussed the necessity for collaborative data teams to apply the work of data-driven instruction more effectively. Van Gasse et al. (2017) described the importance of teachers working together to use data to improve their practices. The interplay between data use and collaborative teacher teams or PLCs demonstrates the reciprocal value of these systems. However, putting teachers into teams and asking them to use data to solve problems is not effective practice (Van Gasse et al., 2017). Many factors contribute to collaborative teams using data successfully to improve instruction and learning.

Data Capacity and Professional Development

Data-use capacity in education involves the extent to which educators can collect multiple sources of data about school improvement, examine student and teacher work, implement data analysis protocols, work collaboratively with others using data, and analyze multiple sources of data—and then use that information to adjust or improve curriculum, instruction, intervention, or any other actions aimed at school improvement (Bernhardt, 2016). Black and Wiliam (1998) investigated formative assessment and data use by asking three simple questions: “Is there evidence that improving formative assessment raises standards? Is there evidence that there is room for improvement? Is there evidence about how to improve formative assessments?” (p. 140). In a follow-up article, Black, Harrison, and Lee

(2004) continued to investigate these questions. To the first two questions, they were able to answer clearly “yes.” However, to the third question, the evidence was less clear. In response to the third question, Black, Harrison, and Lee (2004) identified three primary problems: current assessment practices did not promote learning, current assessment practices emphasized grading and task completion, and assessment feedback often had a negative impact on student learning. In order to provide teachers and educators with options about improving formative assessment practices, Black, Harrison, and Lee (2004) detailed a variety of assessment and data-use strategies specifically focused on collecting ongoing, real-time (formative) data and then using this information to make decisions about and adjustments to instructional approaches and strategies.

Bambrick-Santoyo (2010, 2012) focused mainly on a system designed around interim assessments. In contrast, Black and Wiliam (2004) focused on classroom activities, including questioning and feedback, grading focused on feedback rather than scores, peer and self-assessment, and, most important, an emphasis on student learning and not teaching. These principles about assessment in the classroom and data use have led educators to adopt approaches that are more practical for collecting data during frequent checks for understanding, guided lessons, and individual conferences. In fact, educators have been able to abandon traditional grading for practices more focused on learning and mastery of skills and concepts. Opportunities exist in classrooms and schools for both approaches to focus on student learning and make necessary adjustments to instructional approaches.

Lemov (2015) described a variety of classroom instructional strategies that allow teachers to gather data on student mastery while maintaining engagement and high expectations for all students. Teachers then use that data to monitor student learning. A

number of these strategies (e.g., “own and track”) encourage students to correct, revise, and track their own learning (2015). Saphier and Gower (1997) described practical strategies for conducting formative assessments and collecting data through checks for understanding, student conferences, rubrics, checklists, and student portfolios. These methods align with popular, research-based classroom instructional practices such as the Fountas and Pinnell (2016) guided reading/balanced literacy approach to reading instruction wherein teachers document running records of student learning and acquisition of reading skills to make decisions and adjustments to instruction. In addition, ongoing formative assessment data use aligns well with popular workshop models for teaching reading and writing, including the Lucy Calkins’ Units of Study curriculum resource (Calkins & Ehrenworth, 2016). Although the Bambrick-Santoyo (2012) data-driven instruction system relies mainly on the systematic administration and analysis of standardized interim assessments, data capacity involves more than just interim assessment, encompassing other methods of collecting multiple sources of data and then using that information to adjust instruction.

Bernhardt (2009) noted the importance of examining multiple sources of data, rather than relying exclusively on student learning data, to engage in an ongoing problem-solving cycle aimed at ongoing school improvement. However, in examining effective data capacity, schools must look beyond multiple-choice interim assessments when determining a shared mission and vision and formulating steps for achieving the mission and vision. For example, Venables (2014) described a process and provided protocol for using multiple sources of data, including interim assessment data, informal observational data, demographic data, student work, and other artifacts to triangulate the data, identify learning and instructional gaps, and then create SMART (specific, measurable, attainable, realistic, and timely) goals to

plan for action. Implementing Venables's approach or similar data-use protocol helps build and maintain data capacity so educators' problem-solving efforts are not haphazard or inconsistent. Effective data capacity involves research-based systems, protocol, and instructional strategies; however, another important component for developing and maintaining capacity is training and professional development.

Venables (2014) suggested that data literacy is essential in teachers' ability to review and engage in effective data use: "The teachers who own the data ought to be the teachers who review the data" (p. 14). Jimerson (2015) proposed four factors important for engaging teachers in effective data use: (a) data use-related skills and knowledge, (b) trust, (c) vision and common language, and (d) time. Although teachers may have the capacity and skills to analyze and understand data, they may lack the capacity to put that knowledge into action (Mandinach & Jimerson, 2016). Given the complexity of collaborative data use, teachers need to engage in ongoing professional learning with adequate time and support from school leaders (Wayman et al., 2012).

For teachers to engage in effective professional learning, they must receive proper training. Bambrick-Santoyo (2010, 2012) described an adult-focused approach for helping teachers and educators increase data capacity. Bambrick-Santoyo (2010) found several obstacles hindered effective adult learning and proposed an applied-learning approach to effective professional development. Instead of relying on lecture or guided practice, teachers and educators learn best with well-defined learning goals and activities designed to help them learn about data use mostly on their own with some support when necessary. Desimone and Pak (2017) described "five features of effective professional development: content focus, active learning, coherence, sustained duration, and collective participation" (p. 4). As stated

before, data capacity does not require teacher and staff buy-in—when implemented systematically, effective data use and data-informed instruction inspire teachers and staff acceptance because they see student achievement and school improvement. However, increasing data capacity among teachers and staff requires not only a systematic approach but also a commitment to multiple sources of data, data-use protocols, and effective adult learning and support.

Many factors affect coaching and capacity building for teachers. The dynamics vary widely from one school or grade level to another as well as among the systems or protocols used by principals and instructional leaders. Farrell and Marsh (2015) found four conditions with several factors critical to the capacity building process: intrapersonal, interpersonal, structural-organizational, and environmental. Intrapersonal factors such as teachers' background knowledge, data-use experiences, and perceptions about data use can influence how receptive teachers may be to coaching and feedback around data-driven decision making (Pfeffer & Sutton, 2000). Interpersonal factors such as trust, credibility, and effective communication can affect the dynamics between teachers and instructional leaders (Kerr, Marsh, & Ikemoto, 2006). Bambrick-Santoyo (2012) emphasized the importance of coaching and feedback to improve teacher efficacy and build capacity. With positive interpersonal conditions, teacher teams are more likely to engage collectively in productive learning (Marsh & Farrell, 2015). In addition, structural, organizational, and environmental factors such as time, scheduling, and space play roles in this process. Cosner (2012) found that time, space, funding, and other school-level factors can enable or hamper effective coaching and capacity building.

Professional Learning Communities

Professional learning communities (PLCs) are the educator and teacher teams necessary for effective data-informed instruction, data use, and data capacity. Without these collaborative teams, educators function in isolation, making it very difficult for teachers to adjust and improve their practices to promote learning for all students.

DuFour (2006) defined PLCs as “collaborative teams whose members work interdependently to achieve common goals linked to the purpose of learning for all” (p. 12). Learning-community members need to commit to a mission and purpose and be willing to behave differently in order to achieve that mission (DuFour, 2006). Further, Hirsh and Killion (2009) described the necessary roles of principals and school leaders in creating and maintaining effective PLCs. If PLC members do not understand the purpose or reason their organization exists, it will be hard for them to commit to a mission. Bernhardt (2009) recognized the importance of using the core values and beliefs of staff members to develop a purpose and mission for the school so a clear vision can be developed. Once consensus is reached regarding these principles, members of a learning community should “create an intensive focus on learning by clarifying exactly what students are to learn and by monitoring each student’s learning on a timely basis” (DuFour, 2006, p. 11). To achieve this focus, PLC members should continually ask four questions: “What do we want our students to learn? How will we know if each student has learned it? How will we respond when some students do not learn it? How can we extend and enrich the learning for students who have demonstrated proficiency?” (DuFour, 2006, p. 59)

Marzano (2007) expanded this notion to include the practices and strategies necessary for ensuring that all students learn, developing six lesson design questions to guide PLCs through this process:

How will I communicate clear learning goals that help students understand the knowledge they are expected to master? How will I design and administer assessments that help students understand how their test scores and grades are related to their learning? When content is new, how will I design and deliver direct instruction lessons that help students understand what is important and how parts fit together? After presenting content, how will I design and deliver lessons that help students deepen their understanding and develop fluency in skills and processes? After presenting content, how will I design and deliver lessons that help students generate and defend claims through knowledge application? Throughout all types of lessons, what strategies will I use to help students continually integrate new knowledge with old knowledge and revise their understanding? (p. 7)

Using these guiding questions, PLCs stay focused on what they want all students to learn, how they will ensure that they learn it, and how they will assess that learning.

In addition to planning and designing lessons and assessments, PLCs explore data in order to adjust instruction. Venables (2014) described guiding questions that data team members can use to review and triangulate data when developing an action plan. Many protocols and processes exist for PLCs to use in reviewing teacher and student work, reviewing existing data, and formulating action plans. Mandinach and Jimerson (2016) detailed many models for using data, noting they were not necessarily linear and straightforward yet they all embodied some notion of cycles of inquiry. DuFour (2016)

described a process for organizing PLC teams with protocols for planning collaboratively, using data, creating goals, focusing on results, and engaging in an ongoing cycle for planning, doing, checking, and acting. Bolhuis et al. (2016) studied the effects of using a data-use protocol with teacher data teams and found that not only were teachers more satisfied with the experience but also the teams were able to use data more effectively to solve problems. The data teams' perceptions were positive about the use of data protocol with their teams and had relevant conversations about their data (Bolhuis et al., 2016). Although evidence was inconclusive about the depth of conversations during the data team meetings, teachers did respond positively to working as a team with a data coach (Bolhuis et al., 2016). Similarly, Poortman and Schildkamp (2016) described a systematic intervention for teachers to use when working with data, making decisions, and solving problems. Regardless of the model or process, this work requires time, inquiry, collaboration, effective communication, and ownership among participants (Hord & Hirsh, 2009).

DuFour (2006) noted the importance of teamwork, collaboration, and leadership in PLCs and discussed how teachers and staff could find this difficult work challenging. DuFour (2016) acknowledged the need to engage in significant cultural shifts, taking educators from a focus on teaching to a focus on learning, from a focus on average test scores to a focus on monitoring each student's mastery of every essential skill, from isolation to collaboration and individualized assessments to common formative assessments, from independence to interdependence, and from external training to job-embedded learning and professional development.

Heifetz and Linsky (2002) discussed the role of leaders in any organization engaging in technical versus adaptive work. Teachers have grown accustomed to certain technical

work in education (e.g., planning lessons, making copies, teaching lessons, giving tests, recording grades, completing tasks, and meeting deadlines). Educational and instructional leaders must engage in adaptive work to bring about the systemic and cultural changes necessary for effective PLCs, data use, and research-based professional learning.

In mobilizing adaptive work, you have to engage people in adjusting their unrealistic expectations, rather than try to satisfy them as if the situation were amenable primarily to a technical remedy. You have to counteract their exaggerated dependency and promote their resourcefulness. (Heifetz & Linsky, 2002, p. 15)

Adaptive work is complex and ultimately falls on the shoulders of educational leaders. However, much like the data-driven instruction system, once the PLC systems are in place and functioning effectively, the adaptive work will begin to move from principal to teacher. Schmoker (2006) identified PLCs as one of the surest and fastest ways to improve instruction by ensuring collaborative reflection on instruction, a focus on results, and a focus on curriculum, instruction, and assessment alignment. Nothing is more important than strong collaborative teams working together to ensure student learning: “A successful face-to-face team is more than just collectively intelligent. It makes everyone work harder, think smarter and reach better conclusions than they would have on their own” (Surowiecki, 2004, p. 176).

Response to Intervention (RtI) and Multi-Tiered Systems of Support (MTSS)

One of the questions asked by effective learning communities is, What do we do when students are not learning? The purpose of a responsive and targeted intervention system is to ensure that students who are not learning receive the instruction and support they need to learn what they are expected to learn. Although response to intervention (RtI) is essential for students who need to recoup off-grade-level skills and catch up academically, socially, or

emotionally, ineffective RtI systems or an unfounded reliance on unproven practices in the name of RtI can be obstacles to effective instruction: “RtI subtly diminishes a focus on the importance of good initial teaching” (Schmoker, 2018, p. 84). Schmoker argued that RtI inadvertently overemphasizes tutoring or intervention at the cost of what most RtI systems refer to as *tier-one* or *initial* instruction. If the majority of students require tutoring or intervention, the instructional focus should not be on intervention strategies but on the quality of instruction for all students. Sparks (2011) reported that RtI use extends beyond what research has proven effective: “Before people go out and start proclaiming there is a dominant effective model of RtI that everyone ought to embrace, they really need to have more research on it” (p. 16). Schmoker, Sparks, and other critics of RtI have called for research-based systems that do not subordinate the need for effective whole-class instruction delivering rich, coherent curricula. The overlap between data-informed instruction, professional learning communities, data use in schools, and effective RtI systems involves research-based, high-quality instruction, progress monitoring, and data-based decision making. Without these components, RtI is a roadblock to effective instruction and student learning.

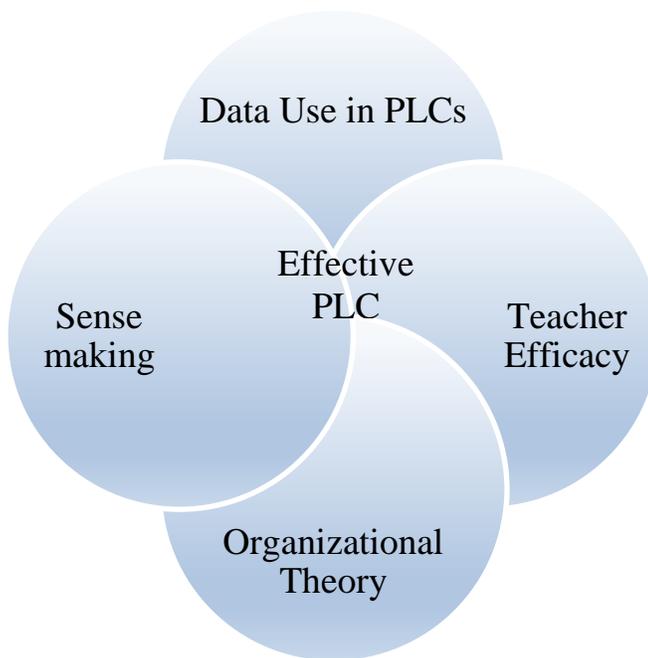
A multi-tiered system of supports (MTSS) should align with and complement the other curricula and instruction systems in schools. Emerging from special education law, MTSS is a general education system that helps educators identify students with disabilities; however, MTSS is more about providing students with effective interventions and documenting student progress (Brown-Chidsey & Steege, 2010). Bryson et al. (2010) identified how educators can address roadblocks to ensure that MTSS practices are implemented effectively. The six essential components of MTSS are high quality, research-

based tier-one instruction; universal academic and behavioral screening of all students; progress monitoring; data collection; data-based decision making; and fidelity of implementation (Brown-Chidsey & Steege, 2010).

In addition to providing valuable interventions for struggling students, using a problem-solving approach to examining students' learning needs and developing individualized learning plans with specific interventions and progress monitoring processes could benefit the teachers and staff who engage in the problem-solving work (Gregory, 2010). For example, Hipp et al., (2008) found that educators who engaged in collaborative work on problem solving and shared leadership were able to make collective decisions about instructional practices designed to meet student needs. This type of collaborative inquiry is necessary both for teacher teams attempting to develop meaningful and individualized interventions for students and for teacher teams seeking to improve their instructional practices (Gregory, 2010; Hipp et al., 2008; Tan & Caleon, 2016). MTSS is beneficial for students and teachers because it aligns support systems and encourages teachers to learn and improve practices through problem solving (Bryson et al., 2010; Gregory, 2010).

Conceptual Framework

The conceptual framework informing this study and representing an overlap of the principles in the review of relevant literature can be summarized as shown in Figure 1. First, to understand the importance of professional learning communities in organizations and describe how they contribute to the transformation and improvement of organizations such as schools and school districts, it is important to review relevant literature concerning organizational theory, sense-making theory, and efficacy theory.

Figure 1*Conceptual Framework***Organizational Learning Theory**

Researchers interested in organizational theory perceive organizations as learning and self-correcting systems and believe that communication is at the core of organizational transformation (Argyris et al., 1985). Kotter (2008) extended this notion, naming four guiding principles for organizational change: having a sense of urgency, having a guiding team, creating a vision and strategy, and communicating the vision and strategy to everyone involved. Organizational learning requires not only dialogue on specific goals and strategies but also team members working together, because individuals' experiences alone cannot foster the knowledge and innovation necessary to move an organization forward (Kotter, 2008). Senge (1990) noted the importance of dialogue and communication for organizational learning: "The capacity of members of a team to suspend assumptions and enter into a genuine 'thinking together'" (p. 10). Senge further described the importance of relying on

members of the team—individual experience is not enough, especially when participants cease to experience the direct consequences of their actions.

These are complicated notions and not necessarily part of training, support, or professional development of teachers and educators. Nevertheless, educators do have the potential to form teams that contribute to organizational learning, and in many instances, teachers already possess the capacity to engage in the practices detailed by Senge (2006) and Kotter (2008). A high-functioning PLC becomes the operating system of the school or organization, in which team members learn from one another and create a stronger learning organization (Senge, 2006). Van Lare and Brazer (2013) suggested a conceptual framework of teacher learning within PLCs based on collaborative and conversational patterns that allow teachers to replay and elaborate on events in their classrooms and learn from their experiences through interactions with peers.

Horn and Little (2010) found that conversational routines in PLCs are related to micro-level discourse routines and meso-level participation routines that actually limit learning opportunities even among eager and competent educators. Meso-level participation routines refer to the size of an organization somewhere between the micro and macro levels, such as a school or learning community. Teachers and educators may be unaware that their discourse and conversational routines during PLCs may negatively affect their learning (Horn & Little, 2010). Schein (2010) found that this lack of awareness affects leaders who are trying to improve the effectiveness of their organization in the face of environmental pressures but who are unaware of the ways that individuals or groups behave ineffectively. In an attempt to improve their organizations, school leaders may implement PLCs as an

expected practice, but communication problems and misunderstandings among group members could prevent learning and improvement (Shein, 2010).

Because learning capacities differ among teachers, making sense of these factors for the sake of improving and encouraging learning through systematic support of PLCs is a complicated process. The knowledge and skills required by teachers and school leaders to engage in the work and learning necessary for effective PLCs are vast and influenced by cultural and social contexts of the school (Schlechty, 2009). Schlechty (2009) defined social systems as systems that define the meaning of the work and values of the work and its outcomes. Too often district and school leaders attempt to implement new ideas—for example, PLCs and collaborative data use—with tools and instruments that influence the technical aspects of the job but fail to consider the impact of these changes on the social systems that already exist in schools (Christensen, 1997; Schlechty, 2009).

Sense-Making Theory

Throughout the course of a day, a week, or a six-week unit, teachers and educators are expected to make thousands of decisions that may ultimately result in high-stakes consequences for student learning (Weick et al., 2005). Over a semester and school year, the culmination of these decisions may have serious effects on important issues related to student achievement and equity (Bertrand & Marsh, 2015; Weick, 2005). In the course of a day, a teacher prepares for work, drives to school, maybe drops off her own children, speaks to colleagues, prepares her lessons, and then teaches her students, responding to their questions, conflicts, and needs. This is an oversimplification of the incredibly complicated dynamics of being a classroom teacher.

In the midst of complicated situations with many contributing factors, teachers are expected to make sense of student learning (or not learning), and then make decisions and take actions that will mitigate problems and maximize student learning. Weick (2005) noted sense making involves “the ongoing retrospective development of plausible images that rationalize what people are doing” (p. 409). Teachers are continuously trying to make sense of why students learn or behave in certain ways or why teachers are required to use particular instructional strategies or resources. Actually, sense making is “about the interplay of action and interpretation rather than about the influence of evaluation on choice” (Weick, 2005, p. 409). Teachers make dozens of decisions throughout the day and engage in actions that may or may not be most beneficial for students. As such, they are not good teachers making good decisions or bad teachers making bad decisions; rather, they are teachers armed with the skills and training made available, trying their best to make sense of what is going on in their classrooms with their students. Given these complications, teachers are trained to use various forms of student achievement data and other formative data to help them make sense, make decisions, and engage in the most appropriate actions for all students.

Teachers are encouraged to work in collaborative teams and use student data to make decisions and solve problems. How teachers make sense of data in the process of decision making is complicated. Teachers may base their sense making about data use on previous experiences with data use in schools or previous conceptualizations or interpretations data (Jimerson & McGhee, 2013).

Teachers’ negative opinions of data use or of the ways their schools or districts have prioritized data use may negatively influence their actions and approaches to using data to learn, make decisions, and solve problems. In addition, Bertrand and Marsh (2015) described

sense making of data use in terms of attribution—in other words, how teachers attribute student outcomes. In thinking about data use, teachers may attribute student learning to their own instruction, student understanding, the nature of the test, or student characteristics (Bertrand & Marsh, 2015). When teachers use data to reaffirm preexisting negative notions about students or the nature of the test combined with what the data may suggest about student learning and understanding of concepts, this encourages them to remove themselves from the responsibility and commitment to all students learning at high levels. As suggested by Bertrand and Marsh, teachers who cite an internal locus of control and associate student learning with their own actions are more likely to view their instruction and student learning as changeable and capable of improvement. Vanlommel and Schildkamp (2018) suggested it is simplistic to expect that implementing data-use systems and PLCs will automatically produce decisions that enhance student learning. In sum, how teachers make sense of data use in schools significantly influences how data-informed decision-making systems and policies affect student-learning outcomes. Having good data does not necessarily ensure good decision making.

Teachers often use data to make decisions; however, these practices might not result in actions that encourage equitable instructional practices. Vanlommel and Schildkamp (2018) found that many teachers base their conclusions on intuitive processes of data use in which data are “gathered spontaneously without triangulation or consideration of alternative explanations” (p. 812). For example, teachers may haphazardly use classroom observations or student behaviors to make decisions without formulating a consistent system for collecting and analyzing information (Vanlommel & Schildkamp, 2018). Teachers engaging in these data-use processes may mistake low student engagement for low achievement. Drawing

conclusions from this type of data collection may influence teachers' beliefs negatively, resulting in inequitable instructional practices. Vanlommel and Schildkamp found that some teachers collected data deliberately and systematically, used predefined criteria for data interpretation, triangulated data, and searched for alternative explanations. Applying a systematic collaborative cycle of inquiry encourages teachers and educators to avoid the negative actions associated with individual intuitive judgment (Vanlommel & Schildkamp, 2018). Teachers and educators require training, support, and encouragement to reflect on and share their sense-making processes and attributions regarding data use in school.

In addition to making sense of data using rational and systematic processes, teachers, educators, and organizations that share and preserve their learning are more likely to become what DuFour (2006) described as a professional learning community committed to the purpose of learning for all. However, Jimerson and Wayman (2015) found that schools have processes for making data collection and interpretation more rational but lack processes for encouraging sharing and preservation of knowledge and learning.

Efficacy Theory

Bandura (1997) studied the importance of belief in people's ability to reach goals or achieve tasks. Self-efficacy affects people's ability to use skills and engage in complex cognitive functioning (Bandura, 1993). This is true for teachers who are trying to interpret student learning and ensure that students master skills and concepts. Self-efficacy affects how teachers function, how well they are able to perform their duties, and how satisfied they are with their jobs (Caprara et al., 2006). Further, Bogler (2001) found that certain leadership styles and behaviors of principals positively affected teachers' feelings of job satisfaction and efficacy. Principals engage teachers in professional learning and goal setting through PLCs,

observation, feedback, and coaching and thus are able to influence teachers' self-efficacy and sense of job satisfaction (Bambrick-Santoyo, 2012; Bogler, 2001).

In addition to systems focused on student-learning data and collaborative work in PLCs, another system aimed at professional learning and increasing teachers' self-efficacy involves observing and coaching teachers. Bambrick-Santoyo (2012) noted that even if school principals and instructional leaders observed every teacher in their school for 15 minutes a week, they would observe only a percentage of the week's teaching and learning time. This is the rationale for carefully monitoring, analyzing, and acting on student-learning data. However, teachers still need coaching to improve and develop their practices. Conroy et al. (2019) found a connection between professional development and teachers' sense of self-efficacy. Marzano (2011) found effective supervision involves supporting teachers in improving their practices. Marzano noted that in major metropolitan areas, the average veteran teacher is observed only once every two years, and new teachers receive only two observations per year. Grissom et al. (2013) found that the instructional time principals spent on coaching teachers was associated with greater student achievement, especially in math. In fact, teachers who received frequent, weekly observations and feedback could develop as much in one year as other teachers developed over the course of their entire careers (Bambrick-Santoyo, 2012).

Bambrick-Santoyo (2012) recommended building an observation and feedback system, including a calendar to ensure all teachers receive observations and feedback weekly. In addition, the system should track the feedback teachers receive and determine whether that feedback has improved teaching. Most important, effective observation should not be evaluative and judgmental but rather should focus on effective coaching to improve student

learning. Marzano (2017) described coaching as critical to helping teachers advance in their pedagogical skills. Grissom et al. (2013) found that the most positive effect of teacher coaching and professional development involved focusing conversations on instructional content. To make transformational improvements in teaching, and ultimately in student learning, observation followed by coaching should be a foundational piece of the data-informed instruction system (Bambrick-Santoyo, 2012). Ultimately, student learning is the focus. Looking carefully at student-learning data and classroom observation data could help instructional leaders and teachers make informed instructional decisions consistent with research-based instructional strategies and practices.

Bambrick-Santoyo (2012) studied coaching and feedback systems and noted the importance of administrators and instructional coaches using a structured feedback protocol to provide immediate feedback to teachers after classroom observations. The effective feedback protocol involves praising desired practices and using probing questions to help the teacher identify problems and action steps (Bambrick-Santoyo, 2012). The conversations conclude with the teacher and coach agreeing on future action, planning, practice, and a timeline for completion. Several key components comprise successful observation and feedback. In addition to creating a strategic, needs-based schedule for observations and feedback meetings, school leaders and coaches must help teachers identify two to three specific action steps for improvement while providing support and direct accountability about how and when these steps will be taken in class (Bambrick-Santoyo, 2012). Neumerski et al. (2018) found that principals who spend more time as instructional leaders tended to give teachers specific and formative feedback from observations, allowing them to work with teachers to pinpoint next steps for professional improvement. Creating a system dedicated to

professional development and improvement through coaching and collaboration develops a culture focused on the idea that quality instruction does not occur naturally but is created through education, practice, and the intentional development of teachers' talents.

The notion that organizations such as schools or school districts can learn from themselves and others leads to the idea that organizations can be transformed and self-corrected. Gustavsen (1993) described the idea of organizational life as an "internal public sphere" in which dialogue is essential to organizations' ability to learn (p. 1361). Dewey (1938) wrote of the importance of individuals' experience in education and recommended basing principles of education on personal experiences. This approach is true for both students and educators. However, isolated experiences of educators alone are not enough to improve schools and increase student achievement. Only through a collective learning approach will teams of educators and faculty transform their schools and organizations (Gustavsen, 2008).

Being consistent and intentional about coaching and feedback can affect teachers' self-efficacy and give them more confidence in their practices (Leithwood et al., 1995; Louis, 2007). The collective work of teachers and school leaders in PLCs can lead to improved self-efficacy, increased professional learning, and improved practices (Gray et al., 2016). School leaders can support and coach teachers as they implement new instructional practices through consistent observations and feedback. When teachers and school leaders operate collaboratively in PLCs, they can increase trust and confidence in implementing new learning and practices (Bogler, 2001; Louis, 2007).

Conclusion

A review of the research shows that collaborative data use in school is an effective way to assess what students are or are not learning so teachers and educators can make necessary adjustments and decisions. Many ways exist for teachers to collect and analyze information about student learning collaboratively. Once teachers are able to collect data and information about student learning, best practices and protocols exist for using this information to improve student learning. The development of problem-solving teams allows teachers and educators to form PLCs focused on ensuring that every student learns at high levels and has access to quality intervention or enrichment based on their needs.

The research that makes up organizational learning theory supports the idea that teachers and educators are more likely to work successfully toward reaching goals when they work collaboratively and assume collective responsibility for student learning. And despite the complicated, sophisticated nature of this work, with appropriate levels of support and feedback, teachers can grow professionally, increase their self-confidence, and improve learning outcomes for students. Schools implementing PLCs successfully tend to operate with enabling school structures, collegial trust, an emphasis on learning, collective responsibility, and reflective dialogue (Bryk, Camburn & Louis, 1999); Gray et al., 2016). At the individual level, teachers and school leaders engaging in PLCs are able to build trust, gain confidence, engage in professional learning, learn new instructional practices, and collectively focus on the needs of learners (Gray et al., 2016).

In what follows, I detail the design of the study as well as the context and setting of the school where the study took place. Using the lens of action research with problem solving

and school improvement as the goal, this project was a single case study of PLCs and collaborative data use among teachers at an elementary school.

CHAPTER 3 – PROJECT DESCRIPTION

As part of existing school improvement efforts, the campus leadership team at Southwest Texas Elementary was already engaged in four foundational systems to guide the decision making, behavior, and time management of administrators, teachers, and staff throughout the school year. At the time of this study, the four systems comprised data-informed instruction; observation, coaching, and feedback; professional learning communities (PLCs); and response to intervention (RtI). The purpose of this study was to examine the functioning of PLC teams at the campus with regard to several questions: How and to what degree did teachers focus collaborative data use on student learning? How did teachers engage or resist collective inquiry? Did teachers possess the professional knowledge and skills to use data effectively?

Purpose and Guiding Questions

The primary reason for conducting this study involved questions about the knowledge and skills that teachers need to engage successfully in research-based PLC best practices—specifically, using multiple sources of data to reflect, analyze, and adjust. As previously referenced, teachers’ sense of self-efficacy is an important factor in student achievement (Skaalvik & Skaalvik, 2007). Teachers’ perceptions of their current PLC practices are important evidence and data for school leaders and decision makers. Effective PLCs and data-use capacity among teachers are important contributing factors for student achievement, teacher efficacy, and school improvement (DuFour, 2006). In addition, the action-research method was a way to engage in inquiry and data collection while modeling for teachers a collaborative problem-solving process encouraging data use and improved data capacity (Herr & Anderson, 2005). Improving teachers’ capacity to use data to identify problems and

improve instruction and learning could enhance instructor effectiveness, leading to increased student learning and achievement.

The study focused on three guiding questions related to collaborative data use in schools:

1. What did teachers think about using data in PLC experiences to inform their instructional practices and increase student learning?
2. How did teachers describe their level of expertise regarding data-use knowledge and skills?
3. How could school principals know that teachers possessed the confidence and self-efficacy to apply data-use strategies effectively in their daily work?

Research Design

Case Study

The design of this study was a case-study approach (Yin, 2009) informed by the tenets and principles of action research. The study followed educators engaged in PLCs and data use in schools and explored their perceptions and interpretations of this experience. I studied the teachers' perceptions of PLC meetings and activities in an attempt to compare that experience to research-based qualities of effective PLCs. I attempted to capture how teachers felt about their participation in PLCs, as well as what they thought would lead to student achievement and what they thought was unproductive.

In addition, I used action-research principles to examine the data and information collected and made informed decisions about next steps and problem solving. The study focused specifically on what teachers valued and did not value about the PLCs at their school. Although the findings of this study may not be generalizable beyond the scope of the

PLCs of this particular school, the study provides valuable insight into the perceptions of particular teachers who regularly engaged in PLC meetings at their school and who have used those opportunities for embedded professional development, data analysis, lesson designs, and problem solving. I synthesized survey results, focus group responses, and observation summaries to take an in-depth look at the perceptions and interpretations of teachers regularly engaged in PLCs with norms and expectations based on research and best practice. Case-study design allowed me to examine this particular case to see if teachers' values about qualities of effective PLCs were consistent with the literature. This case study was not an attempt to prove or disprove best-practice qualities and norms of PLCs but rather facilitated a closer look at what this group of teachers found valuable and useful about regularly engaging in PLC meetings and using data in school as participants of this particular phenomenon. The rationale for investigating this group of teachers was to determine if their perceptions about PLCs coincided with research-based standards.

Action Research for School Improvement

In the pursuit of school improvement, action research emerges as a way for teachers and administrators to become participants in the research process and to take ownership in the critical reflection inherent in quality action research. Action research originates from the work of Kurt Lewin, who believed that knowledge should be created from problem solving in real-life situations (Lewin, 1946, as cited in Herr & Anderson, 2015). Lewin's work led to the idea that work teams could become site-based management teams focused on continuous organizational learning (Argyris & Schön, 1978). This thinking exists in education today as educational leaders seek to empower teachers and staff to solve problems as insider researchers and experts in the work setting (Herr & Anderson, 2015). Thus, the practitioner

action researcher is at the center of the inquiry and understands the problems of the organization and the perceived need for change.

Herr and Anderson (2015) distinguished practitioner action research from participatory research in terms of positionality. The practitioner action research approach places the insider at the center of the research but risks leaving out other important stakeholders and diminishes collaboration (Herr & Anderson, 2015). For the purpose of examining the perceptions of teachers about PLCs at a school, the practitioner approach makes sense because the roles of the practitioners in PLC already exist, and collaboration is a principle valued by successful teachers and required by many schools and districts (Wayman et al., 2012). The challenge for practitioner action researchers is to question the status quo of their practices collaboratively and critically without inadvertently failing to recognize problematic practices resulting from the group's own problem solving (Argyris et al., 1985; Robinson, 1993). Given this challenge of practitioner action research, it is important for those involved, especially the person leading the research study, to consider positionality, to encourage collaboration, and to respect the critical and reflective notions of teacher-researchers.

Positionality is important in asking how the researcher relates to the participants and setting. For example, Herr and Anderson (2015) described the role of insider as one of collaborating with other insiders in an attempt to improve practice and transform the organization. Herr and Anderson cautioned action researchers that forming collaborative teams to improve practice could exclude other important stakeholders from the process. This caution was something I considered when designing the study and reporting the limitations of the findings. In addition, Herr and Anderson (2015) detailed the relationships insiders have

with one another and explained the possibility that the teams or groups might not be authentic or responsive to the conservatism inherent in action research.

Schön (1983) defined the degradation of the critical spirit of action research as *dynamic conservatism* wherein practitioners are pulled back to the status quo. Inquiry groups in action research should not exist to push a bureaucratic agenda or enforce central office mandates involving PLCs and data use among teacher teams (Schon, 1983). Brydon-Miller and Maguire (2009) discussed the extent to which conventional forms of research tend to support the status quo and benefit the powerful by rendering these systems invisible. Brydon-Miller and Maguire contended that by including “insiders” in the research and action, participation and engagement of teachers and school administrators in the decision-making process fosters equitable and empowering educational reform. Thus, action researchers should understand and mitigate these confounding factors and stay committed to the spirit of critical inquiry and collaboration.

Although more traditional, positivist research methods have their place in many fields, including education, for the practitioner engaged in transformational leadership or struggling with issues of social equity, action research has many merits. Related to what Friere (1970) described as *generative themes*, the process of learning through participation is essential in finding solutions to problems. Educating children is not like maximizing productivity in a factory. Transforming an underperforming school does not resemble quality or statistical control in a business. Eliminating inequity, especially in a school district in which inequity has been the norm, cannot be accomplished by outsiders (Brydon-Miller & Maguire, 2009). However, practitioners might be too immersed in their work to care about writing up the design, findings, and conclusions of their work. Herr and Anderson (2015)

explained that compared to those who work in the academy, practitioners often do not have the leisure to write research reports. Action research offers practitioners an opportunity to be more technical in their approach to solving problems, more reflective in their response to phenomena, and more collaborative and inclusive in their efforts toward critical reflection. Further, action research not only offers educators an opportunity to discover local knowledge that can contribute to school improvement but also offers opportunities to contribute to knowledge bases that may assist other schools and districts to approach similar problems in similar ways.

Positionality

As the principal of the school where the study took place, I was in a unique position to examine current data use and PLC practices among grade-level teacher teams. I attended and participated in weekly grade-level PLC meetings with members of the campus leadership team, including the assistant principal and the instructional support specialists. I wanted our school to function as a PLC so every student could learn and achieve at grade level or above. I wanted every teacher to grow professionally and engage in adaptive, collaborative work. I did not want my presence and role in PLC team meetings to result in a mandated climate in which teachers felt compelled to engage in certain behaviors because of directive or utilitarian goals (Herr & Anderson, 2015). I wanted teachers to engage in authentic, data-informed problem solving and collective inquiry.

Ultimately, I wanted teachers to lead their own team meetings and engage using best practices for PLCs and collaborative data use. At the time of the study, some teams were more autonomous than were others, and the professional knowledge and skills for doing this work varied from teacher to teacher. Having knowledge of the teachers and existing practices

was an advantage regarding my goals as a leader to improve the systems and practices at our school, but my knowledge complicated the study. I was not able to get full participation of the entire teacher faculty. Further, because I conducted the interviews and focus group and observed in PLC meetings, my presence likely altered the data collection process.

As an insider in collaboration with other insiders, I know my positionality affected the setting of the study (Herr & Anderson, 2015). In addition, because I was the principal and supervisor of the people in the study, there was an inherent power imbalance. To mitigate this, I used specific protocols and a structured data-collection process standard in case-study research (Yin, 2009). This approach allowed me to minimize bias—thus, I relied on data collected through these processes and in my analysis and discussion of findings.

Study Context

General Context

The proposed study was conducted in a medium-sized public-school district covering approximately 52 square miles with nearly 16,000 students and 1,200 teachers. At the time of the study, 61% of students in the district were considered economically disadvantaged. The district had two traditional high schools, two specialized high schools, one discipline-alternative school, two ninth-grade campuses, three middle schools, four intermediate schools, and 10 elementary schools. All but two of the elementary schools received Title funding. The district department of curriculum and instruction and the district center for teaching and learning encouraged teachers to engage in PLC meetings regularly, and there were recommended PLC expectations and norms. These expectations and norms resembled best-practice PLC qualities recommended by DuFour (2012), Schmoker and Marzano (1999), and Senge (1990).

Campus Context

At the time of this study, the school provided a traditional elementary education for all students, with some special programs available. Southwest Texas Elementary was a school-of-choice academy for science, technology, engineering, art, and math (STEAM). This new academy served all students in pre-kindergarten through fifth grade, and all students attended an innovative art class and piano lab weekly as part of their “specials” rotation classes. The emphasis on art, creativity, and project-based learning was an integral component of the STEAM Academy mission and vision. All teachers received specific training to implement the STEAM curriculum. Most of the students in STEAM lived within the school’s zone. Parents of students attending the STEAM Academy but living outside the school’s zone had applied prior to the school year, and a lottery system generated the seated and waiting lists. In addition to STEAM, the school implemented a new system called AVID to promote organization, provide college and career readiness, and offer engaging instructional activities. AVID was a school-wide system benefiting all teachers and students. For the 2019–2020 school year, all students participated in AVID and STEAM Academy curricula and instruction.

The leadership team implemented four school-wide processes designed to improve student achievement and school improvement: data-informed instruction, observation and feedback, PLCs, and RtIs. The next sections detail the school processes associated with this study. These were current instructional leadership processes implemented at the school and occurring interdependently with data use and PLC processes. Detailing these systems is necessary for describing the context of PLCs and collaborative data use that existed in the school at the time of the study.

Data-Driven Instruction

Using Bambrick-Santoyo's (2010, 2012) Leverage Leadership and Driven by Data approaches, the campus leadership team and I implemented a process for ensuring data-informed instruction and decision making involving implementation of a viable curricula. The process contained an effective lesson design and delivery process and an aligned formative assessment system for facilitating consistent student-progress monitoring. Data-informed instruction allowed the teachers and I to monitor the progress of all students throughout the year. In addition, the system allowed the assistant principal and I to monitor teachers' behaviors and instructional approaches. Specifically, the data-driven instructional model provided campus instructional leaders and I with information about how teachers were planning and delivering instruction and what students were or were not learning.

Bambrick-Santoyo (2012) asserted that it is impossible for principals and instructional leaders to see everything that happens in all classrooms throughout the year regardless of their dedication to a rigid observation and feedback system. Consistently assessing student learning and student understanding, as well as using well-designed and aligned formative assessments, allowed the teachers and instructional leaders to monitor student progress throughout the year. During this process, teachers were able to identify and respond to learning gaps. In addition, instructional leaders were able to identify and respond to teachers' instructional gaps (Anderson and Wallin, 2018).

Applying data analysis and data-informed instruction requires teachers and instructional leaders to understand data use in schools (Cosner, 2014). For this study, the campus leadership team and I implemented professional learning and development for teachers based on applied learning so teachers could generate content and put it into practice

themselves. The data-driven instructional system involved the breakdown of curricular content into units of study. At the end of each unit of study, students completed formative assessments aligned to the state standard, the Texas Essential Knowledge and Skills and Student Expectations (TEKS/SEs). In addition, students took two types of district-mandated, standardized practice tests, the Common Formative Assessments (CFAs) and the Benchmarks test. Students took two CFAs and one Benchmark in the fall and one CFA and one Benchmark in the spring before taking the summative state test, the State of Texas Assessment of Academic Readiness (STAAR). Curricular units of study addressed the assessments, and teachers and instructional leaders engaged in planning, designing, monitoring, and adjusting. Lesson design and delivery was an essential component of these unit cycles. Teachers used a specific lesson agenda to plan the topic, objective, and clearly defined learning outcome for each lesson. At the end of each unit, after students had completed the assessments, teachers and instructional leaders analyzed the results of the tests and evaluated current instructional practices. Evaluating the assessment data allowed teachers to adjust their lesson designs and anticipate student misunderstandings.

In addition, the teachers and I completed a data-reflection guide encouraging further analysis of the assessment data. I conducted data-analysis meetings with each teacher the week after the assessment to assess student performance and determine the questions and standards they had mastered or not mastered. In the data-analysis meetings, the teachers and I reflected on questions that students had not answered correctly, seeking to anticipate possible misunderstandings. Next, the teachers and I categorized the types of student errors and developed a plan for spiral reviews, re-teaching, and intervention with timelines to ensure that instruction was delivered and students demonstrated understanding of concepts they did

not master on the assessment. The campus leadership team and I monitored student progress in every classroom in every grade level.

Observation and Feedback

Using the Leverage Leadership approach (Bambrick-Santoyo, 2012), the campus leadership team and I implemented an observation and feedback process based on teachers' goals, emerging teachers' needs, assessment data, classroom observation data, and T-TESS dimensions. The most important aspects of this system were coaching and feedback. Teachers received ongoing coaching and feedback on their planning, instructional practices, and data use. Teachers improve professionally when they receive consistent coaching and feedback (Marzano et al., 2011). The purpose of feedback was not evaluative but constructive and focused on specific and observable teacher behaviors. As much as pedagogy and teacher efficacy are matters of personal experience for classroom teachers, campus instructional leaders and I were careful to remain objective and focused on what they heard teachers say and do. In addition, the instructional leaders and I remained committed to coaching and feedback, when appropriate and as much as possible, as a process of open dialogue with teachers. Thus, school leaders and I were able to develop positive relationships with teachers and provide relevant and supportive coaching.

The instructional leaders and I each committed to observing and providing feedback frequently every day and week. This process involved walk-through observations followed by a brief feedback and planning meeting within a minimum of two days of the observation. This plan ensured that every teacher received an observation with a follow-up conference every two weeks of the school year. This system required teachers to stay open-minded to the idea of professional growth and development. Coaching and feedback was individualized and

aimed at supporting teachers to reach their goals or helping teachers overcome emerging challenges and needs. In addition, the instructional leaders and I committed to improving our own professional growth as coaches and discussed, planned, and practiced our observation, coaching, and feedback skills regularly as a leadership team.

The observation and feedback system consisted of a color-coded spreadsheet that the leadership team and I used to track and monitor teachers' instructional goals and emerging needs. The color-coding system was based on teachers' professional development goals. The instructional leaders and I used this document to organize our walk-through plans into two-week intervals. Each member of the instructional leadership team selected teachers who would be their focus for observing and coaching for that two-week period. Each team member calendared their observations and feedback meetings using the same color-coding system so teachers received support in areas related to their initial professional goals or emerging needs. The leadership team and I met weekly to discuss our observations and coaching, practice coaching, and share instructional resources. To accomplish this goal, I created an individualized coaching library where the leadership team stored all instructional resources, articles, videos, artifacts, professional development training opportunities, and books so teachers could use and share these resources. In summary, the instructional leaders and I provided teachers with individualized and ongoing support based on their needs and choices. The instructional leaders and I continued in this process of systematically providing individualized coaching throughout the school year.

The coaching and feedback meetings were brief, specific to what was observed, focused on one instructional component, and aligned to the six steps of effective feedback protocol from *Leverage Leadership* (Bambrick-Santoyo, 2012). This coaching and feedback

protocol encouraged instructional leaders to praise and reinforce positive teacher behaviors and successes, ask probing questions about what was observed, ask differentiated questions to facilitate the identification of the problem, form an action plan, practice and plan ahead, and set a goal and timeline for follow-up. The individualized coaching library provided resources for instructional leaders and teachers to choose from as they worked together to develop and implement the action plan.

Instructional leaders and teachers focused on one planning, instructional, or classroom environment goal at a time. Once a teacher had set a goal, implemented the plan, and made progress toward the goal, the instructional leader and teacher moved on to a new goal or emerging need. For teachers who showed improvement and progress toward goals, instructional leaders continued to coach them toward new goals. The instructional leaders and I allowed teachers to take risks and try new methods in their classes as they refined their teaching. For teachers who did not make sufficient progress, instructional leaders implemented appropriate interventions, including offering simpler instructions and techniques. In addition, leaders implemented a more directive coaching approach, consisting of peer observations and learning walks, lesson modeling by me or one of the specialists, or allowing a master teacher or specialist to take over a class twice a week for six weeks so the teacher in need of assistance could observe and work closely with an expert.

Although teachers' planning, instruction, and reflection skills will likely improve through data-informed instruction, and although they will grow professionally through systematic observations and effective coaching and feedback, teachers learn best by engaging collaboratively in professional learning communities focused on student learning, data use, best practices, and continuous improvement (DuFour, 2006). When teachers embrace the

notion that their grade or content teams can move beyond the levels of basic planning and become transformative learning communities focused on a continuous cycle of inquiry and improvement, teams are able to work together to solve problems and ensure all students make progress and achieve (Cosner, 2014). Thus, professional learning communities are an essential school-improvement system because they focus on student learning and teachers' professional learning.

In this study, leadership team members, teachers, and I developed and operated as a collaborative professional learning community focused on data use, student learning, and continuous improvement. PLC meetings allowed teachers and instructional leaders to engage regularly in dialogue about the mission of the school, to discuss obstacles, to collaborate on ideas for overcoming obstacles, to develop systems for tracking progress, and to share a collective responsibility for successes and areas of improvement. Teachers and instructional leaders used a data-use problem-solving method to identify and define problems, design instructional approaches and interventions, implement and monitor progress, and assess and reflect on outcomes.

The Professional Learning Community (PLC)

In this study, members of PLCs within the cycle of inquiry continually asked four essential questions about student learning: What do we want students to learn? How will we teach them? What do we do when they learn? What do we do when they do not learn? Depending on where PLC teams were within the scope of curriculum units, teachers and instructional leaders focused on the elements of the continuous improvement cycle: design, teach, assess, share, reflect, evaluate, adjust, and inquire (Jimerson & McGhee, 2013). In addition to these conceptual modes, PLC members implemented a data-use protocol that

allowed them to use multiple sources of data to identify and define root causes of problems to facilitate effective problem-solving. Effective PLC practice required extensive and ongoing training for participants so the focus of meetings stayed aligned to the mission and vision of the school.

The leadership team and I scheduled weekly times for grade-level PLCs to meet uninterrupted. Instructional leaders and teachers worked together to establish norms, share responsibilities, create agendas, keep notes, track time, and ensure meetings were focused on the goals of the PLC. Depending on where they were in the unit cycle, PLC members worked to design lessons with clear learning goals, engaged in backward design practices to design lessons, reviewed student work to ensure alignment to learning standards, analyzed assessment data to adapt lessons, designed interventions, or created enrichment activities. The PLC meetings focused on the four questions of PLCs. The goal was for teacher teams to take ownership of their work in PLCs and set goals and plans for weekly meetings.

Response to Intervention (RtI)

During implementation of the data-informed instruction and PLC processes, teachers and instructional leaders discovered that some students were not learning despite adjustments to instruction or had not learned what they should have already known. For these students, the leadership team and I implemented a response to intervention (RtI) process to ensure that educational and behavioral goals were set. Specific, targeted interventions were created and implemented, and student progress was monitored. The RtI system allowed the teachers and campus leaders to identify students at risk for poor learning outcomes, develop learning goals, provide research-based instructional interventions, monitor progress toward goals, and adjust the intensity and nature of interventions based on student progress. The purpose of RtI

was to ensure that students in need of assistance beyond the scope of universal instruction received the assistance they needed. In this study, RtI was not a system for identifying or referring students for special services. When appropriate and necessary, teachers, educators, and parents made decisions about students potentially involving disabilities.

The educators involved in implementing the RtI system understood that the purpose of the system was not identification or labeling but assistance, intervention, and recouping of lost or unlearned skills and standards. The RtI committee consisted of the principal or assistant principal, the counselor, the teacher, a specialist, and, when necessary, parents or other educators. The committee was responsible for responding to concerns of the teacher or parents, looking at present levels of performance, formulating a plan of action with targeted goals, selecting research-based interventions to implement, and monitoring student progress toward goals. The RtI committee members met regularly to monitor the student's response to intervention until the student no longer needed additional assistance beyond general universal instruction.

The RtI system was a multi-tiered system that monitored every student academically, socially, and emotionally to ensure progress (Buffum et al., 2018). Tier 1 was considered universal instruction and support that all students received. Tier 2 and Tier 3 instruction was specialized instruction for students based on their needs and potential learning gaps. The campus leadership team and I developed a protocol for the RtI committee with roles and responsibilities of each member. This decision-making committee led the implementation of RtI. In addition, I developed a year-at-a-glance calendar with specific dates and deadlines throughout the year. Included on the calendar were the deadlines for teachers to administer the academic and behavior beginning-, middle-, and end-of-year universal screeners to all

students. The calendar illustrated timelines for monitoring progress and making decisions. The beginning-of-year screener identified students at risk of poor learning outcomes who had received Tier 1 instruction alone. These students were monitored closely for two weeks following the screener. After two weeks of receiving additional support and monitoring, students who still were not learning at desired levels began receiving Tier 2 instruction based on the decisions of the RtI committee. Tier 2 instruction or intervention consisted of at least 90 additional minutes per week beyond regular Tier 1 instruction so students could receive targeted intervention focused on mitigating learning gaps and recouping unlearned skills. After six to nine weeks of monitoring student progress, students who were still not responding favorably to interventions were placed into Tier 3 intervention groups. Tier 3 intervention consisted of 120 minutes beyond regular Tier 1 instruction per week. Again, students did not receive tiered instruction or placement into intervention groups without RtI committee decisions. In addition, the RtI committee set specific goals for students based on unlearned skills and concepts.

Procedure

For this study, I worked with the superintendent and deputy superintendent to gain permission to conduct research at Southwest Texas Elementary School with the grade-level teacher teams. Southwest Texas Elementary received Title I funding during the time of the study. The elementary school served students in pre-K through fifth grades. At the time of the study, Southwest Texas Elementary school fed into one middle school and one high school; thus, the teachers in this study over the course of several years served the same students and families. The school had roughly 60% of students who qualified as economically disadvantaged. The school had established professional learning communities

(PLCs) in all grade levels with established norms, schedules, administrative support, and values based on the vision and mission of the school. The PLCs at this school resembled the district ideal and other schools in the district based on DuFour's (2006) PLC principles: learning, collaboration, collective responsibility, and results. The school did not receive state accountability ratings because of the COVID-19 cancellation of STAAR testing. Further, because this was the first year of operation, Southwest Texas Elementary did not have previous years' accountability ratings.

In concert with the school systems previously described, I conducted a case study based on the tenets of action research. I invited 40 teachers to complete a survey, participate in a focus group, and participate in interviews. I observed and collected field notes during teacher team PLC meetings, analyzed the documentation and protocols used during PLC meetings, and maintained a reflective journal throughout the study. In addition to taking notes, I recorded and transcribed the focus groups and interviews. I used protocols, detailed in the appendices, to collect and record information.

Once data collection was completed, I relied on my guiding questions to orient my data analysis (Yin 2009). I used an explanation-building technique to analyze the data and pair information collected with my research questions to describe and explain teachers' perceptions about data use in PLCs (Yin 2009). I was interested in discovering teachers' thoughts about the work they were asked to do regarding collaborative data use and professional learning communities. In addition, I was interested in assessing the degree to which they possessed professional knowledge and skills (capacity) to do this work effectively.

Participants

Teachers at the school ranged in years of experience from new zero-year teachers to teachers with more than 20 years of experience. The most common (39%) range of years of experience was one to five years, but 30% of teachers had between six and 20 years of experience, with more than 15% possessing Master's degrees. District and school leaders required teachers at all grade levels to engage in regular PLC meetings. School expectations involved weekly grade-level PLCs with a principal-generated agenda and leadership from the assistant principal, instructional coaches, and teacher leaders. As the principal, I provided school-wide expectations for PLC meetings with agendas, meeting protocol, norms, student-achievement data, discipline and attendance data, guiding questions based on DuFour's (2006) approach to PLCs, and guidance from the district school improvement and curriculum and instruction departments. During the study, I continued to participate in the teacher team PLC meetings, but I mitigated my role by focusing data collection for the study on my three guiding questions and relying on case-study practices for collecting and analyzing data and information (Yin 2009). The primary expectation for PLCs involved student achievement, data-informed instruction, and school improvement.

In addition, teachers engaged periodically in other PLC groupings, including a STEAM PLC, AVID site team meetings, and longitudinal (content-oriented) PLCs. This was the first school year that PLCs were implemented according to these expectations because this was the school's first year of operation. However, many of the teachers and school leaders had participated in school-wide PLCs during previous school years. Teacher perception data from 2018–2019 indicated that some teachers in the school district struggled with differentiating between team planning time and PLC-time based on the research-based

best practices espoused by DuFour (2006), Hirsh (2009), Marzano (2007), Schmoker (2006), and others. Specifically, previous perception data showed that teachers valued planning time with grade-level team members above time spent reflecting on data, instructional practices, and the PLC process of problem solving and inquiry. Teachers' primary concern was finding value in PLCs as an opportunity to work collaboratively with peers to improve instruction and increase student learning rather than a perfunctory meeting that took time away from planning.

The participants in this study were teachers from all grade-level and content-specific PLCs at the school who wished to participate. I contacted the executive director of the school to discuss the study and explain procedures for keeping all data confidential. I sent out information to the teachers about the purpose of the study and the data-collection process. The teachers were made aware that their participation in the study was voluntary and that all information and data collected during the study would remain confidential. Teachers who wished to participate in the study completed and returned consent forms.

Sampling

I used purposeful sampling for this study because potential participants were required to be members of grade-level teacher team PLCs at Southwest Texas Elementary. Merriam and Tisdell (2016) described purposeful sampling as a sampling system "based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 96). For this study, I included teachers who engaged in PLCs and were willing to complete a survey and participate in a focus group. I conducted three teacher interviews and one focus group. I also observed teachers engaging in 10 different PLC meetings over the course of one school semester.

I did not randomly sample teachers at the school because all of the teachers were members of either grade-level or content-area PLCs and were therefore all potential participants in the study. I invited all teachers who engaged in team PLC meetings to participate, and I observed and collected data during 10 grade-level meetings. Teachers had the choice to participate in the survey, focus group, and interviews; thus, that part of the study was voluntary. I did not want to limit the study by randomly sampling and potentially missing insightful feedback.

Data Collection

The data collection process took place during the spring semester of 2020. First, I distributed an online survey to all teachers who agreed to participate in the study. Second, the survey contained an additional question asking for teachers who would be willing to participate in an interview or a focus group regarding PLCs at their school. Third, I conducted observations using an observation protocol focused on teachers' perceptions of the qualities and aspects of PLCs that they found effective as well as about research-based qualities of effective PLCs. I was a complete observer during the process of data collection.

Survey

I conducted a confidential online survey (Appendix A) to ask teachers Likert Scale and open-ended questions regarding their interpretations of qualities of effective PLCs. I drew on the *Survey of Data Use and Professional Learning* (Jimerson, 2016) to create the survey items and conduct the confidential online survey. I used Qualtrics to create and conduct the survey. I collected 28 responses from the survey and organized them into categories based on my guiding questions and the content of the responses. I coded the data based on patterns related to the purpose of the study and the research questions.

Focus Group

I asked teachers for permission to conduct a short focus group with consenting teachers before or after a PLC meeting. I asked the participants of the focus group to join me in an online Zoom meeting so we could conduct the focus group. The focus group protocol (Appendix B) concentrated on the research questions of the study and aligned with responses from the survey questions as well. Five teachers participated in the focus group. I recorded the focus group using the phone application Rev and recorded it on Zoom while taking field notes. Immediately after the focus groups, I used the Zoom transcription option to transcribe the responses so the information could be categorized and coded.

Observations

I used a specific observation protocol (Appendix C) to collect field notes and documentation during 10 PLC meetings related to researchers' suggested quality components of PLC meetings; teachers' responses were gathered from the survey questions and focus group sessions. The observations were conducted after the survey was administered and the focus group was completed. I recorded the sessions and took careful field notes using the protocol as a guide. Immediately after each observation, I used the field notes and recordings to draft a summary of the observation; thus, phrases, comments, actions, reactions, and other phenomena could be categorized and coded.

Documentation

I analyzed documentation used in the collaborative data-use processes, including data-reflection guides, PLC schedules and agendas, data boards, student data folders, and teacher data folders. I used a documentation protocol (Appendix D) to list, categorize, and summarize the documents examined.

Interviews

I conducted three in-depth interviews with different teachers from different grade level teams to gain individual insights into the research topic. I set up a Zoom meeting with each teacher to conduct the interviews virtually. I used the interview protocol (Appendix E) to guide the teachers in open-ended lines of inquiry about the topic. I addressed the following issues at the beginning of each interview: my motives and intentions for the interview, the protection of the respondent when my findings were shared, my assurance that I retained final say over the content of the study, and logistics regarding time, number of questions, and probing questions. I recorded the interviews with Rev, an application on my phone, and took detailed notes. In addition, I recorded the Zoom meetings and used the Zoom transcription option to transcribe the interviews.

Reflective Journal

Finally, I maintained a journal of my own reflections and questions, so I could capture my own perceptions and reactions during or soon after observations and interactions with teachers at PLC meetings.

Data Analysis

Once the data were collected from all the sources, I sorted answers, comments, responses, and other information into categories based on the guiding questions of the study. Miles and Huberman (1984) described a process of reducing the data by selecting, focusing, and simplifying findings into themes and categories. I looked for patterns to emerge from the data involving particular practices or PLC agenda items that teachers valued. Specifically, I sought patterns involving the way teachers described their data-use experiences and assessed similarities or differences in these descriptions. I used codes from the survey responses to

look for patterns in descriptions of data use, including what teachers found valuable or ineffective. In addition, I used codes from observation notes and summaries to look for similarities and differences among the descriptions of teachers and the phenomenon of collaborative data use.

I used descriptive field notes to qualify the teachers' experiences in PLC meetings when they were discussing student data so I could compare that experience to literature on qualities of effective PLCs and data use in schools. I used codes from the focus group transcriptions to compare the teachers' responses during the focus group discussion.

Comparing descriptions and adopting a coding scheme to indicate value and uselessness allowed me to compare teachers' perceptions and interpretations of data use to researchers' perceptions of qualities of effective data use. I relied on the theoretical propositions related to my guiding questions and review of the literature (Yin, 2009). Finally, to address the guiding questions, I used a pattern-matching technique to discover common words and phrases in the survey responses, interviews, and the focus group, which I used to build an explanation about the case based on the data collected (Yin, 2009).

Assumptions and Limitations

The main limitation of this study involved the argument that case studies and action research are bounded by the situation, participants, and context of the setting. However, Fenstermacher (1994) noted that action research has less to do with naturalistic inquiry and more to do with gaining practical knowledge from reflecting on action and experience. Yin (2009) admitted that case-study research might lack rigor compared to more traditional experimental forms of research. Nevertheless, although action research involves insiders' participation in the research process, there is more to action research than just the right place,

right time phenomenon (Fenstermacher, 1994). Combined with a “well thought-out” philosophy, reflecting on experience to develop courses of action means experience is a “powerful educative principle” (Dewey, 1938, p. 72). Action research may not have the same external validity as other more traditional forms of research; however, schools and similar organizations share similar problems and challenges. What works in one setting might not transfer to another, but schools and school districts would be remiss in ignoring the successes, failures, experience, and knowledge gained from one another. Merriam and Tisdell (2016) described the dichotomy between reliability and validity in a qualitative research study. Although the reliability of this study may not depend on results that can be replicated, I strove to design and conduct a study in which findings accurately matched the reality that existed among teachers conducting data-driven instructional practices in the context of the school examined.

Similarly, critics of action research who have claimed it is a less legitimate methodology have argued that action researchers imply they have a privileged access to truth as practitioners and insiders. For example, Carter et al. (2014) asserted that practitioners’ descriptions and interpretations of their settings are not reality but an insiders’ version of reality. In terms of Dewey’s (1938) explanation about experience, the version I present of the reality and the stories of the people involved in the work are as powerful and useful than anything else resembling the truth. Traditional researchers do not possess the power to find the truth in complicated organizational settings any more than in the people involved. As Herr and Anderson (2015) discussed, this challenge highlights the importance of having insiders and outsiders on action research teams. As a review of the literature on organizational learning shows, practitioners and insiders are often in a better position to

become the experts in their field, poised to employ research strategies collaboratively to address challenges and solve problems (Brydon-Miller & Maguire, 2009).

Similarly, critics of case-study research have argued that it is difficult and time consuming to prepare and conduct a proficient case study; the skills necessary to do so are currently difficult to define formally (Yin, 2009). To mitigate some of these concerns, I designed and conducted a single-case study focused on one school, and I employed the following case-study standards: asking good questions, being a good listener, being flexible, thoroughly understanding the issue, and avoiding bias (Yin, 2009).

Although this study presents a credible description of how a particular group of teachers perceived PLCs as part of their professional practice, the case-study conclusions cannot be transferred to other situations. The study yielded conclusions that fostered a comparison of certain teachers' experiences with PLCs, data use, and research-based notions on quality PLCs; however, these conclusions cannot be generalized beyond this particular case. Nevertheless, the study provides a good example for educational leaders who are interested in learning how their teachers' feelings about PLC meetings may or may not coincide with accepted PLC standards. In addition, the findings provided insight into how much the teachers at the school knew about using data to inform instruction. Despite this limitation, the study did provide a starting place for a larger examination of teachers' experiences using data in PLCs to determine whether the most important members of learning communities in schools are aligned with research-based best practices.

Trustworthiness and Credibility

I employed qualitative research strategies to ensure the study was conducted rigorously so that findings and conclusions are valuable. I used five different data collection

methods: an open-ended survey, a focus group, three interviews, analysis of protocols, and observations of PLC meetings to ensure that information collected and analyzed was triangulated from different aspects of the teachers' experiences (Merriam & Tisdell, 2016; Yin, 2009). The survey allowed teachers to express their opinions privately and confidentially. The focus group was more conversational, allowing teachers to brainstorm ideas collectively. The interviews provided individual insights. The observations showed teachers in action, giving me rich descriptions of what they were doing and saying during PLC and data-use experiences. The analysis of data use and PLC protocols allowed me to examine the systems in place at the school and to observe how teachers and administrators interacted with data and operated during PLCs (Yin, 2009).

In addition, I allowed adequate time to collect data. Once the surveys were completed, I conducted one focus group with five participants in an attempt to reach saturation of common themes based on the guiding questions of the study. In addition, I conducted three interviews with three different teachers from different grade levels to gain insight into different perspectives. I also conducted 10 observations to conceptualize the experience of these particular teachers in their PLC meetings.

Action Approach

After reviewing teachers' perception data and working collaboratively with the teacher teams, I developed a course of action for PLC improvement, guided by current best practices of PLCs and professional development detailed in the review of literature and in ongoing research and review. Herr and Anderson (2015) described action research as a series of cycles of actions that community or organization members engage in to collect and analyze evidence and then take actions to solve problematic situations. I used information

from this case study to improve and refine the school processes described in the context section. I discuss those action steps in Chapter 5. In addition to the information ascertained from this study about teachers' perceptions of PLCs, data use, and self-efficacy, I continue to search for solutions to school problems and continue to refine our practice of collaborative problem solving. Schön (1983) asserted that the reflective practitioner uses gained knowledge and experience as the most valuable form of professional learning and development, even beyond what can be learned from more traditional forms of research in education. Based on themes that emerged from the findings in this study, I was able to develop action steps collaboratively for data use and PLC improvement.

Summary

In summary, the purpose of this study was to examine the perceptions of grade-level teams of teachers from an elementary school in a nearby suburban district about data use in PLCs as part of their regular professional practice. I sought to discover how they described data use in PLCs, determine what they found useful and ineffective, and assess how these notions corresponded with accepted practices of quality PLCs. The study was a case study with tenets of action research focused on a particular phenomenon in one school. The study yielded insight into the experiences, perceptions, and interpretations of teachers regarding data use in professional learning communities to solve educational problems.

CHAPTER 4 - FINDINGS

The purpose of this chapter is to present the data and findings of the study regarding collaborative data use and teachers' professional learning community (PLC) experiences in an elementary school. During the study, I collected quantitative data using a teacher survey with Likert-scale questions involving collaborative data use. In addition, I collected qualitative data using open-ended survey questions, three teacher interviews, a focus group, observations of teacher meetings, and analysis of teachers' PLC protocols and documents. I received 28 responses to the teacher survey, interviewed three teachers, conducted one focus group with five teachers, observed 10 PLC meetings, and analyzed a variety of PLC artifacts, including agenda planning guides, meeting norms and expectations, data reflection guides, and action plans.

This study focused on the perceptions of teachers working collaboratively in professional learning communities. The data in this chapter, both quantitative and qualitative, are grouped according to three research questions:

1. What do teachers think about using data during PLC experiences to inform their instructional practices and increase student learning?
2. How do teachers describe their level of expertise regarding data-use knowledge and skills?
3. How can school principals know that teachers possess the confidence and self-efficacy to apply data-use strategies effectively in their daily work?

Research Question 1: Data Use During PLC Experiences

Data use during PLC experiences centers on how teachers used multiple forms of data to make instructional decisions and inform and adjust their practices. Qualitative and

quantitative data were collected through surveys, interviews, observations, and analysis of PLC artifacts. The findings show that the teachers in the study used data to inform their decisions; valued the use of data in planning and informing practices; valued the practice of using multiple forms of data; valued the practice of using authentic, formative forms of data; found collaborative data use helpful; and were comfortable collaborating with colleagues during PLC and team meetings. The findings further indicate that teachers found time and curricular restraints to be the major barriers to effective data use.

Data Use in PLCs

The teachers at the elementary school examined in this study used data consistently during PLC meetings to make collaborative instructional decisions, discuss intervention strategies, discuss student progress, and plan for future lessons. Some form of data was used or discussed in all 10 PLC meetings observed in this study. Findings from the survey questions about data use were consistent with the observations of data use in PLC and collaborative meetings. Table 2 indicates that more than 75% of teachers agreed somewhat or agreed strongly that they were comfortable collaborating with colleagues about data. In addition, nearly 90% of teachers indicated that data use helped them make informed decisions. Only three teachers indicated that they were not comfortable collaborating with colleagues on data use, and only one teacher did not think data use helped with making informed decisions.

Table 2

Results of the Teacher Survey

Question	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Total

I am comfortable collaborating around data with colleagues.	17 60.71%	7 25%	1 3.57%	2 7.14%	1 3.57%	28
Data use helps me make informed decisions.	21 75%	5 17.86%	1 3.57%	0 0%	1 3.57%	28

The findings indicated that the teachers in the study had favorable perceptions of engaging in collaborative data use to make decisions about their teaching practices. Responding to an open-ended survey question, one teacher noted using data to monitor progress and adjust instruction: “I use data to monitor student progress. Their progress, or lack of, tells me if I need to try a different strategy or change the way I am delivering information.” Another teacher from the focus group used data, specifically certain forms of achievement data, to solve problems or address concerns:

Specifically, when we prepare for STAAR and just using data that we get back from the previous year and maybe our Benchmark, and we target things where kids are struggling and make a plan to move forward.

In an interview, a teacher reported using data to identify the levels of student learning; however, students were interested in data and wanted to understand their own strengths and weaknesses. The teacher noted, “So, it really helps me to kind of focus my attention on where we need intervention, but it also trains the kids to know what their weaknesses are and what they need to work on, because we have those conversations.” Throughout the focus group, the participants were able to articulate a variety of examples of teachers and PLC teams using data individually and collaboratively to inform decisions and solve problems regardless of their grade level or role at the school:

I know for me as a SPED teacher, IEP progress monitoring, we do that regularly, daily and kind of focus on one subject for my Life Skills class per day, what's appropriate for him cognitively to have that focus and I know I use it to just see him, see their growth and modify my activities in ways I approach working with them. Based on the findings from observing PLC meetings, the survey, interviews, and the focus group, the teachers in this study generally had positive perceptions about using data to solve problems, inform instruction, and plan future lessons and activities.

Value of Data Use

Most of the teachers in the study valued using data and believed that data use is beneficial for student improvement and achievement as well as important for improving their own teaching practices. One teacher specifically articulated the importance of using data at school to improve achievement scores: "Well, I think it's important to use data at school, especially if you're wanting to improve test scores, because you have to figure out where to focus your efforts." Several responses in the survey indicated teachers found data use helpful and beneficial in improving and tracking student progress: "Data drives my instruction and keeps me focused on what topics to target when teaching. What makes data useful is to know what students know or don't know in order to teach and reteach skills for mastery."

Table 3 shows the teachers in the study appreciated the benefits of using data in their practice. More than 96% of participants either agreed somewhat or agreed strongly that data use benefits educators and students. Only one participant strongly disagreed. In addition, more than 92% of participants either agreed somewhat or agreed strongly that using data helped them be better teachers or educators. Only one participant strongly disagreed.

Table 3*Benefits of Data-Use Practices*

Question	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Total
Data use benefits educators and students.	22 78.57%	5 17.86%	0 0%	0 0%	1 3.57%	28
Using data helps me be a better teacher.	22 78.57%	4 14.29%	1 3.57%	0 0%	1 3.57%	28

Most teachers valued data and believed data were beneficial for themselves and their students. In addition, teachers said using data helped them to become better educators and improve their practice, which in turn increased student learning:

Well, data definitely drives my instructional choices. I don't think I would be an impactful and really the best teacher that I could be for my students if I didn't know where they were. And so, I use data to get a baseline and then to track their progress throughout the year.

In addition, the teachers in the study considered data use of value in collaborative meetings and PLCs. In all 10 PLC observations (Appendix D), teachers had conversations about student learning and discussed evidence of learning, or not learning, in terms of various student-achievement data, including teacher assessments, district common assessments, benchmark assessments, universal screeners, reading benchmark assessments, and end-of-year summative assessments. Teachers tended to spend significant time in conversations regarding student learning and achievement. In documenting PLC observations, I found that teachers spent from 10 to 30 minutes discussing some form of learning or achievement data during their 60-minute PLC meetings. In addition, an analysis of protocols (Appendix E)

used by teachers and school leaders during PLC meetings indicated that the participants valued documenting and monitoring student learning and achievement. Teachers were required to log and document assessment data in data reflection guides after every district common formative assessment and benchmark assessment. Further, teachers logged assessment data after reading benchmark assessments and monthly computerized reading assessments. Finally, the campus lead team maintained and regularly updated a digital data board with various achievement data points for every student in every grade level.

In addition to valuing student achievement data, the teachers in the study indicated they valued data and information that helped them learn more about student interests and personalities so they could form better relationships. One teacher expressed this in an interview:

But I do think there's all different kinds of data. I think we don't need to be so hyper focused on just, you know, testing data. We also need to be collecting data on the kids, their lives, and what motivates them. I mean, sometimes there's also the data you get on their learning styles. There are surveys and things that you can do with the kids so that you can differentiate your instruction better.

In observing teachers during PLCs, conversations and discussions about students generally tended toward discussion of the whole child and not just learning and achievement scores. In all 10 PLC meetings observed, teachers had conversations about students' social emotional needs, interests, home and health concerns, personalities, or some other information beyond academic learning and achievement. In one interview, the teacher indicated the importance and value of data points beyond academic standards: "Because I don't think the TEKS are the only thing we need to take data on. I think it's also the child,

the whole child. So, I think there are ways to collect that data.” Based on multiple comments in interviews and during PLC meetings and on the findings in the survey, I found the teachers in the study valued data use and accepted the importance of using data to make decisions and improve their practice.

Multiple Forms of Data Use

The teachers in the study understood the importance of using multiple forms of data and described these forms and how they could be used. One example of data use during these observations involved teachers looking at formative data sources such as classroom checks for understanding and other formative assessments. Teachers tended to value this type of data use and engaged in discussions about student learning based on responses to quick-checks, classroom assignments, and questions and responses. In response to an open-ended survey question, teachers repeatedly mentioned the importance of using multiple forms of data to inform or adjust instruction.

In response to the survey question regarding multiple forms of data states, one teacher said, “I use data from formative assessments, anecdotal observations, and checks for understanding all to assess whether my students have a conceptual understanding of the material or not.” In all three interviews, teachers spoke of their preference for using organic, formative forms of data and information to determine what their students were learning and at what level. When asked to provide an example of effective data collection, one teacher described preferring to collect data from students in class through questioning and probing rather than relying on a standardized or computerized test:

So, the data was generated from their results of this online test that they did from listening and clicking versus something that I could have them do right in front of me

and watch them do it and how they do it. The data is going to be gathered a little bit differently. So, I have a more personal view on things when they're doing it right there in front of me versus when they are listening to somebody else say it and clicking through things because I can see, like, what misconceptions they might have. This quote provides insight into how this teacher preferred to collect data from students in class through listening, observing and questioning rather than relying entirely on more standardized or computerized forms of assessments.

In addition, information from the Likert-scale questions indicated that teachers understood the value of using multiple forms of data. Table 4 shows that more than 90% of teachers used a variety of data to inform practices, with fewer than 10% disagreeing or strongly disagreeing.

Table 4

Multiple Forms of Data

Question	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Total
I use a variety of data to inform my teaching and/or daily practices.	17 60.71%	9 32.15%	0 0%	1 3.57%	1 3.57%	28

During one interview, a teacher expanded on the idea of using a variety of data to inform teaching and planning. The teacher explained the importance of using standardized tests but not relying on them exclusively to inform decisions:

If a student is doing an electronic test like IREADY at the beginning of the year, they took the test with all of these different types of questions and then it formulated data

for us based on what standards they were missing. So, the data was generated from their results of this online test.

This statement indicates the teacher's understanding and willingness to use a more standardized, screener test; however, the teacher was able to articulate how other forms of assessment and data use that did not involve a standardized test but involved more targeted formative assessments were beneficial:

If I start with the end in mind, I need to know if they understand regrouping, that's what I want to know. So, I'm going to give this group base-ten blocks, I'm going to give this group an algorithm, and I'm going to give this group expanded form, and I want to see what they do with each of those. If a student can do all three of those things, they know how to regroup.

These two statements demonstrate the teacher's understanding of multiple forms of data. The findings detailed in this section show that teachers did have an understanding and willingness to use multiple forms of data.

Formative and Authentic Data Use

Another important theme that emerged in collecting and analyzing the findings during this study involved teachers' willingness and preference for more formative and authentic forms of assessment and data use. An analysis and examination of PLC protocols and documentation used during PLCs and as part of the school's data-use system indicated a reliance on standardized assessments. Teachers were expected to administer and use data collected from common unit assessments directed by the school district, standardized reading and math screeners, benchmark assessments written at the district level to resemble state tests, and summative state assessments (STAAR). Despite the prevalence of these types of

assessments and data collection instruments, evidence from multiple sources, including the survey, interviews, the focus group, and PLC observations indicated that teachers had an understanding of authentic data use and could articulate how they used quick-checks, classroom assessments, questioning, and other strategies to collect data, collaborate, and make instructional decisions.

A teacher expressed this propensity for authentic data use: “I use informal data to assess in real time if students are grasping the concepts. The informal data allows me to adjust or reteach if I see that students are unclear on what they should be doing.” One teacher described using daily instructional practices to make immediate adjustments: “I use informal data (questions and answer) responses from students to adjust my teaching in the moment.” Another teacher expressed the importance of informal data use as a means to make quick adjustments and remain dynamic and flexible to meet student needs:

A test, you know, the first day after you’ve kind of introduced the skill, you give a test. You see where they are at. You see the kids who already know this skill and you extend on them, and then you see the kids who really need more practice and then you practice with them throughout the week. And you can see those kids who were struggling at the beginning of the week and if they have made any progress.

In addition, teachers in the focus group discussed the importance of less formal assessments and data use in creating flexible intervention groups to adjust instruction rapidly and address student needs:

Allowing more flexible grouping, even among other teachers and doing a split if someone works better with certain groups or skills so it’s a team effort. It’s not just

you looking at the data but everyone uses the data to split up the whole grade into groups.

The teachers in this focus group began to shift the conversation from individual teachers using authentic data to make decisions about students to the team as a whole beginning to use data more collaboratively.

Collaborative Data Use

Another theme that emerged from data in the study was the importance of using data collaboratively as a team to make meaning of what students were or were not learning and then create strategies and plans to address these challenges collectively. Teachers described collaboration as an important component of the professional learning and data-use process: “I love when someone who is confident in the data can help me paint the picture for me and we discuss a plan moving forward as a whole.” The teachers in the focus group had a conversation on PLCs, discussing how they first joined PLC meetings in school, how the nature of those meetings evolved over time, and what components of the meetings improved collaboration. One teacher described the early meetings and challenges: “I remember when we started PLC, and it was one of those that wasn’t rolled out very well as far as clear expectations of what the purpose of it was so I think initially teachers probably did see it as a waste of time.” The group noted that professional development and training on holding effective PLCs improved the process: “We got more professional development and learned more. What the reasoning behind PLCs was and what we were supposed to be doing, I think that the time became more valuable.” The group further described how adding certain expectations, norms, and protocols improved the function of PLCs and improved collaboration:

I think two things: I think PLC is what you put into it with all people involved, but then also, I think it's important to have that clear focus of our objective and then stick to the script. Having a shared purpose and then everybody being part of that and contributing, having an agenda and sticking with it and not getting distracted.

Data collected from PLC observations (Appendix D) and protocol and artifacts collected during the study indicated that teachers used norms, agendas, and protocols to keep the PLC meetings focused on certain objectives and student learning. In all 10 PLCs observed, teachers used an agenda with specific goals for the meeting. In addition, all participants contributed to the conversations. Participants during the PLC meetings collaborated on agenda items and used the agendas, data-use protocols, and team norms to stay focused on team goals and objectives.

Limitations and Barriers to Data Use

Although participants used multiple forms of data collaboratively to solve problems and inform decisions, several themes emerged representing limitations and barriers to data use at the school. The most commonly articulated frustrations regarding data use involved lacking sufficient time; handling curricular restrictions related to curriculum units, scope, and sequence; keeping up with paperwork or task documentation; and completing data forms. Teachers indicated that the time spent completing required data forms prevented them from maintaining and benefiting from more autonomy: "With all the district requirements for a paper trail, it makes it difficult to find the time to do this as well as meet all the other necessary pieces required for teachers. I like the freedom to run my own data to use." In addition, lack of sufficient time to collaborate, explore, and interpret the data and information with colleagues, as well as to formulate plans, emerged as a barrier to effective data use:

“Analyzing data correctly can be very time consuming. Therefore, having a lack of time to analyze the data can cause us to make the wrong decision on a student’s actual need.” The teacher further explained a desire to use time for analyzing data and action planning: “Too many PLCs have been talking and filling out forms. It would be better if instead of filling out forms, the teachers could use the PLC time to plan for future lessons collaboratively.” In addition, teachers stated in interviews and the focus group that time was a barrier for effectively using data and executing action plans:

Time, not having enough time to do the adequate amount of teaching that might be needed to see progression. Over the course of, you know, a day or a week, whatever is being asked as far as a specific lesson. But timing and the curriculum.

Another teacher reflected similarly about not having enough time to both analyze data and devise an action plan and then actually be able to put that into action:

I think part of the thing that is hard to use data effectively is that it is really hard sometimes to juggle reteach and small groups with continuing to move forward. It is much harder to figure out how to spiral back and hit those things again when you’re still pressing forward. I just think there is not enough time sometimes.

Curricular restraints were a common theme that emerged regarding barriers associated with effective data use. Teachers said the curriculum, curriculum units, scope and sequence, and other instructional expectations actually prevented them from using data effectively because they did not have time to respond to what the data suggested; they felt compelled to keep going rather than intervene and respond to student needs:

Like a curriculum. If it’s too structured [it] does not allow for time for reteaching or time for review of concepts that are not as easily caught on to and then you know you

are pushed on to the next standard or the next lesson subject, whatever it is, and you do the best you can to scaffold. I know I see from my data that my kids need more time doing this and they're not ready to move on yet, then that can definitely restrict data use.

In addition, teacher responses from several data sources indicated that district systems such as curriculum and instruction requirements and data-reflection guides were barriers to effective data use. Several survey responses indicated that paperwork was time consuming and got in the way of time spent analyzing and using data more productively: "I do believe the public school system requires teachers to collect too much data; all of this extra paperwork takes time away from actual instruction and contributes to additional stress for educators."

Another emergent theme involved completing forms or doing paperwork associated with student achievement data. One teacher reported that looking at data and completing data forms could be a waste of time if teachers did not use it to engage with staff or inform instructions: "Using several forms of data without disaggregating the data to form study groups or guide lessons is a waste of time."

Overall, the most common frustrations reported concerned filling out forms, doing paperwork, or looking at different data systems related to student-achievement data:

At times, we are required to fill out forms that are in different templates or programs.

When we have to transfer data to multiple places, forms or applications, this wastes time and energy. Also, repeatedly going over the same piece of data is redundant.

Examples of the data-reflection guides teachers described as barriers and time wasters appear in Appendix E. These data-reflection guides were created by the district's curriculum

and instruction department, and teachers were required to use them to document student achievement data.

One teacher elaborated on data use as a time-consuming process and complained of not always having enough time to analyze data and then plan collaboratively with the team:

Time spent with colleagues really to look at data together because it is you know a time-consuming process. If you really want to make good use of it, you know, really collaborate and come up with an all-encompassing plan where we're all on board with the same plan in response to our data.

The teacher further explained that when time was available to review data, scores, and results with the team, there was not always time left for meaningful discussions about action planning:

I feel like when we have had time to go over data together and the time is spent putting the results and scores on the data wall, I think that is beneficial. But then, we spend time doing that and then we don't have, you know, really problem-solving discussions on, you know, how we're going to react to what's going on.

Participants in the study were required to use and complete a number of data forms and data-reflection guides to document student scores and progress on various assessments (Appendix E). The data indicated that teachers did not value completing data-use forms or reflection guides and preferred using collaborative time to analyze data and use the information to create action plans collaboratively, plan interventions to improve instruction, and address team challenges.

Research Question 2: Teachers' Descriptions of Expertise Levels

Regarding their levels of expertise regarding data-use knowledge and skills, teachers focused on their ability to analyze and use multiple forms of data to inform their instructional decisions. Qualitative and quantitative data were collected through surveys, interviews, observations, and analysis of PLC artifacts. The findings suggest that teachers possessed and could articulate an understanding of data use, had generally positive notions about using data to improve their practices, had negative notions about some aspects of data use, and were interested in how they could make data use more teacher- and student-centered.

Levels of Expertise

Several data points collected in the study suggested that teachers had an understanding of effective data use and believed they possessed some level of expertise concerning data use. Three survey questions specifically related to teachers' perceptions of data-use expertise. Table 5 summarizes teacher perception findings about data-use expertise.

Table 5

Teachers' Perceptions of Data-Use Expertise

Question	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Total
I am good at using data to plan lessons.	13 46.43%	11 39.29%	1 3.57%	2 7.14%	1 3.57%	28
I am good at using data to diagnose students' learning needs.	13 46.43%	11 39.29%	2 7.14%	1 3.57%	1 3.57%	28
I like to use data.	16 57.14%	7 25%	2 7.14%	1 3.57%	2 7.14%	28

More than 85% of participants reported they were good at using data, and specifically using data to diagnose student-learning needs. In addition, more than 75% of participants indicated they liked using data. However, although the majority of participants indicated they

were capable of using data effectively, had positive levels of expertise, and enjoyed using data, fewer teachers chose *agree strongly* or *agree somewhat* on these questions compared to other questions on the survey. Specifically, five of the 10 questions on the survey related to teachers' perception of self-efficacy and levels of expertise.

Table 6 shows the mean, standard deviations, and variances of each question. The questions were based on a 5-point Likert scale where 1 = *strongly agree*, 2 = *agree*, 3 = *neither agree or disagree*, 4 = *disagree*, and 5 = *strongly disagree*. The lower the score, the more positive the response to the question.

Table 6

Descriptive Statistics of Questions about the Value of Data Use

Questions about Data-Use	Mean	Standard Deviation	Variance
I am comfortable collaborating around data with colleagues.	1.68	1.07	1.15
I use a variety of data to inform my teaching and/or daily practices.	1.57	0.94	0.89
Data use helps me make informed decisions.	1.39	0.86	0.74
Data use benefits educators and students.	1.32	0.80	0.65
Using data helps me be a better teacher/educator.	1.36	0.85	0.73

Table 7 shows that teachers responded more favorably in response to questions that were about the value of using data and engaging in collaborative data-use practices.

Table 7

Descriptive Statistics of Questions about Data-Use Self-Efficacy/Expertise

Questions about Data-Use Self-Efficacy and Expertise	Mean	Standard Deviation	Variance
When I examine data reports, I am confident that my interpretations are accurate.	1.86	1.09	1.19
Once I analyze data and draw conclusions, I know what action steps to take next.	1.86	0.87	0.77
I am good at using data to plan lessons.	1.82	1.04	1.08
I like to use data.	1.79	1.18	1.38
I am good at using data to diagnose students' learning needs.	1.79	0.98	0.95

Teachers had a less favorable perception of data use in response to questions related to efficacy and data-use expertise than to questions involving general data use in education. The means of the first five questions listed were noticeably lower than the five questions related to efficacy and expertise, which means that fewer participants strongly agreed or somewhat agreed that they were good at using data or knew what to do with them.

In addition to responses from the Likert-scale survey, several responses in the survey and in interviews indicated that teachers had an understanding of and were aware of their data-use efficacy and levels of expertise but were likely less confident in these areas than they seemed to be, according to the themes previously discussed. The following two sections provide examples of positive and negative teacher perceptions.

Positive Perceptions of Data-Use Expertise

The findings in this study showed consistently that teachers had positive perceptions about using data and their ability and level of expertise regarding data use. A variety of responses supported this finding. One teacher described levels of data-use expertise positively: “Data helps lead instruction and shows whether or not what we are doing is

working. It also helps for future planning purposes of certain programs.” Another teacher described the importance data use and articulated being able to make data-informed decisions:

It drives my instruction and keeps me focused on what topics to target when teaching.

I think when teachers really dive into the data to determine which concepts students struggle with, they can adjust their instructional practices to try to help rather than continue to instruct in possibly ineffective styles.

When asked specifically, teachers responded positively about their ability to collect, analyze, and use data to make decisions and inform instruction:

I’m on a scale of, like, one to 10, probably like an eight. I feel confident that when I’m the one that’s collecting the data, I can analyze it more thoroughly. But I feel like the more I use data, the more I see different ways that it can be analyzed and broken down.

This quote indicates that the teacher felt confidently able to use data in different ways and look at data differently. Another teacher responded similarly when asked about confidence in using data: “I mean I’m confident, I mean I feel confident in reading data. And if it’s a new kind of system, like, say I was using an online system, I felt competent in learning how to navigate and interpret students’ scores and results.” A third teacher indicated feeling confident in using data to improve instruction and make data-informed decisions:

Very confident that I have done that about a million different ways. Since I’ve been in three different school districts so I have done things like cut up a test, reorganize it on a piece of construction paper based on TEK. I would say I’ve done some very extensive training on how to analyze data so I actually like to look at data.

These responses indicate that teachers in the study had positive perceptions of their own data-use expertise. They were able to articulate an understanding of effective data use as well as their own self-efficacy involving data use in schools.

Negative Perceptions of Data-Use Expertise

This section details evidence and responses from the study showing some teachers' negative perceptions of data-use expertise. In addition to the survey Likert-scale questions, survey responses indicated not all teachers felt confident about their abilities to use data to inform or adjust planning and instruction. Responding to the first survey question about using data, one participant shared the following quote: "Honestly, I'm not sure but that is because I am not confident in that aspect of my career. I am honest when I say I am not comfortable at looking at data or statistics and know what to do with it." In addition, several participants described efficacy and levels of expertise as they related to training, experience, and support:

When I was a brand-new teacher, I didn't understand any of the data and it showed in my students, but whenever someone took the time to actually show me how to use it and I understood it, I think it made a huge difference.

Further, this teacher described the importance of PLCs and collaborative work to support the data-use skills and learning of new teachers: "And that's why, also why, PLC time is important so that you can make sure your team is on the same page and you're all collaborating and using the data." Similarly, a teacher noted the importance of sharing and working with data in a clear and coherent way, especially for teachers who may lack certain levels of expertise: "I think that presenting data in a way that is understandable is important. Not everyone is fluent or knowledgeable in reading data, so it's great when it can be understood in a simple manner."

In sum, although some findings included evidence that teachers had positive perceptions about data use and confidence in their levels of expertise, some evidence from the Likert-scale questions and from qualitative responses showed that teachers had doubts about effective data use and their own levels of expertise, especially without guidance, training, or support from colleagues or school leaders.

Teacher- and Student-Centered Data Collection

A noteworthy theme that emerged from the study involved teachers' desire to continue to use, learn more about, and improve making data use more teacher- and student-centered in their classrooms. Teachers indicated both in interviews and in the focus group that they were interested in improving their data-use practices by engaging in teacher- and student-centered strategies that were more authentic. One teacher described how students had become interested in using data to monitor their own progress. The teacher explained the students were more engaged in monitoring their own data because of how the teacher had set things up in class:

It's been really interesting this year. I think since I've been in the district we're so much more data focused, and there's the data wall and all that, they got really excited looking at the data wall this year especially. Since we were doing so well, they wanted to. I mean, I have kids that talk to me about going from yellow to green or green to blue or whatever, you know, which I've never really had kids that care that much about that. Maybe it's just that I've presented it in a different way.

The teacher further described one student in particular who was motivated to look at his achievement data, monitor his progress, set goals, and improve:

One of my students, who was at the bottom of the barrel, came to see me every day. I mean, the score doubled, granted it was still failing, but still I mean, he was very proud of himself. And he wanted to push himself further and that's what I thought was really interesting with this particular child.

In addition to making data use more student-centered, teachers described the value of making assessment, data collection and data use more teacher-centered, with teachers being part of the process rather than relying on computerized tests or data-standardized testing software. One teacher described the importance of being part of the process, understanding the questions, and focusing on students' responses to make better use of the information: "I look at what was asked and the students' response. Next, I ask the individual student the same question. If their responses are the same as the original assessment, I make sure to reteach and spiral back to specific skills." In another response, a teacher described wanting to learn more about developing specific assessments to meet the needs of the students and use to make more valid inferences:

I wish I knew more about how to formulate the most effective assessments, like if I always know this is the data that I am wanting to get. I want to see what kids are mastering this concept, what kids are meeting it, you know, proficient, and what kids really still need help. But I have a harder time creating valid assessments to make sure that I'm getting that information no matter the student's ability level.

As reported previously, teachers in the study valued using multiple forms of data, using assessments that were more authentic to determine student learning, as well as learning how to develop their own data collection systems that involved students in the process.

Research Question 3: School Principals and Teacher Self-Efficacy

School principals may consider teacher self-efficacy to understand how principals can use perception data to determine whether teachers possess the self-confidence and self-efficacy to apply data-use strategies effectively in their daily work. Qualitative and quantitative data were collected through surveys, interviews, observations, and analysis of PLC artifacts. The findings for Research Question 3 demonstrate that teachers had a good understanding of authentic data use, could interpret data and put that knowledge into action, and were able to describe what the ideal data-use system would look like.

Teachers' Understanding of Authentic Data Use

Misconceptions about effective data use surfaced in the findings. When teachers were asked to describe examples of good data use, most responses centered on examples of formative or teacher-collected data, rather than relying solely on standardized assessments to collect data and make decisions. Overall, teachers' data use during PLC meetings showed an understanding of data use beyond standardized test scores and student achievement data. For example, during observations of grade-level PLC meetings, teachers' conversations tended to focus on individual student needs, as well as on students' work and responses in class, their interactions with adults and other colleagues, and other more qualitative information. During the five observed PLC meetings focused on scheduling and rostering students for the next year (Appendix D), teachers focused more on qualitative aspects and information about individual students before making those decisions. The teachers created rostering cards that had some standardized testing data such as district CFAs, Benchmarks, or STAAR tests. However, most decision making centered on student reading levels as determined by teacher-administered assessments and running records. In addition, teachers' decisions centered on

student personalities and behaviors as determined by observational data collection that came with knowing a student over the course of many months in class rather than relying entirely on student scores on standardized or computer-based assessments.

When asked to describe barriers to good data use, teachers in the study frequently discussed the difficulties of having to document standardized assessment data in district-created data reflection guides (Appendix E). A teacher described these activities as a waste of time or as barriers to using data and engaging in authentic data-use practices:

I think data planning sheets that make teachers copy data from various sources is a waste of time. I think more time should be spent on analyzing the data in depth to make specific plans for improvements in instruction or interventions should be the top priority.

Another teacher actually listed computerized tests as being inaccurate at times and therefore relied more on formative, one-on-one testing: “Computerized testing sometimes gives false data. You have to do additional one on one testing to see an accurate account of what a student can do.” When asked to describe what does not work well regarding data use, one teacher focused on relationships with students and not on numbers or test scores:

I do think sometimes we focus too much on the numbers and not enough on the relationships with children, which I think make a bigger impact on test scores than data analysis. I think when a child grows in confidence and feels an alliance to themselves or their teacher, they will make progress. We also need to focus on growth instead of just passing and failing. Teachers need to foster a growth mindset.

The central themes in this teacher’s response were relationships, building confidence, and growth. Another teacher answered similarly:

I think relationships are just as important as data. But I do think there's all different kinds of data. I think we don't need to be so hyper-focused on just, you know, testing data. We also need to be collecting data on the kids in their lives and what motivates them, so different kinds of data.

Both of these responses indicate that these teachers tended to favor more authentic or teacher-centered forms of data collection for making decisions and improving instruction rather than relying entirely on standardized forms of data collection.

Further evidence in the findings suggests that teachers preferred forms of data collection considered more authentic, such as observations, teacher-created or teacher-administered assessments, running records, questions and answers, and student work. When asked about how to use data, one teacher described applying informal data use in class: "I also use informal assessments like running records and daily quick-checks to plan my daily groups and needs of the children in my classroom." Another teacher described multiple forms of data beyond standardized achievement data:

I use multiple forms of data (i.e., progress monitoring data, evaluations, formative assessments) to adjust my lessons, review instruction with my students, adjust individual students' goals, and utilize different activities to meet student learning needs.

Thus, this teacher described formative data use as a way to monitor and adjust. Another teacher described formative data use as complementary to summative data use:

I use both formative and summative data to see what students understand. Formative data allows me to understand students' success in an ongoing way. Summative data shows me what students are able to apply. Data from computer programs show me a

broad overview of where to start with students when I need to know where to intervene and reteach. Anecdotal notes allow me to look for trends in student behavior and academic endeavors.

Finally, another teacher gave an example of how formative assessments were useful for making immediate adjustments based on student learning: “Quick checks, like a scaled system, allow me to gather data quickly and turn around and use it for instruction.” These responses included teachers’ understanding and ability to use multiple forms of data including authentic data such as anecdotal notes, running records, and formative assessments.

Teachers’ Ability to Interpret and Use Data

This study explored teachers’ perceptions of putting data into action. Teachers in the study were required to collect, analyze, and use data to create action plans, adjust instruction, and devise interventions for students. Much of this work occurred collaboratively in PLC meetings among grade-level peers or in data meetings with members of the campus lead team. Specifically, teachers were required to record, analyze, and plan using district-created data reflection guides that included performance and results, item analysis, and teacher action-plan sections (Appendix E). In addition, grade-level teams and the campus leadership team were required to use a PLC planning document to create PLC agendas (Appendix E). Observation documentation during grade-level PLC meetings indicated that teachers and campus instructional leaders were able to analyze, interpret, and use data to plan and adjust instruction (Appendix D).

In addition, data from the Likert-scale questions in the survey indicated that teachers perceived they could make accurate interpretations of data and then take next action steps to formulate a plan. More than 85% of responding teachers strongly agreed or somewhat agreed

they could examine data reports and make accurate interpretations and then use that data to draw conclusions and plan action steps. Only five participants either somewhat or strongly disagreed with these survey questions, as shown in Table 8.

Table 8

Self-Efficacy and Teachers' Expertise

Question	Strongly Agree	Somewhat Agree	Neither	Somewhat Disagree	Strongly Disagree	Total
When I examine data reports, I am confident that my interpretations are accurate.	13 46.43%	11 39.29%	0 0%	3 10.71%	1 3.57%	28
Once I analyze data and draw conclusions, I know what action steps to take next.	10 35.71%	14 50%	3 10.71%	0 0%	1 3.57%	28

Based on this information, the majority of teachers perceived they did have the ability to analyze and interpret data and then put that thinking into action. Similar themes emerged from survey responses, interviews, and the focus group.

Teachers' responses indicated the value of using data to formulate plans and solve problems. One teacher identified the need to keep going after using data to solve a problem: "Having an open mind and knowing that identifying the problem is not the last step. Now what? That is where the tire hits the road and progress is achieved." Teachers consistently desired to use multiple forms of data to solve problems or create intervention plans for their grade-level teams. A teacher identified the importance of using data to interpret problems and then implement a plan to solve them: "As a grade level, we created a plan and implemented it together. Data has to be more than just viewing it and discussing it."

In addition, teachers valued collaborative planning and problem solving. Teachers in the study articulated their desire to work with their teams and use data collaboratively: “Teachers could use PLC time to plan for future lessons collaboratively.” One teacher responded similarly yet implied that sometimes not enough time was devoted to putting plans into action. This sentiment of not having the freedom to use team PLC time for action planning was detailed in the previous section as well. One teacher described data-use practices that did not seem to be a good use of time: “Just putting data up on the wall and never discussing it or using it to take action.” One teacher described how the team used data during PLC meetings and then received help from instructional support specialists to create intervention groups:

Sometimes we can do that in our PLCs, like kind of coming together as a grade level, looking at the data, I can talk over the data with the specialists. I’m going to get more suggestions on trying to pinpoint exactly what’s going on. So, collecting it and then looking further to see, how can we help and what group would best fit them.

Another teacher described how the team collaborated to plan intervention groups that involved the whole team: “So it’s a team effort. It’s not just you looking at the data, but you use the data to split the whole grade into groups.”

Data and responses from the findings indicated that teachers had a perceived value of interpreting and using data to create and implement plans. Further, teachers in the study were required to spend time analyzing data collaboratively during PLC and data meetings to make inferences and create plans and interventions.

Teachers' Ideal Data-Use System

One of the questions in the focus group asked teachers to describe the ideal data system (Appendix B). However, themes related to this topic emerged in other findings during the study as well. When asked about the ideal system, teachers in the focus group discussed the importance and difficulty of adopting a cyclical process that involved analyzing data, coming up with a plan, implementing the plan, and then coming back to follow up:

I think like having to come up with an immediate plan. I've talked about how I can collect the data, and I can change the instruction based off of it. But I have a hard time being, like, this is going to be my next step, and this is how I'm going to measure it. So maybe once we have collected the data, then you have a set process of, these are the three things I'm going to try and these are the results I got. Then we meet back and follow up with it and making sure to follow up with the data.

The teachers in the study were required to engage in data meetings with the principal and campus leadership team periodically throughout the year to review student learning and determine next steps. The focus group conversation shifted to this topic when asked about the ideal data system:

And even though the data meetings do make the teachers nervous sometimes, I really have enjoyed the data meetings because it really does make you be more intentional and have someone else to bounce ideas off.

Another teacher in the group also discussed the data meetings:

And I think the data meetings are important. So, I think having those meetings where it's like, okay, well, this is what it says so what do we need to do? And to be

somewhat helpful in those rather than someone saying well you've done this wrong obviously.

The next theme that emerged in the focus group regarding an ideal data system was culture. The teachers discussed the importance of a positive culture in which everyone takes ownership and accepts the process of using data collaboratively to solve problems and develop improvement plans: "And how about buy-in from teachers and I mean really, not just teachers, like everybody involved are buying into the process." Teachers appreciated the necessity for buy-in and positive culture. Another teacher specifically described the importance of people developing a positive culture around data use: "You have to have that direction first and get people, not trained, but get them in the frame of mind and thinking that it does become natural and it becomes just the culture of what we do."

Finally, a focus group member discussed the importance of having one aligned system of supports working in unison:

All of this system working together, like, instead of having a meeting for this and a meeting for this and a meeting for this like RTI meetings and data meetings and PLCs, all of those things working in one piece or one accord.

The main themes that emerged in the focus group discussion about an ideal data system were (a) engaging in a collaborative cycle that would involve using data to solve a problem, (b) having a positive data-use culture, and (c) having one aligned system of data use and decision-making. Similar themes emerged in other findings. One teacher recommended having one single spreadsheet or source for recording collected data so teachers could see that student without having to go from one data system to another:

I think having frequent check-ins, multiple sources of data available, and a single spreadsheet to record all collected data is useful so that you are able to see the child from different perspectives without having to jump from source to source to see the whole picture of the child.

This response illustrates the need for alignment and echoes the focus group discussion about having one aligned system. Another teacher suggested the need for vertical alignment from one grade to another and recommended data should be analyzed longitudinally:

And even in fifth grade, why are we not taking a deeper look back into fourth grade to figure out what the interventions are. If the kid has been in the district since third grade, I mean, by fifth grade you should have some pretty solid data on how they're doing in reading or math or anything to kind of know where to start the year and not lose so much time trying to get to know them.

Based on these responses, teachers in the study valued having a collaborative cycle of data use, a positive culture of data use, and an aligned data system as components of an ideal data system.

Negative Perceptions

Throughout the study, certain teachers' perceptions emerged that were contrary to other teachers' beliefs about important components of effective data use. One main contrary theme emerged—Some teachers did not like having to complete so much paperwork and data forms. An analysis of data and accountability protocols showed that teachers were required to complete a data-reflection guide consisting of performance results and goals, item analysis, and action planning sections (Appendix E). The forms were maintained as Google sheets and had been streamlined some since the previous year. After every district-required assessment

and STAAR test, teachers were required to enter data from DMAC, the district data system, into the reflection guides. These data-reflection guides were then discussed during PLCs and in data meetings. Examples of these documents appear in Appendix E. Teachers in nontested grade levels (i.e., PK, kindergarten, and first grade) had to enter their assessment data into DMAC and complete a data meeting form for data meetings that happened at the beginning, middle, and end of the year. Teachers disapproved of some aspects of this system, mainly regarding what they considered redundant paperwork: “What is the point of taking numbers and putting them into a different form. It’s a waste of time when you could actually just pull the reports from DMAC and put them into Excel.” Another teacher responded similarly: “The reflection guides in DMAC already have our strengths and weaknesses highlighted. I don’t see a point in writing a reflection guide and repeating the same information. I find it redundant.” This theme was repeated throughout the survey, in the interviews, and the focus groups. Teachers reported that they valued data use, wanted to collaborate with colleagues, and wanted to use data to plan and solve problems; however, they did not like the redundancy of the paperwork that was part of the current system at the school and district.

Summary

The findings described in Chapter 4 provide answers and information related to the three research questions of the study. The content and design of the survey questions and approach of the interviews and focus group were aligned to the contextual framework presented in the review of relevant literature. Based on the findings, I described the teachers’ perceptions of collaborative data use and PLC experiences at the school involved in the study. The primary conclusions from the findings were that the teachers in the study understood and were able to articulate the value of using data collaboratively to solve

problems, inform instruction, and improve their instructional practices. In addition, teachers said that a lack of time to do the collaborative work or having to use their collaborative time to engage in what they perceived as nonproductive practices (paperwork and data forms) were their main frustrations. Teachers further described curricular restraints as barriers to effective data use and problem solving. Finally, teachers described their ideal data-use system as collaborative, solutions-oriented, aligning with resources, and having a positive culture of support and buy-in among participants. Chapter 5 is a discussion of these findings.

CHAPTER 5 - DISCUSSION AND IMPLICATIONS OF THE FINDINGS

Overview of the Problem

The problem explored in this study involved the grade-level teacher teams that met weekly to engage in professional learning and collaborative data use. Teachers tended to have difficulty consistently aligning their behaviors during PLC meetings with research-based, best practice principles regarding collaborative data use, problems solving, and instructional planning. The study aimed to explore perceptions of teachers who were compelled to engage in PLCs and collaborative data use to inform instructional practices and increase student achievement.

Purpose of the Study

The purpose of the study was to examine and gain an understanding of teachers' perceptions about their current PLC and collaborative data-use practices. An understanding of teachers' perceptions could allow the principal and other school leaders to support teachers and increase their data-use capacity in solving problems and informing instruction.

Findings were organized and reported on three guiding questions related to collaborative data use in schools:

1. What did teachers think about using data in PLC experiences to inform their instructional practices and increase student learning?
2. How did teachers describe their level of expertise regarding data-use knowledge and skills?
3. How could school principals know that teachers possessed the confidence and self-efficacy to apply data-use strategies effectively in their daily work?

Summary of the Findings

Data Use during PLC Experiences

The study found that teachers at the school used multiple forms of data to plan and inform instructions. Teachers reported they valued using data and working collaboratively with colleagues to assess multiple forms of data, including standardized student achievement data, formative data, and other data sources. These findings are consistent with and support the broader literature regarding data-use strategies. For example, Bernhardt (2016) emphasized the necessity of using multiple forms of data to triangulate and make informed decisions. In addition, teachers in the study preferred using formative and authentic data sources rather than exclusively relying on standardized assessment data, which is consistent with the findings of other studies in which teachers were most interested in data from their own classrooms and students (Black & Wiliam, 1998; Schildkamp & Kuiper, 2010). Further, teachers valued using data collaboratively during PLCs with grade-level team members. Teachers reported the importance of using data collaboratively during PLCs to make meaning of what students were or were not learning and then using that information to develop strategies and interventions to increase student learning. As described in the literature review, effective data use, problem solving, and action planning are connected to the collaboration and professional learning among teacher teams (Black & Wiliam, 1998; DuFour, 2006; Hord, 1997; Mandinach & Gummer, 2016; Schildkamp, 2019; Vanlommel & Schildkamp, 2019; Wayman, 2006).

Limitations and barriers to data use identified by teachers in the study were related to having insufficient time to work with colleagues to analyze data and then formulate and implement action plans. In addition, teachers reported curricular restraints involving

curriculum units and pacing calendars that compelled teachers to move forward teaching new content instead of responding to data that suggested they should slow down, reteach, or intensify interventions. Teachers further reported paperwork and completion of data forms as barriers to effective data use. As described in the literature review, insufficient time and too much paperwork were reported as barriers to effective data use in similar studies (Cosner, 2014; Gray, Kruse & Tarter, 2016; Hipp et al., 2008).

Teachers' Description of Level of Expertise

Most teachers in the study responded with positive perceptions of their data-use expertise and reported being good at using data to plan lessons and diagnose student-learning needs. Teachers were able to collect, analyze, and use data to make decisions and inform instruction. This finding contrasts with the findings of Schildkamp and Kuiper (2010), who found that school staff did not use data to make decisions. In addition, teachers' perceptions were not as positive regarding data-use expertise and efficacy compared to perceptions of general data use. Bryk, Camburn, and Louis (1999) found that teachers' desire to maintain the status quo or resist school-improvement efforts could relate to their sense of self-efficacy or to the levels of support received from school leaders. Several teachers reported they lacked the confidence and expertise to use data effectively, make meaning of data, and create action plans and interventions. Collegial trust and professional learning support are important prerequisites for teachers to engage in effective PLC practices (Gray et al., 2016; Louis, 2007).

Teachers in the study felt confident engaging in teacher- and student-centered data use and wanted to learn more about this practice. Teachers described their desire to engage students in the data-use process and to develop their own data collection systems focused on

authentic data collected during class using formative and informal assessments. Although student-centered data use can be an effective practice, Jimerson et al. (2016) found that teachers did not necessarily possess high levels of understanding regarding how and why student-centered data use might improve their practices or student learning.

School Principals and Teacher Self-Efficacy

Teachers reported positive perceptions regarding authentic data use. For example, teachers wanted to use data they collected in class during lessons, including quick-checks, formative assessments, student work, and daily checks for understanding. Teachers reported feeling confident in collecting and using these types of authentic data. In addition, teachers reported the importance of analyzing and using data to develop action plans and interventions to improve student learning. Jimerson et al. (2016) promoted the implementation of student-involved data use as long as teachers had the data-use training, support, and capacity to implement these practices in ways that promoted and maintained a healthy environment for both teachers and students. In this study, grade-level PLC teams used multiple forms of data to make decisions about schedules, intervention groups, lesson plans, and action plans. Research on data use in schools has established that using multiple forms of data and triangulating data can improve decision making and professional learning (Bernhardt, 2016; DuFour, 2006; Hord, 1997; Schildkamp & Kuiper, 2010; Wayman et al., 2012).

Numerous studies have suggested the importance of collaboration, trust, and positive school culture in creating and sustaining PLCs in schools (Bryk et al., 1999; Leithwood et al., 1995; Schildkamp & Kuiper, 2010; Vanlommel & Schildkamp, 2019). Teachers in this study described an ideal data system as one that encouraged collaboration, alignment of resources, cycles of inquiry, and positive culture. Teachers reported negative perceptions of data use

regarding the redundancy and inefficiency of paperwork and data forms they were required to complete before data meetings and PLC meetings. Teachers reported this work interfered with their ability to use data effectively and collaboratively to solve problems, create action plans, and monitor student progress and response to action plans.

Tenets of Action Research

While this study was a case study of collaborative data use and PLC experiences at an elementary school, there were tenets of action research and ongoing inquiry and improvement. The elements of an action research dissertation including action steps, timelines, and cycles of action are beyond the scope of this study (Herr & Anderson, 2015). However, I wanted to clarify in this section how action research tenets fit into this study.

I did not specifically document my action cycles, but the recommendations that follow represent the actions that I will continue to take based on the information and findings of the study. I learned extensively about the perceptions of the teachers at our school regarding collaborative data use and PLCs. Moving forward I plan to use that information to refine and improve the data-use and PLC systems at our school based on the cycles of improvement consistent with quality action research (Herr & Anderson, 2015).

Recommendations for School Principals

From the findings, I identified specific actions I can take as a principal to improve PLC leadership practices on my campus. I recommend other principals who are working to improve PLCs and collaborative data-use practices adopt these practices at their schools.

Teacher-Centered PLCs and Data Systems

The teachers at this school engaged in weekly grade-level PLC meetings, engaged in collaborative data use with colleagues in their grade levels, and sometimes engaged during

vertical articulation meetings with teachers in other grade levels. The school operated as a PLC, and the teacher teams met regularly as a whole group to share and engage in learning. The findings show that most of the teachers who participated in the study valued data use and appreciated the opportunity to collaborate with peers.

The most noteworthy negative aspect from the findings involved teachers feeling as if they had too many clerical tasks regarding data use—for example, recording data in forms, posting data in folders or data walls, and completing paperwork. Teachers needed the autonomy and trust from school principals and leadership teams to engage fully and remain committed to the inquiry process. Hord (2008) noted that engaging in a shared vision, professional learning, collaborative work, and shared leadership does not happen because of mandates.

Principals should consider giving teachers an opportunity to lead PLCs and contribute to decision making regarding data-use systems and protocols. Too often, leaders organize PLC agendas and design data-use systems but unintentionally create barriers and extra work for teachers. Principals should include teachers in the design and decision-making process involving PLCs and data use. Kleine-Kracht (1993) discussed the need for everyone to contribute to and be part of the learning. Hord and Hirsch (2009) asserted the importance of distributed leadership—the principal shares power and becomes more of a guide for teachers in the process. In addition, teachers in this study emphasized the importance of collegiality; based on these findings, principals should consider implementing several further recommendations regarding teacher-centered PLCs and data use, discussed in the next sections.

Create and Share Explicit Resources to Guide Work

Although some work is intuitive, educators can benefit from having explicit guidelines to help work begin and to guide initial attempts at new processes (Schildkamp & Kuiper, 2010; Schildkamp et al., 2019). Guidelines help create norms and reduce anxiety early in efforts to integrate new practices (Gray et al., 2016). To this end, principals should create and share with teachers a guiding PLC handbook that defines and explains characteristics of effective PLCs and collaborative data use. Such a document could provide a baseline of expectations for teachers' behaviors regarding PLCs and data use and provide ready answers to questions, thus allowing groups to dedicate time to more complex issues. Based on the findings from this study, teachers would benefit from the guidance and support of a PLC handbook, and by creating these guidelines, principals can distribute leadership and encourage teachers to assume leadership roles (Hord, 2008).

Create and Lead a Campus Guiding Coalition

Schildkamp et al. (2019) encouraged school leaders to establish a leadership team with a clear vision, norms, and goals for school-wide implementation. The leadership team, consisting of school leaders and teacher team leads, could guide and sustain the implementation of PLC practices (Levin & Datnow, 2012; Marsh, 2012). To this end, principals should create a campus guiding coalition consisting of teacher leaders, school leaders, specialists, and other staff to determine the collective shared vision and expectations for the school as a professional learning community. Based on findings from the study, teachers value using data to inform instruction and understand that school culture is connected to effective data use. The guiding coalition will implement and maintain systems and supports conducive to collaborative data use (Schildkamp et al., 2019). The coalition

should meet regularly and engage in decision making to ensure that the school functions as a PLC and remains committed to learning and using data effectively to solve problems and ensure high levels of student achievement.

Encourage Teacher-Guided PLCs

Hirsh and Killion (2009) described specific principles for ensuring that PLCs function collaboratively and stay focused on teacher and student learning. Principals and school leaders who guide teachers to govern themselves participate in the shared leadership, which increases the possibility for buy-in and increased professional learning and engagement (Hirsh & Hord, 2008). To ensure this outcome, principals should allow grade-level PLC teams to drive their own agendas and meetings while ensuring their behaviors align with the PLC handbook and the decisions of the guiding coalition. Principals and campus leaders should participate in these meetings, not necessarily as leaders but more as consultants or facilitators. Teachers should drive the decision-making and problem-solving processes of their PLC teams in terms of inquiry, data analysis, professional learning, instructional planning, progress monitoring, and reflection.

Training, Support, Time, Space, and Resources

Principals cannot expect teachers to engage in the difficult work required of PLCs and collaborative data-use without ongoing training and support. For such an approach to work successfully, teachers need training, support, time, space, and resources. In addition, teachers need plans and guidance for applying their new learning and skills to their classrooms effectively (Hord, 2008). Time, space, and resources are challenges. One of the most obvious barriers to teachers' effective data use noted from the findings was having enough time to analyze all the data and then actually use the data to create an action plan.

Hord (2009) included time for learning, space for learning, and data-use support as components of conditions for success. Hord (2008) described the difference between logistical conditions and the relational and human-capacity conditions that must exist as part of a principal's role in providing support. Principals and school leaders are responsible for creating and maintaining school conditions conducive to effective PLCs. In order for teachers to be successful in PLCs and collaborative data use, I recommend principals consider several actions, discussed in the next sections.

Develop Ongoing Professional Development in PLC Practices

Gregory (2010) described a profound need to increase teacher capacity to serve students more effectively. PLCs can provide the basis for a type of collaborative professional learning in which teachers learn from one another, explore new instructional practices, learn from the expertise of school leaders and specialists, and learn during problem-solving processes (Gregory, 2010; Little, 2002; Tan & Caleon, 2016). In addition, effective PLCs operate effectively when they build collegial trust, understand effective data-use practices, communicate effectively, and focus on student learning (DuFour, 2006; Hord, 2008; Louis, 2007). To encourage this collaborative professional learning, principals should develop an ongoing professional development plan that provides all teachers and staff involved in the PLC with training in areas such as data-use practices, trust and collaborative work, instructional strategies, conflict resolution, team building, effective communication, and any other emerging needs of teachers or teacher teams. Further, principals should develop an annual professional development calendar that includes opportunities for teachers to engage in whole-group learning with the entire staff, embedded professional learning during PLC meetings, and opportunities to attend off-campus training and meetings. The plan should

include an alignment of budget resources so there are options to adjust or make revisions based on emerging needs.

Create a Plan for PLC Support

Hord (2008) described the resources and conditions necessary for PLCs to function effectively. Teachers require space to do their work, resources to support effective data use, relational support to promote collegiality, and support in discussing shared language and problem solving (Gray et al., 2016; Hord, 2008; Horn & Little, 2010). To promote collective capacity for effective PLCs, principals should create a plan for providing both physical (structural) support and relational (human capacity) support.

Physical and structural support should include a schedule with designated days and times for teachers to meet regularly, as grade-level teams and as a whole school, to practice engaging in inquiry, analyzing data, looking at student work, examining instructional practices, monitoring progress, and planning actions. Teachers should have access to protected times and necessary resources to engage in this work in an inviting environment that can accommodate everyone and that has everything teachers need.

In addition, the principal should engage teachers in team-building activities that build trust among colleagues. Principals should take care to nurture the human capacities of teachers who are required to engage in this difficult work (Horn & Little, 2010). Principals should be intentional about teachers' needs to be social and develop activities that allow for positive relationship building among colleagues (Hord, 2008). Principals should be intentional about providing support for teachers and creating conditions for PLCs that result in positive conversations focused on student learning and problem solving.

Plan and Align the Allocation of Resources

Hord and Hirsh (2009) described the intentional behaviors of principals and school leaders that produce an alignment of resources conducive for supporting and maintaining effective PLCs. When teachers have the time and resources they need and can engage in professional learning that builds capacity, they are able to engage in the work necessary to improve student outcomes and instructional practices (Hord, 2008; Hord & Hirsh, 2009). To this end, principals should plan and align budgets and allocation of resources to ensure teachers have the time and materials necessary to engage in productive PLCs and the training to increase their capacity to engage in collaborative data-use work.

Data-Informed School Culture

Teachers offer valuable information about using data, especially when it comes to the nuanced ways teachers collect data and gather information on a daily and weekly basis about students' learning, needs, personalities, strengths, and weaknesses. It is difficult to quantify or describe all the ways teachers know their students and families and the contextual factors that contribute to the complexity of being an effective teacher. In fact, in their attempts to establish or maintain positive school cultures that value using multiple forms of data to make informed decisions, principals should intentionally rely on the knowledge, skills, and expertise of teachers. It is important for leaders to incorporate the core values and beliefs of teachers and staff in order to create a collective vision for curricula, instruction, assessment, school environment, and collaborative data use (Bernhardt, 2016). Hord (2009) studied schools with supportive cultures in which staff members viewed each other as caring, cooperative, intellectually curious colleagues who wanted to learn as much as they could in order to be the best teachers they could be for their students. Based on the findings in this

study, teachers and staff at schools with supportive cultures conducive to learning communities and collaborative data use take time to build trust and relationships intentionally in order to foster collegiality (Louis, 2007). Gray et al. (2016) found that the principal's ability to create enabling school structure, collegial trust, and an academic emphasis was an antecedent to effective and sustainable PLCs. Louis (2007) concluded that trust was a critical factor in successfully engaging teachers and staff in the difficult work of PLCs and collaborative data use. Schildkamp et al. (2019) found that principals who created a positive climate for data use were more successful in creating effective, collaborative data-use teacher teams.

Develop a Positive, Data-Informed Culture

Hord (2008) encouraged principals to engage in the development of a strong culture in which teachers and staff value collaboration, professional learning, data-informed decision making, inquiry, and collective responsibility. Principals should engage teachers and staff in a beginning-of-year process for developing and committing to a collective mission and shared vision based on the core values and beliefs of teachers and staff (DuFour, 2006). Core values and beliefs should be developed in response to the premise that “the fundamental purpose of the school is to ensure that all students learn at high levels” (DuFour, 2006, p. 11). Several data-use protocols exist that school leaders and teachers can use to develop a school mission and vision specific to the organization's goals in terms of curriculum, instruction, assessment, and student learning (Bernhardt, 2016). The process should allow participants to review and triangulate multiple sources of data regarding the current state of the school, develop their own core values and beliefs in response to the data, work in collaborative groups to categorize and narrow their core values (Bernhardt, 2016; Hord, 2008). Participants

then summarize that information to synthesize a mission statement that includes a clear purpose and a shared vision statement clearly articulating student outcomes (Bernhardt, 2016; Hord, 2008).

Plan Actions around the Shared Mission and Vision

Gray et al. (2016) described the school structures that facilitate rather than hinder the establishment of effective PLCs. These structures emerge from developing organizational processes that are more participative, focusing on student learning, adopting a shared mission and vision, and building collective and collegial trust (Bernhardt, 2016; DuFour, 2006; Gray et al., 2016; Hord, 2008). Principals and school leaders should use the shared mission and vision statements to make decisions about curricula, instruction, assessment, intervention, resource alignment, data use, and PLCs. The shared mission and vision should guide decisions about continuous campus improvement, recruitment and selection of new teachers and staff, allocation of school resources, development and refinement of school systems, conflict resolution, and the school environment.

Ongoing Review of Core Values, Shared Mission, and Vision

Bernhardt (2016) described the process of teachers and school leaders continually using multiple sources of school data to refine and revise the shared mission and vision to meet the evolving needs of a school. Principals should continually encourage teachers and staff to review and revise the mission and vision of the school to adjust and adapt to the changing needs of the students and the school. Teachers and staff should begin every school year and possibly every semester by reviewing the shared mission and vision to recommend revisions based on changes in data and emerging needs.

Create Conditions of Trust, Collegiality, and Professional Learning

Louis (2007) described enhancers of trust, including shared decision making based on stakeholders' perceptions and feedback. Principals should foster a positive school culture conducive to collaboration and professional learning by intentionally engaging teachers and staff in team-building activities that encourage trust and collegiality and include stakeholders in decision making (Louis, 2007). Principals should spend time gathering teacher perception data so they can engage teachers and staff in meaningful learning opportunities such as book studies and professional development sessions designed to encourage collaborative problem solving, trust, ownership, listening, and collegial relationships.

PLCs as Teacher-Driven Problem-Solving Teams

When teachers and staff work together to analyze data, share practices, and engage in collaborative problem solving, they can be more confident in their ability to meet the needs of individual students and achieve their shared missions and vision. Hord (2008) stated, "Learning in successful learning communities is based on collegial inquiry and reflection by participants" (p. 12). Collegial inquiry involves teachers and staff focusing on student learning, the instructional strategies to ensure that learning, and the barriers that prevent that learning from taking place. Ultimately, the cycle leads PLC participants to form plans or interventions they can apply in their practices. More data are collected as the teacher team implements the plan, and the team continues to meet to discuss successes and make adjustments.

Tan and Caleon (2016) found that receiving four elements—sufficient time, an opportunity to engage in collaborative problem solving, data about students' prior knowledge, and a theoretical framework promoting discussion—allowed teachers' problem-

solving discussions to focus on student learning and instructional action plans. Given the right level of professional support, a problem-solving process based on research, and the time to work, teachers can engage in productive problem solving centered on student learning and instructional solutions (Gregory, 2010). Based on the findings from this study, teachers value consistent opportunities to work together, analyze data, and create action plans.

Encourage Learning in Collaborative Problem-Solving Teams

Gregory (2010) found that teachers learn and increase instructional capacity through collaborative problem solving with colleagues. When teachers feel comfortable sharing information through problem-solving conversations, they are able to determine what practices work and do not work in adjusting approaches to meet student needs (Gregory, 2010; Leithwood et al., 1995). To promote teachers' engagement in effective problem solving regarding increased learning, aligned curriculum, and improved instruction, principals should provide teachers with training and support to apply a common problem-solving process or protocol that will help keep teachers' problem-solving discussions focused on student learning and improved instructional practices (DuFour, 2006; Gregory, 2010). Based on findings from this study and similar work, teachers learn from one another and benefit professionally when engaged in collaborative problem solving regarding student learning (Gregory, 2010; Schildkamp et al., 2019; Schildkamp & Kuiper, 2010).

Guide Teachers to Take Ownership of PLC Experiences

Hord (2008) described the importance of sharing leadership and encouraging buy-in from teachers engaged in PLC activities. Principals and members of the campus leadership team should attend PLC meetings to help guide and facilitate problem-solving discussions to ensure that teachers stay focused on student learning and action plans for improving

instruction. However, principals should not drive or dominate these meetings (Hord, 2008; Schildkamp et al., 2019). Instead, principals and school leaders should give teachers the autonomy to analyze and engage in their data to discover and explore root causes of problems, determine next action steps, and engage in the cycle of inquiry aimed at solving instructional and curricular problems (Schildkamp et al., 2019). Based on the findings in this and similar studies, teachers benefit from the autonomy to take ownership of their PLC experiences to improve instructional practices (Gregory, 2010; Schildkamp et al., 2019; Schildkamp & Kuiper, 2010).

Encourage Student-Centered Data Use

Jimerson et al. (2016) described the importance of including students in the formative assessment process. As teachers become more involved in creating assessments and collecting data, students should be more involved in data use. Students can engage with data through the use of data folders, goal-setting forms, data walls, and other strategies that specifically engage the learners in the data-use process and promote a growth mindset among students (Jimerson & Reames, 2015). While engaging students in data-use processes may result in positive learning outcomes and increased student motivation, a misinformed or misguided implementation of student-centered data use may result in a variety of student outcomes that may not all be positive (Jimerson & Reames, 2015). Principals and school leaders should carefully and collaboratively implement data-use practices that involve and engage students in their learning.

Recommendations for District Leaders

Findings from this study, in concert with the broader literature, suggest several avenues for central office leaders who may be working to improve their PLC and

collaborative data-use systems. Depending on the district's phase in this process, the following recommendations are offered for district leaders looking to improve PLCs through alignment of data-use systems and PLC protocols, alignment of resources, and levels of autonomy given to schools based on their specific needs.

Systems of Central Office Support

Support School PLCs

In a study on sustaining professional learning communities, Hipp et al. (2008) described central office behaviors as “a positive support rather than as a barrier to the work of the school” (p. 190). In order for a central office to remain a positive system of support for the work of PLCs and collaborative data use, central office educators should be intentional about understanding the needs of each individual school and aim to align their support systems to meet these needs. To accomplish this goal, central office leaders should support but not direct school leadership decisions and initiatives related to PLCs and collaborative work. Just as school leaders should leave the work of grade-level PLCs to the teachers on those teams, school leadership decisions should be made by school leaders. Based on the findings from this study and similar studies, central office leaders should guide and support decisions regarding professional development, allocation of resources, recruiting and hiring, curricula, instruction, assessment, and data use (Leithwood et al., 1995; Van Lare & Brazer, 2013; Wayman et al., 2012).

Create Explicit District-Wide PLC Guidelines

Leithwood et al. (1995) found that a coherent district-led sense of direction for PLCs helped school leaders and teachers develop and maintain a clear understanding and general direction regarding how PLCs and collaborative data use should operate. Central office

leaders should develop a district PLC and collaborative data-use handbook for principals and school leaders. The handbook should include expectations for professional learning, curricula, instruction, assessment, data use, PLC guidelines, resource allocation, and school systems. Central office leaders should take a facilitative and supportive role that empowers rather than undermines the decisions of teachers and school leaders that emerge from collaborative PLC work (Hipp et al., 2008). The district PLC handbook should be a living document developed collaboratively with school leaders, embodying the district's shared vision on PLCs.

Participate in School PLCs

As much as possible, central office leaders should be present at schools during team- and staff-wide PLC meetings to engage in the work and provide support, feedback, and assistance. When school leaders, teachers, and staff see central office educators engaging and participating in the work and sharing in the collaborative process, they feel validated and supported (Hipp et al., 2008). In addition, central office leaders can gain perspective as they visit different schools and help as school clusters work collaboratively to make improvements and increase student learning.

Alignment of Central Office Resources

Develop a District Shared Mission and Vision for PLCs

As school districts move from operating as hierarchical organizations, with the majority of decision making coming from a few members of the central office team, toward operating as learning organizations that embrace distributed leadership, it is important that central office leaders align resources with the shared visions of schools so school leaders, teachers, and staff can work toward achieving their goals. Leithwood et al. (1995) found that

centrally generated initiatives often fall short of aligning support and resources necessary to address the challenges faced by public schools. To ensure an alignment of resources and support, central office leaders should collaborate with district staff from all levels to create a clear, accessible shared vision and mission for PLCs that includes a commitment to high levels of learning and ensures the allocation of resources consistent with a commitment to life-long learning for all stakeholders (Gray et al., 2016).

Develop a Model for Professional Learning

Killion and Harrison (2016) identified the roles of successful district leaders in developing an effective system for professional learning. Central office leaders can positively influence professional learning by facilitating the development of professional learning systems and implementing and sustaining new learning at schools (Killion & Harrison, 2016). Central office leaders should create and maintain a model for providing and supporting continuous professional development for all teachers and staff. Central office leaders should provide individualized support to schools depending on the needs of the teachers and students (Schildkamp et al., 2019). In addition, schools should receive flexible professional development budgets that can be used to support the learning that best serves the teachers and staff at their campuses (Hipp et al., 2008). The findings in this study suggest that teachers and school leaders could benefit from central office professional-development guidelines that align with teachers' values and focus on positive student outcomes.

Develop District Goals that Support Campus Decisions

Adams (2016) found that system leaders who took a collaborative inquiry approach to supporting school leaders and improving student learning were able to build positive relationships with principals and teachers and play a collaborative role in school decision-

making processes. Central office leaders should create a framework for developing district goals and then provide school leaders with support in developing aligned goals based on the needs of the district and individual schools. Central office leaders should participate in schools' site-based decision-making meetings and make resource allocations based on the schools' decisions and needs (Adams, 2016). Findings from this study suggest that teachers are distrustful of district-level mandates requiring them to engage in what they perceived as unnecessary data-use work. When district leaders participate in site-based decisions at schools with principals and teachers, they build positive relationships and trust and are able to engage and positively guide the decision-making process (Adams, 2016).

Balance District Guidance and School Autonomy

Teachers and school leaders value and embrace the opportunities to commit to professional learning and high levels of learning for all students when they engage in the decision-making processes that guide their schools (Hipp et al., 2008; Leithwood et al., 1995). District leaders should provide guidance and support for schools and school leaders; in turn, teachers should enjoy a degree of autonomy when making decisions about curricula, instruction, assessment, data use, professional learning, and school process systems. To achieve this balance, district leaders should provide district guidelines for curricula, instruction, assessment, data use, and professional learning; however, they should allow school leaders and teachers to make campus-based decisions about curricula, instruction, assessment, intervention, data use, and PLC practices. The nature of PLCs is that of a collaborative inquiry, and problem solving requires autonomy (Hord, 2008). If principals and teachers are to become action-oriented practitioners, they will need a balance of guidance and

autonomy. District leaders should participate in and guide PLC and collaborative data-use decision making, but they should not drive these processes.

Hire Principals Committed to Professional Learning and Collaborative Data Use

Hord (2008) described the importance of leadership in developing and sustaining effective PLCs. District leaders should hire principals who are committed to and knowledgeable about PLCs and collaborative data-use best practices. District leaders should develop careful protocols for vetting new principals based on the candidates' understanding of and ability to implement effective PLCs focused on student learning, professional learning, data-informed problem solving, collaboration, and a culture of trust and collegiality (Hord, 2008). The findings of this study suggest that teachers value collaboration, collegiality, and a positive culture conducive to PLCs and data use. District leaders should be intentional about hiring school leaders who are committed to collaboration, collective responsibility, data-informed decision making, and collaborative problem solving (DuFour, 2006).

Implications for Policy Makers

School Improvement

As policy makers work to influence school reform and close the achievement gap, school reform policies have emerged that focus on student achievement and school improvement. Little (2002) concluded that policies regarding school reform should consider the capacity of schools to make necessary improvements based on schools' capacity to function as PLCs. Wayman et al. (2012) found that narrowing data use to one group of students or only to struggling students was not effective. Instead, data use should be multilayered and comprehensive. Booher-Jennings (2005) wrote specifically about the Texas

Accountability System, describing a system of “triage” that focused solely on test data and passing tests (p. 232). In fact, the school in Booher-Jennings’s study provided merely an appearance of goal attainment by finding certain loopholes. Policy initiatives for school reform should encourage best practice rather than manipulation of a fabricated system.

Avoid Over-Reliance on Standardized Testing

Based on the findings in this study regarding PLCs and collaborative data-use practices, school improvement policy decisions should encourage the use of multiple forms and broad sources of data. The findings in this study and details of the literature review indicate that teachers value and use multiple forms of data to triangulate and make informed decisions (Mandinach, 2012; Mandinach & Jimerson, 2010; Santangelo, 2009; Schildkamp et al., 2010). Too often, policy initiatives focus on limited data points such as standardized tests, attendance, or demographic data (Booher-Jennings, 2005). School improvement policies should focus on learning—for students, teachers, and all stakeholders. As schools and districts shift toward becoming learning communities committed to high levels of learning for all students, relying too heavily on limited sources of standardized assessment data to make decisions or drive reform efforts hinders the efforts of learning communities.

Avoid Punitive Accountability Systems

A punitive accountability system informed primarily by end-of-year standardized testing does not encourage or promote best practices for professional learning communities and collaborative data use as described in this study. Punitive accountability systems encourage school and district leaders to engage in exclusionary data-use practices that do not emphasize learning for all students (Booher-Jennings, 2005). Policy makers should adopt reform efforts and initiatives that encourage collaboration, effective data use, professional

learning, and a focus on all students learning at high levels. Policy implementations grounded in fear or punitive measures for schools that do not measure up encourage teachers and school leaders to engage in manipulative data-use practices that do not produce high levels of learning of all students (Booher-Jennings, 2005).

Implications for Future Researchers

Limitations of the present study included sample size and the nature of the case-study approach. However, as the principal of the school examined in the study, I can certainly use what I have learned about teachers' perception of data use and PLCs to inform my decision making. I can work to implement the recommendations I made for principals, and I can share my recommendations for central office leadership to the central office leaders in my district. Nevertheless, more research should be conducted on teachers' perceptions regarding collaborative data use and PLCs. Teachers can provide valuable insight into the nuanced variables that affect how teachers use data and information to make instructional decisions, adjust their practices, and meet student needs.

In addition, this was a qualitative study, and although informative and practical for the purposes of refining and improving PLC practices and supporting teachers' needs in a particular context, generalizing conclusions requires further research to explore the possible connection between teachers' perceptions of PLC practices and student learning and achievement. I suggest a quantitative or mixed-methods study to explore this connection. A quantitative or mixed-methods study could help principals and district leaders understand how teachers' perceptions of PLCs and self-efficacy affect student learning. Understanding that connection could inform professional learning and school improvement efforts.

Conclusion

The results of this study suggest that teachers know a great deal about PLCs and collaborative data use in schools. Teachers' perceptions of these practices are important in understanding barriers to improving PLC practices and ultimately student learning. It is important for principals and district leaders to be mindful of teachers' knowledge and perspectives about PLC practices. School improvement initiatives cannot succeed without buy-in and trust of the educators required to do the majority of the work. Moreover, based on the responses in this study, teachers appreciate effective data-use practices and want to use data to improve their practices and student outcomes. It is important for school and district leaders to listen to teachers and respond to their professional needs. The teachers in this study were the integral part of the PLCs at the school. If the school is to function as an effective learning community in the future, teachers must believe in what they are doing, receive the support they need, and experience success through their practices so PLCs become a sustained component of school culture.

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APPENDIX A

Survey Questions

Open-ended Survey Questions:

1. How do you use multiple forms of data to inform or adjust your planning and instruction?
2. What do you think is helpful and works well regarding data use?
3. What do you think is a waste of time or does not work well regarding data use?
4. How would you describe your level of expertise regarding data use?

Likert Scale Questions:

1. I am comfortable collaborating around data with colleagues.
2. When I examine data reports, I am confident that my interpretations are accurate.
3. Once I analyze data and draw conclusions, I know what action steps to take next.
4. I use a variety of data to inform my teaching and/or daily practices.
5. Data use helps me make informed decisions.
6. Data use benefits educators and students.
7. I am good at using data to diagnose students' learning needs.
8. I am good at using data to plan lessons.
9. I like to use data.
10. Using data helps me be a better teacher / educator.

All items will be set on a 5 point Likert Scale that includes the answer choices, “strongly disagree,” “disagree,” “neither agree or disagree,” “agree,” and “strongly agree.”

APPENDIX B

Focus Group Questions

Focus Group Questions:

1. Tell me about a time when you used data to solve a problem or improve your practices.
2. Describe how you go about analyzing and using data.
3. Some teachers might say that data use and PLC are a waste of time. What would you say?
4. What would be the ideal data-use system in a school?

Probing Questions:

Tell me more about that...

Give me an example of...

What was it like for you when...

APPENDIX C

Observation Protocol

1. Physical setting – Virtual Zoom Meetings
2. Participants – Grade level teacher teams PK - 5th grade
3. Activities / interactions – data analysis, examination of student learning, examination of learning standards, reviewing lesson plans and instructional activities, interventions, struggling students, scheduling and grouping students for the coming school year
4. Conversation – Group conversation, all participants participated, campus lead team members and grade level teams facilitated
5. My behavior – I did not lead or facilitate PLC meetings while I observed and collected; I observed and recorded data

APPENDIX D

Observation Log

Name	Description	Summary
PLC Meeting 1	Pre-K & Kindergarten PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATIION reading data, IREADY math assessment data, behavioral and social and emotional data, and other observational and formative data to create class lists for their students for 1st grade.
PLC Meeting 2	1st Grade PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATIION reading data, IREADY math assessment data, behavioral and social and emotional data, and other observational and formative data to create class lists for their students for 2nd grade.
PLC Meeting 3	2nd grade PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATIION reading data, IREADY math assessment data, behavioral and social and emotional data, and other observational and formative data to create class lists for their students for 3rd grade.
PLC Meeting 4	3rd grade PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATIION reading data, IREADY math assessment data, behavioral and social and emotional data, and other observational and formative data to create class lists for their students for 4th grade.
PLC Meeting 5	4th grade PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATIION reading data, IREADY math assessment data, behavioral and social and

emotional data, and other observational and formative data to create class lists for their students for 5th grade.

PLC Meeting 6	5th grade PLC	The teachers used multiple forms of data to make decisions about scheduling students for the coming school year. Teachers looked at End of Year reading assessment data, ISTATION reading data, IREADY math assessment data, behavioral and social and emotional data, and other observational and formative data to create class lists for their students for 6th grade.
PLC Meeting 7	2nd grade PLC	Teacher focused on data analysis and planning. Teachers conversations centered around the “What do we want our students to learn?” and “What do we do if our students are not learning?” questions. Teachers were looking at most recent CFA data and unit quick check data to plan tier 1 and intervention online lessons.
PLC Meeting 8	PK / Kindergarten PLC	Teachers had two general agenda items during this meeting: Retention discussion and grade level interventions. Teachers used the Light’s retention scale to discuss possible retention of students in kindergarten and teachers used LLI running records to discuss moving students or rearranging intervention groups.
PLC Meeting 9	3rd grade PLC	The 3rd grade team looked at the most recent CFA data to plan for upcoming tier 1 instruction and intervention groups. The discussed giving concise 4 step directions during Zoom meetings to help focus students and avoid student confusion and having to repeat instructions
PLC Meeting 10	4th grade PLC	Teachers looked at most recent CFA data and a unit quick check to plan instruction and intervention and to plan the next week’s virtual lessons.

APPENDIX E

Artifacts - PLC Documentation & Data Use Protocol

Artifact 1 - Campus Data Reflection Guides

Overall Passing (percentage at Approaches / Meets / Masters)																					
	STAAR 2019			CFA 1			CFA 2			Fall Bmk			CFA 3			Spring Bmk			STAAR 2020		
	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast
District	69%	40%	23%	71%	30%	15%	69%	38%	24%	72%	44%	17%	85%	69%	57%	71%	48%	20%			
Campus	71%	49%	26%	92%	59%	35%	92%	68%	52%	87%	57%	19%	99%	92%	86%	87%	68%	32%			
Teacher A				92%	59%	35%	92%	68%	52%	87%	57%	19%	99%	92%	86%	87%	68%	32%			
Teacher B																					
Teacher C																					
Teacher D																					
Teacher E																					
Teacher F																					
Teacher G																					

Campus Goals																		
	CFA 1						CFA 2						Fall Bmk					
	Approaches		Meets		Masters		Approaches		Meets		Masters		Approaches		Meets		Masters	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Goal (before)	75%	55	40%	29	25%	18	80%	60	50%	37	30%	22	80%	60	50%	38	30%	22
Actual (after)	92%	68	59%	43	35%	25	92%	69	68%	51	52%	39	87%	66	57%	43	19%	14
Difference	17%	13	19%	14	10%	7	12%	9	18%	14	22%	17	7%	6	7%	5	-11%	-8
# students tested	74						75						76					
	CFA 3						Spring Bmk						STAAR 2020					
	Approaches		Meets		Masters		Approaches		Meets		Masters		Approaches		Meets		Masters	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Goal (before)	85%	65	70%	53	60%	46	90%	70	70%	54	50%	39	100%	0	80%	0	60%	0
Actual (after)	99%	76	92%	70	86%	66	87%	67	68%	53	32%	24	0	0	0	0	0	0
Difference	14%	11	22%	17	26%	20	-3%	-3	-2%	-1	-18%	-15	-100%	0	-80%	0	-60%	0
# students tested	77						78											

Overall Passing (percentage at Approaches / Meets / Masters)																					
	STAAR 2019			CFA 1			CFA 2			Fall Bmk			CFA 3			Spring Bmk			STAAR 2020		
	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast	App	Meets	Mast
District	75%	41%	22%	61%	29%	12%	87%	59%	31%	61%	39%	17%	73%	49%	19%						
Campus	78%	45%	25%	65%	29%	7%	90%	60%	32%	65%	37%	18%	77%	42%	9%						
Teacher A				74%	29%	12%	95%	66%	29%	75%	47%	19%	81%	46%	16%						
Teacher B				57%	29%	3%	88%	56%	33%	54%	26%	17%	73%	38%	3%						
Teacher C																					
Teacher D																					
Teacher E																					
Teacher F																					
Teacher G																					

Campus Goals																		
	CFA 1						CFA 2						Fall Bmk					
	Approaches		Meets		Masters		Approaches		Meets		Masters		Approaches		Meets		Masters	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Goal (before)	75%	51	40%	27	25%	17	75%	55	40%	29	25%	18	80%	56	50%	35	30%	21
Actual (after)	65%	44	29%	19	7%	4	90%	66	60%	44	32%	23	65%	46	37%	26	18%	12
Difference	-10%	-7	-11%	-8	-18%	-13	15%	11	20%	15	7%	5	-15%	-10	-13%	-9	-12%	-9
# students tested	68						74						71					
	CFA 3						Spring Bmk						STAAR 2020					
	Approaches		Meets		Masters		Approaches		Meets		Masters		Approaches		Meets		Masters	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
Goal (before)	70%	51	40%	29	20%	14	80%	0	45%	0	30%	0	90%	0	60%	0	40%	0
Actual (after)	77%	56	42%	31	9%	6	0	0	0	0	0	0	0	0	0	0	0	0
Difference	7%	5	2%	2	-11%	-8	-80%	0	-45%	0	-30%	0	-90%	0	-60%	0	-40%	0
# students tested	74																	

Artifact 2 - Item Analysis

1	13	5.6F Making Inferences	95%	I taught the kids to analyze their metacognition using a graphic organizer. I have also hammered home that topic is the central idea of the text. We have been very repetitive about that, and it stuck with the kids. All they really had to do was look for the topic here.	The kids worked on proving their inferences with text evidence	This seemed like a VERY easy question if the kids paid any attention to central idea of the text.
2	15	5.3B Context Clues	91%	Using the dictionary to look up definitions	Using the dictionary in conjunction with context clues is the best way to teach vocabulary	These were pretty easy questions because the answer were very similar to the dictionary definition. The kids are slow at finding words in the dictionary though, so we definitely need to practice using the dictionary quickly.
3	6	5.6F Making Inferences	91%	I taught the kids to analyze their metacognition using a graphic organizer	The kids worked on proving their inferences with text evidence - we also discussed the author's usage of an introduction paragraph	This is also a very easy question if you paid attention to the topic of the text.
4	7	5.3B Context Clues	89%	Using the dictionary to look up definitions	Using the dictionary in conjunction with context clues is the best way to teach vocabulary	These were pretty easy questions because the answer were very similar to the dictionary definition. The kids are slow at finding words in the dictionary though, so we definitely need to practice using the dictionary quickly.
5	2	5.3B Context Clues	89%	Using the dictionary to look up definitions	Using the dictionary in conjunction with context clues is the best way to teach vocabulary	These were pretty easy questions because the answer were very similar to the dictionary definition. The kids are slow at finding words in the dictionary though, so we definitely need to practice using the dictionary quickly.

Artifact 3 - Teacher Action Plan

5B - Teacher A			
Class	2		
Group	1 ▼	Essential Standard	5.3B
Area of Focus	Context Clues and Dictionary		
Action Plan			
<p><i>Group will meet during intervention and practice finding words in the dictionary. We will also address identifying parts of speech and multiple meaning words in a sentence. The students will have to justify their definition choice with evidence from the sentence (context clues).</i></p>			
<p><i>*highlight student group on SE Tutorial report, use the Quintile report to identify overall student performance level</i></p>			
Class	2		
Group	2 ▼	Essential Standard	5.6F
Area of Focus	Making Inferences and Justifying Using Textual Evidence		
Action Plan			
<p><i>In a previously read aloud text, students will be given three inferences, and they will have to find the best sentence in the passage that justifies the inference.</i></p>			

APPENDIX F

Interview Questions

I am collecting information about teachers' perceptions regarding data use in schools for my doctoral dissertation.

Your identity will remain confidential, and I will not use your name when sharing my findings.

I have final say over the content of this study.

This will be a short and focused interview with five questions and possibly some probing questions if I want to hear more about something you are talking about.

1. What do you think about using data at school?
2. How confident are you in analyzing and using data?
3. Can you give me an example of good data use?
4. Describe barriers at school that prevent you from using data effectively.
5. In terms of data use at school, what do you wish you knew more about?

Probing Questions:

Tell me more about that...

Give me an example of...

What was it like for you when...