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An Analysis of Variance in Teacher Self-Efficacy Levels Dependent on Participation Time in Professional Learning Communities

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ABSTRACT

The purpose of this study was to determine variance in mean levels of teacher self-efficacy (TSE) and its three factors – efficacy in student engagement (EIS), efficacy in instructional strategies (EIS), and efficacy in classroom management (ECM) – based on participation and time spent in professional learning communities (PLCs). In this cross-sectional study, 123 teachers from two similarly profiled high schools in one, New Jersey urban public school district were surveyed using the Teacher Sense of Efficacy Scale (Tschannen-Moran and Hoy, 2001). An independent sample *t* test was used to measure variance in mean levels of TSE, ESE, EIS, and ECM between two independent groups, those teachers who did participate in PLCs and those teachers that did not participate. Results revealed no statistically significantly different mean composite and factor efficacy levels based on participation in PLCs. An analysis of variance was used to measure variance in mean levels of TSE, ESE, EIS, and ECM among four independent groups, (a) those that did not participate in PLCs, (b) those that participated in PLCs one day a week, (c) those that participated in PLCs two days a week, and (d) those that participated three or more days a week. Results revealed statistically significantly different mean levels of TSE and ESE between those that did not participate in PLCs and those that did participate in PLCs three or more days a week. In other words, those teachers that participated in PLCs three days or more a week had significantly higher TSE and ESE beliefs than those that did not participate in PLCs.

Keywords: teacher self-efficacy, professional learning communities, professional development, sources of efficacy

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DEDICATION

I dedicate this work to my two children, Emma Virginia Marx and Thomas Samuel Marx. Emma and Thomas: Thank you for playing outside with Daddy so that I could work on my dissertation. I love you both very much and smile thinking of how blessed Daddy and I are to have two very special, happy, loving children. G'Dude gave me good advice about learning: Have fun! Always have fun learning, because then you too can do great things like be an author or a whole body doctor. Guys: Mommy finished her dissertation!

Submitted in memory of my grandmother Virginia Salmon Desmond who graduated in the class of 1949 from Seton Hall University. You're right, Papaginsi: it's not just a party school.

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CHAPTER 1

INTRODUCTION

Introduction

Mahatma Gandhi once said "If I have the belief that I can do it, I shall surely acquire the capacity to do it even if I may not have it at the beginning." This profound and seemingly provocative statement is rooted in social cognitive theory that suggests one can achieve if one has the perception that he is capable of achieving, even if he does not have the skill set at the onset of the action. Bandura (1997) conceptualized this notion in his theories of self-efficacy: the belief in one's ability to execute actions to achieve desired outcomes. Although not to mean or imply *effectiveness*, the measurement of difference between desired and actual outcomes, efficacy can be a predictor of the likelihood that one can be effective. Bandura (1997) embraced the notion that one can effectuate change if one believes in his capacity to do so.

> Teachers with a high sense of instructional efficacy operate on the belief that difficult students are teachable through extra effort and appropriate techniques and that they can enlist family supports and overcome negative community influences through effective teaching. In contrast teachers who have a low sense of instructional efficacy believe there is little they can do if students are unmotivated and that the influence teachers can exert on students' intellectual development is severely limited by unsupportive or oppositional influences from the home and neighborhood environment. (p. 240)

This belief in one's self—this high sense of self-efficacy—drives the foundations for studying teacher self-efficacy for the purpose of driving instruction and increasing student achievement. Bandura (1997) defined teacher self-efficacy as the perceptions teachers have

about their own individual ability to support all students in reaching desired learning outcomes (personal or self-efficacy). Ross and Bruce (2007) extended this definition of teacher self-efficacy to include the ability to bring about student learning. Both definitions of the term imply that the higher the teacher self-efficacy, the more student achievement. Bandura (1997) examined four sources of efficacy, including (a) mastery experiences, (b) vicarious experiences, (c) physiological arousal, and (d) verbal interactions, the examination of which provided insight into the ways to effectuate change in efficacy levels. These sources of efficacy are defined later in this chapter and are further elaborated in Chapter II.

Tschannen-Moran and Hoy (2001) acknowledged the connection among these four sources of efficacy when they created the Teacher Self-Efficacy Scale (TSES), a measure for teacher self-efficacy. Their scale breaks down efficacy of teaching to three factors: (a) efficacious beliefs about student learning, (b) efficacious beliefs about instructional strategies, and (c) efficacious beliefs about classroom management. As such, it would be prudent to understand how to increase teacher self-efficacy through increasing teacher beliefs about their abilities to engage students, have strong classroom management, and utilize the best instructional strategies. Furthermore, Tschannen-Moran and McMaster (2009) offers that teachers can increase their beliefs through the four sources of efficacy, specifically through verbal persuasion. Such interactions could occur during professional development.

Ross and Bruce (2007) studied the effects of a professional development (PD) program on teacher self-efficacy.

> We recommend intensive qualitative studies of the effects of PD on teacher beliefs about their capacity, focusing especially on the extent to which PD influences teacher choices

> about the sources of efficacy information they attend to and how they process efficacy information. (p. 59)

Their findings were a call to action in that professional development played an important role in the development of knowledge, it is the interactions – the support and collaboration – that proved most positively to affect a teacher's efficacy – both in terms of her belief that teaching makes a difference and her ability to effectuate learning outcomes. Using this understanding of the nature of the sources of efficacy beliefs, we can begin to operationalize Bandura's notions that teacher efficacy can lead to increased learning through an increase in and consistent effort to provide teachers with the kind of professional experiences that heightens efficaciousness in teaching, such as collaboration and student-centered, learning-driven professional dialogue, and experience. Consistent with this idea of PD is the professional learning community.

Researchers and organizations struggle to operationalize the definition and characteristics of professional learning communities (PLCs). Lieberman and Miller (2011) synthesized research postulating professional learning communities (PLCs) as the key to teacher professional growth. They re-established the definition of a learning community as "on-going groups" that meet regularly. They "create and maintain an environment that fosters collaboration, honest talk, and a commitment to the growth and development of individual members and to the group as a whole" (p. 16).

The idea of facilitating professional growth through interactions—and specifically for these purposes the 'talk'—with colleagues is directly in line with Gibbs' (2002) postulations about vicarious experiences influencing one's efficacy beliefs with the goal of becoming more effective, i.e. increasing learning outcomes and Tschannen-Moran and McMaster's (2009) understanding of verbal persuasion.

Statement of Problem

Teacher self-efficacy is rooted in Bandura's social cognitive theory that one has the perception that he is capable of achieving, even if he does not have the skill set at the onset of the action. Bandura (1997) conceptualized this notion in his theories of self-efficacy: the belief in one's ability to execute actions to achieve desired outcomes. Further operationalized, teacher self-efficacy has come to mean the ability to bring about student learning (Ross & Bruce, 2007). Tschannen-Moran and Hoy (2001) constructed a scale to measure teacher self-efficacy based on the teacher's beliefs in his or her abilities with regard to (a) student engagement, (b) instructional strategies, and (c) class management practices. These three factors, aligned with Bandura's sources of teacher self-efficacy (Tschannen-Moran et al., 1998; Tschannen-Moran & Hoy, 2001), are the focus of much collaboration and professional development, especially in low performing urban communities. Such collaboration and interaction exists in the form of professional learning communities which is postulated to facilitate professional growth as it relates to teacher self-efficacy (Gibbs, 2002; Richmond & Manokore, 2011).

Tschannen-Moran and Hoy's (2001) measured was a call to action for researchers to determine ways that teacher efficacy could be influenced in order to increase student outcomes. Alas, frequently advanced yet uninvestigated in the empirical research is the notion that more research needs to examine potential predictors of and influences on teacher self- efficacy, especially with regard to professional development that targets instructional strategies, classroom management, and student engagement.

As educational best practices implicates collaboration through professional learning communities (PLCs) and high efficacy beliefs among teachers, it is imperative that factors that increase teacher self-beliefs about their abilities be explored so that student learning can be

maximized. Do they improve student achievement and teacher self-efficacy? These studies have addressed the success of professional learning communities in various school settings, and many of them have focused on elementary or non-domestic learning communities. Few studies have addressed the success of PLCs in high schools, specifically in urban districts where raising student outcomes is an administrative team focus.

Moreover, many researchers leap over self-efficacy in favor of identifying a connection between implementing PLCs and improving student achievement; however this correlation is not a direct one. If the idea that high teacher self-efficacy makes a teacher more likely to use best practice is accepted, which in turn maximizes student success, then studies should focus on the extent to which PLCs improve self-efficacy.

School and district leaders make decisions driven by economic forces (i.e. funding and budgetary constraints) and professional growth-forces resulting from new evaluation methods and growing desire in the field and by outside constituents. These necessary decisions often are the result of quantifying the economic value attached to the *line item*. The answer to the question of how professional learning communities will contribute to student achievement and what the value is in committing funding to teacher efficacy lies in the further research that school administrators need to prioritize professional development that contributes not only to teaching strategies that increase student achievement but also to initiatives that increase teacher efficacy, effectuating the same results.

Purpose of Study

The purpose of this study is to investigate the effects of time spent in PLCs in urban high schools on teacher self-efficacy; one's belief in his or her ability to be an effective educator. As educational best practice implicates collaboration and high teacher self-efficacy through

professional learning communities (PLCs), it is imperative to explore whether PLCs are effective in raising teacher's self-beliefs about their abilities to maximize student learning. Is there a correlation between time spent in PLCs and the level (positive or negative) of teacher self-efficacy? Do teachers who participate in PLCs have a higher teacher-self efficacy than teachers who do not participate? Do levels of teacher self-efficacy correlate with time spent in PLCs? If yes, what factor of efficacy—instructional strategies, classroom management, and student engagement—most benefits from time spent in PLCs. The goal of this study is to determine whether educational researchers should invest more empirical research on the ability to change levels of efficacy and for educational leaders to determine the value of PLCs as they support the ability to effectuate efficacy beliefs.

Research Questions

The following research questions guide the study:

1. Do teachers who participate in PLCs have higher levels of teacher self-efficacy than teachers who do not participate?
2. Do teachers who participate in PLCs have higher levels of efficacy in student engagement than teachers who do not participate?
3. Do teachers who participate in PLCs have higher levels of efficacy in instructional strategies than teachers who do not participate?
4. Do teachers who participate in PLCs have higher levels of efficacy in classroom management than teachers who do not participate?
5. Does length of time in PLCs have an impact on levels of teacher self-efficacy?
6. Does length of time in PLCs have an impact on levels of efficacy in student engagement?

7. Does length of time in PLCs have an impact on levels of efficacy in instructional strategies?
8. Does length of time in PLCs have an impact on levels of efficacy in classroom management?

Null Hypothesis

1. There is no statistically significant difference in teacher self-efficacy ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
2. There is no statistically significant difference in efficacy in student engagement ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
3. There is no statistically significant difference in efficacy in instructional strategies ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
4. There is no statistically significant difference in efficacy in classroom management ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
5. There is no statistically significant relationship between time spent in PLCs and teacher self-efficacy.
6. There is no statistically significant relationship between time spent in PLCs and efficacy in student engagement.
7. There is no statistically significant relationship between time spent in PLCs and efficacy in instructional strategies.
8. There is no statistically significant relationship between time spent in PLCs and efficacy in classroom management.

Significance of the Study

Evans and Tribble (1986) called for more research on the connections between efficacy and PD, especially with secondary education teachers. Lumpe (2007) synthesized research to reconceptualize our notions of PD to lend for more collaboration among colleagues for the purposes of sustained inquiry to improve student achievement. The call to researchers is to determine more discretely the extent to which these PLCs can increase both faculty collective-efficacy and teacher self-efficacies. Because there is evidence that teacher efficacy is not merely a byproduct of student achievement and worth more consideration as a driving variable in learning outcomes, then teacher efficacy is a timely research focus of doctoral students. Nevertheless, there is a need for further investigation among educational researchers.

The gaps in peer-reviewed research seem to be vast. Few studies address the success of professional learning communities in high schools--specifically in urban districts--in raising teacher self-efficacy. In fact, very few studies have included teacher self-efficacy as a dependent variable. Moreover, many researchers leap over self-efficacy in favor of identifying a connection between implementing PLCs and improving student achievement; however this connection is not a direct one. The research that has been published seems to lack a focus on the impact of time spent in domestic, cross-curricular (outside of the STEM classes), professional learning communities in urban high schools, and its effect on teacher self-efficacy. This study aims to address the gap in the research and provide insight for both researchers and educational leaders about how to impact teacher self-efficacy.

Limitations

One limitation of this study is that the focus is only on the effects of time spent in PLCs on teacher self-efficacy, and not on the effects time in PLCs on collective efficacy of the faculty.

Although studying collective efficacy might yield results that would provide more information about how to impact self-efficacy, the scope of this study did not include perceptions of the faculty as a whole. Another limitation of this study is the size of the sample and the limit of the study to two urban high schools in one district. A third limitation is that this study is cross sectional. A longitudinal study that looked at changes in teacher self-efficacy levels over time spent in PLCs would be compelling. Nevertheless, without first establishing any variance in mean efficacy levels dependent on time spent in PLCs, the study of impact over time is unnecessary.

Delimitations

This study focused on all teachers in two urban high schools with comparable demographics in one district. This is a cross-sectional study with a one-time measurement of perceptions of self-efficacy and time spent in PLCs over the course of the academic year.

Definition of Terms

Teacher self-efficacy. A teacher's belief that he or she has the ability to bring about student learning and achievement. Bandura (1997) proposed four sources of efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological arousal.

Mastery experiences. The greatest sources of efficacy defined as those experiences teachers have in their instruction where students are successfully learning. These experiences invoke a greater sense of efficacy.

Vicarious Experiences. A source of efficacy that is defined as the demonstration of a targeted instructional activity by a teacher that serves as the observing teacher's model. This observation is not evaluative in nature; rather, it is for the purpose of seeing a colleague effecting

positive educational outcomes in the hopes that the experiences offer both an increased belief in the observer's ability and in the actual capability of performing the same instructional activity.

Verbal persuasion. Verbal interactions between a teacher and other learning community members, for example administrators, colleagues, mentors, parents, and students that focus on the success of the teacher in his instructional program.

Physiological arousal. The response—physical, emotional, or physiological in nature—to an activity. For example, if a teacher's response to an instructional activity is positive, in part because it is successful, he or she is likely to perceive an increase in her ability to get students to learn.

Collective efficacy. A faculty's belief that the faculty collectively has the ability to make learning happen and to increase student achievement.

Efficacy v. effectiveness. Efficacy is the belief that one can bring about student learning. Effectiveness is the actual ability to bring about student learning. Efficacy is a perception; effectiveness is a quantitative and evidenced-based measure.

Teachers' Sense of Efficacy Scale (TSES). The scale developed by Tschannen-Moran and Hoy (2001) which measures teacher self-efficacy, in other words, it measures teachers' perceptions about their abilities to achieve learning outcomes. Efficacy is a construct with three factors: efficacious beliefs about student engagement, efficacious beliefs about classroom management, and efficacious beliefs about instructional strategies. This scale was used as the tool by which teachers communicated their perceptions about their abilities to bring about learning.

Efficacy in student engagement. This factor of teacher self-efficacy will allow the researcher to measure the extent to which teachers believe that they can engage students in learning.

Efficacy in instructional strategies. This factor of teacher self-efficacy will allow the researcher to measure the extent to which teachers believe that they can employ sound instructional practices to bring about student learning.

Efficacy in classroom management. This factor of teacher self-efficacy will allow the researcher to measure the extent to which a teacher believes he or she can employ effective classroom management strategies in order to create opportunities for learning.

Professional learning communities (PLCs). Consistent and deliberative collaboration that is on-going groups and meets regularly for the purpose of professional growth and improving teacher practice.

Collaboration or talk. This term refers to teachers regularly communicating with one another for the purposes of identifying and implementing best practices, increasing student engagement and achievement, and professional development.

Organization of Study

The purpose of this study is to investigate the effects of time spent on PLCs on teacher self-efficacy beliefs. Chapter II is the literature review for this study, as well as an analysis of the empirical research on PLCs as it relates to teacher efficacy and a description of the gaps in the research. Chapter III addresses the design and procedure of this cross-sectional study, as well as the instruments and the method for data analysis. Chapter IV provides an analysis of the findings of the study. Finally, Chapter V provides as examination of the implications of this

study and further insight into the policy, research, and practice of PLCs as a tool for increasing teacher self-efficacy levels is provided.

CHAPTER II

LITERATURE AND RESEACH

Self-efficacy

The core of Albert Bandura's social cognitive theory is perceived efficacy, that is, self-efficacy is defined as the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3). In other words, someone with a high self-efficacy believes in his or her ability to act or effectuate with regard to a particular function, even if knowledge of that function is limited. A person with low or negative efficacy levels would believe himself or herself incapable of executing a task, especially in light of his or her skill level. Therefore, accepted is that perceived self-efficacy is not a measure of the skills one has but rather a belief about what a person can do under different sets of conditions with whatever skills he possesses (Bandura, 1997).

In contrast to effectiveness--defined as the unit of difference between expected or desired results and actual outcomes--efficacy is a measure of belief in the ability to achieve a desired outcome. Bandura (1997) established the importance of (a) cognitive awareness of efficacy and (b) promotion of high levels of efficacy in relationship to effectiveness:

> People who have strong beliefs in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an affirmative orientation fosters interest and engrossing involvement in activities. They set themselves challenging goals and maintain strong commitment to learn. They invest a high level of effort in what they do and heighten their effort in the face of failures or setbacks. They remain task-focused and think strategically in the face of difficulties. They attribute failure to insufficient effort, which supports a success orientation. (p.39)

The "success orientation" referred to by Bandura suggests that efficacy is an active determinant of or contributor to rather than just a predictor of human attainments. People with high efficacy beliefs actively make things happen, rather than passively submitting themselves to happenings. Embedded in Bandura's ideas is the notion that the higher the sense of efficacy a person has, the more likely he or she is to be successful at achieving his or her desired outcomes. Conversely, a low sense of efficacy could contribute to not being able to achieve expected results. Tschannen-Moran and Woolfolk Hoy (2007) argued that these self-efficacy beliefs are thus "self-fulfilling prophecies" (p. 945) in their validation of capability or incapacity.

Teacher Self-efficacy

If perceived efficacy is the belief that one can bring about change, then teacher self-efficacy is a "teacher's expectation that he or she will be able to bring about student learning" (Ross & Bruce, 2007, p.50). In other words, a teacher with high efficacy, believes within his or her power is the ability to increase student achievement. To be clear, this is not to say that the teacher effectuates the achievement. Rather, he or she believes it is within his or her domain to make learning happen. Bandura (1997) defined characteristics of teacher self-efficacy as follows:

> Teachers with a high sense of instructional efficacy operate on the belief that difficult students are teachable through extra effort and appropriate techniques and that they can enlist family supports and overcome negative community influences through effective teaching. In contrast teachers who have a low sense of instructional efficacy believe there is little they can do if students are unmotivated and that the influence teachers can exert on students' intellectual development is severely limited by unsupportive or oppositional influences from the home and neighborhood environment. (p. 240)

Essentially, teachers with high senses of teacher self-efficacy believe in their abilities to make learning happen even in the face of the most negative and impeding external influences that affect and create unmotivated students. Teachers who believe in their abilities to effectuate and actuate learning will do so, even with--what low efficacy teachers would call--un-teachable students and in what nonbelievers would call a learning environment not conducive to learning.

Midgley, Feldlaufer, and Eccles (1989) found that teacher efficacy beliefs affected student belief in ability. Moreover, Midgley et al. found that students with highly efficacious teachers found mathematics less difficult than students with less efficacious teachers. Changes in students' perceptions about subject matter as they related to teacher self-efficacy were found to be more significant in low-achieving students. This provocative discovery suggests that despite a tendency to put efficacious teachers with high-achieving students, teachers with high efficacy should work with struggling students. Furthermore, the more teachers that are highly efficacious work with underperforming student bodies in communities with several oppositional influences, the more positive results will be found. This finding could have a tremendous impact for school and district administrators who want to look for low-cost methods for increasing student achievement in new and compelling ways. Imagine that an administrator would not only invest time in increasing student achievement but would also identify ways of increasing teacher efficacy.

Bandura's Four Sources of Efficacy

Bandura (1997) proposed four sources of efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological arousal. He proffered mastery experiences as the most effecting source because the term refers to actual teaching accomplishments with students. Efficacy is raised if a teacher believes her instruction is successful; this experience

contributes to notions of future expectations presumed to be successful too. Implied is the repetition of experience through action in order to increase one's belief that one is capable. The term *vicarious experiences* refers to the modeling of what Tschannen-Moran and Woolfolk Hoy (2007) referred to as a "target activity" (p. 945). The connection an observer feels to that model will contribute to the observer's sense of efficacy.

Physiological arousal occurs based on the response—emotional, psychological, or physical—to an activity. For example, a teacher's sense of efficacy may increase by means of the joy experienced from successfully teaching a lesson, or a teacher's sense of efficacy may decrease as a result of a lesson not going as well as planned. Bandura (1997) highlighted the relationship between sources and efficacy as they pertain to arousal as follows:

> When faced with academic stressors, teachers of high perceived efficacy direct their efforts at resolving problems. In contrast, teachers who distrust their efficacy try to avoid dealing with academic problems, and, instead turn their efforts inward to relieve their emotional distress. The pattern of coping by withdrawal heightens emotional exhaustion, depersonalization, and a growing sense of futility. (p. 242)

Finally, Tschannen-Moran and Woolfolk Hoy (2007) fleshed out the meaning of these sources of verbal experiences in the following statement: "verbal interactions that a teacher receives about his or her performance and prospects for success from important others in the teaching context, such as administrators, colleagues, parents, and members of the community at large" (p.945). Significant here is the talk that occurs that can increase a teacher's belief about his or her ability to teach. Fundamentally, a part of current educational trends and policy in terms of evaluation and professional growth is the notion that collaboration through dialogue begets increased achievement.

Collective Efficacy

Collective teacher efficacy is "the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students" (Goddard, Hoy, & Hoy, 2000, p. 480). Bandura (1997) proposed a correlation between teacher efficacy and collective efficacy in the following statement: "Perceived self-efficacy operates as a higher order determinant with broad impact on attitudinal, affective, motivational, and behavioral aspects of functioning. Therefore, perceived collective efficacy represents an overriding quality that affects different aspects of a social system" (p. 247). In other words, collective efficacy is a way of conceptualizing the normative environment of a school and its influence on both personal and organizational behavior (Goddard et al., 2000).

The importance of considering the faculty's belief system about their capability to influence and effectuate has everything to do with the notion Bandura (1997) proffered about efficacious schools. Not only do they "endorse high standards but back them up with mastery aids for success. Teachers maintain a resilient sense of instructional efficacy and accept a fair share of responsibility for their students' academic progress" (p. 244). In other words, teachers in an efficacious school who have high efficacy beliefs individually and collectively have the power to overcome the oppositional influences on students and the learning environment and with resilience effectuate learning.

Bandura (1993) acknowledged that there is a profound relationship between efficacy, specifically here a collective instructional efficacy, and student achievement. He wrote,

> Adverse student body characteristics influence schools' academic attainments more strongly by altering faculties' beliefs about their collective efficacy to motivate and educate their students than through direct effects on school achievement. Indeed, with

> staff who firmly believe that, by their determined efforts, students are motivatable and teachable whatever their backgrounds, schools heavily populated with minority students of low socioeconomic status achieve at the highest percentile ranks based on national norms of language and mathematical competencies. (p. 143)

In a study that synthesized collective efficacy beliefs, Goddard, Hoy, and Hoy (2004) clarified that efficacy is only a belief and should not be misunderstood as the action or "competence" in performance; there is a logical misassumption that "teacher efficacy" is synonymous with "teacher effectiveness" (p.4). Therefore, to be clear, teacher efficacy is not the act of improving student achievement. Rather, Goddard et al.'s synthesis of research shows that teacher efficacy is a predictor of productive teaching practices. For example, relative to teachers with low self-efficacy beliefs, teachers with high self-efficacy, that is, belief in their abilities, tend to employ classroom strategies that are more organized and better planned, student centered, and humanistic. The connection to student achievement is, therefore, that teachers with strong perceptions of self-capability possess qualities that explain the positive link between one's sense of self-efficacy and action or performance outcome.

Worth noting is that Goddard et al. (2004) suggest that collective efficacy and self-efficacy manifest themselves through much the same process. Significant is the implication that administrators can create increased student achievement holistically through implementing ways of increasing collective efficacy. One way is to focus on increasing teacher self-efficacy.

Research on Efficacy and Learning Outcomes

Gibson and Dembo (1984) highlighted the convergence of the multidimensional factors of teacher efficacy through their construct validation of their Teacher Efficacy Scale. In the several phases of their study, teacher efficacy is separated from teacher effectiveness. Although

statistical significance of their data was not always found, observable differences in high-efficacy teachers and low-efficacy teachers were identified. For example, high-efficacy teachers probed students during questioning and criticized students less. Again, these results were not statistically verified, and further investigation was deemed necessary before data could be considered conclusive. Nevertheless Gibson and Dembo opened the door for further research and practice that explored increasing a teacher's sense of efficacy to increase teacher effectiveness.

With some authority of tone, Bandura (1997) asserted that Gibson and Dembo's findings were foundational elements of teacher's perceived efficacies. He stated,

> Teachers who have a high sense of instructional efficacy devote more classroom time to academic activities, provide students who encounter difficulties with the guidance they need to succeed, and praise their academic accomplishments. In contrast, teachers of low perceived efficacy spend more time on nonacademic pastimes, readily give up on students if they do not get quick results, and criticize them for their failures. Thus, teachers who believe strongly in their ability to promote learning create mastery experiences for their students. (p.241)

In creating these "mastery experiences" for students, teachers with high efficacy tend to set higher goals for students, maintain higher standards for their pupils, help sustain on-task behavior, and clearly communicate clearly expectations of students (Allinder, 1995). Teachers who do not follow these behaviors show weak commitment to teaching (Evans & Tribble, 1986) and devote less time to academic matters (Gibson & Dembo, 1984). Coladarci (1992) found that a high sense of efficacy was a strong predictor of a person's commitment to teaching. He argued that a greater sense of teacher commitment can be expected among teachers who "believe student

achievement can be influenced through skillful instruction, who have confidence in their own ability to influence student achievement, and who assume personal responsibility for the level of student achievement they witness in their classrooms" (p. 334).

Ashton and Webb (1986) were among the first researchers to explore the direct relationship between teacher efficacy and student achievement. They found a correlation between teachers' beliefs about their instructional practices and student achievement over the course of a year. Among seasoned teachers of students in remedial classes, students whose teachers had a high sense of instructional efficacy learned more. Anderson, Greene, and Lowen (1988) also found that personal efficacy beliefs at the beginning of the year affected student achievement, especially in lower grade levels.

More recently, Hoy, Sweetland, and Smith (2002) found that when collective efficacy was high, teacher behavior was influenced by academic pursuits. This influence both directs persistence and reinforces a pattern of efficacious beliefs. They found that academic press—the extent to which a school is driven by the quest for academic excellence—works through collective efficacy to increase student achievement. Hoy et al. reinforced the reciprocal relationship between self-efficacy and collective efficacy when they wrote the following:

> As teachers experience successes and observe the accomplishments of their colleagues, as well as success stories of other schools, they develop beliefs in their own capabilities to succeed. It seems that personal teaching efficacy promotes collective efficacy, which reinforces personal teaching efficacy. (p.91)

Hoy et al. argue for the development of these efficacies through attention to Bandura's (1997) four sources of efficacy.

Gibbs (2002), in a descriptive study of the connection between teacher efficacy and teacher effectiveness, asserted that teacher effectiveness is a product of self-efficacy. Self-efficacy is influenced by several of the sources of efficacy, one of which is *vicarious experience*: "Modeling the behaviour of significant others can strengthen self-efficacy." (Influences on Self-Efficacy). In his humanistic, physiological model of enhancing self-efficacy beliefs and control, Gibbs contended that teacher education—which can be inclusive of professional development—must develop a teacher's "cognitive capacities to self-reflect, self-motivate and self-regulate…so that teachers develop competence in exercising control of their thinking, behaviour and emotions" (Final Comments). In other words, modeling and self-reflecting on others' behaviors, can increase teacher self-efficacy, thus increasing the effectiveness of the individual teacher.

Professional Development and Efficacy Beliefs

Hoy et al. (2002) argue that teachers can be "changed by talks, workshops, professional development, and feedback about progress and achievement." (p. 91). Teachers need role models to demonstrate effective practices that achieve desired learning outcomes. These vicarious experiences will increase their mastery experiences in the form of their own positive instructional scenarios. These two sources of efficacy are important to the development of a teacher's perceptions and the collective beliefs among teachers at a given school about their abilities to influence teaching and learning. Thus, they might be essentially important to the administrator who must take measure of teachers' perceptions of their abilities to bring about student learning in order to identify ways of affecting those beliefs.

In their study of Adequate Yearly Progress (AYP) and its effect on teacher self-efficacy, Bryant and Yan (2010) identified that there were significant differences in levels of self-efficacy beliefs between teachers in AYP schools and those in non-AYP schools. They recommended

that, because such an external factor can affect a teacher's sense of efficacy, schools should support teachers to build an awareness of these external factors and how they can affect their perceptions about their abilities. Bryant and Yan also recommended teaching training programs that allow for clarification of efficacy beliefs and development of increasing efficacy. The contribution of this study to the understanding of self-efficacy is the affirmation that in urban schools, both teacher self-efficacy and collective efficacy can be dependent variables. This makes efficacy high stakes, because, as it has been shown, efficacy rates are related to student achievement as the independent variable. If a perception of self-efficacy can be changed, so could rates of student outcomes dependent upon that perception.

In a longitudinal study that analyzed the factors that affected teacher efficacy and burnout, Pas, Bradshaw, and Hershfeldt (2012) acknowledged that despite a continued interest in teacher efficacy and burnout due to the trend that half of all teachers leave the profession within five years, research on predictors of efficacy and burnout is limited. Pas et al. found that better teacher preparedness was associated with higher efficacy, initially. Alas, longitudinal rates of increase in burnout were higher among those who felt more prepared initially. Not only does this support foundational principles that efficacy is not related to skill level (Bandura, 1997), but this also suggests that rigorous training programs and other professional development, even for those who seem highly prepared, are integral for preventing burnout and maintaining high sense of efficacy. Pas et al. also identified teacher affiliation as a predictor of efficacy and burnout worthy of further considering. They wrote, "Teacher affiliation appears to be an important potential target, thereby suggesting that activities that promote the formation of strong staff relationships and collegial support may have a positive impact on teacher efficacy and burnout" (p.144). Professional learning communities—a form of professional development—can foster

these collaborative and collegial relationships and thus increase efficacy, of which Pas et al. encouraged further investigation: "additional research is needed on the impact of professional development and pre-service training programs that directly target preparedness and related teacher factors in order to determine their long-term effects on teacher efficacy, burnout, and ultimately, student outcomes." (p. 144). Worth noting for school leaders is the evolution of research in this area such that teacher efficacy is not only considered as the independent variable, but as a factor of other variables; a living state of belief that changes and can be developed.

Goddard et al. (2000) suggested that because of the relationship between collective efficacy and student achievement, administrators should, "lead schools in a direction that will systematically develop teacher efficacy; such efforts may indeed be rewarded with continuous growth in no only collective teacher efficacy but also student achievement" (p.483). In other words, leaders of an educational institution should invest time and resources in increasing teacher self-efficacy. The results may yield gains in collective efficacy, which, in turn, may yield higher rates of self-efficacy and results related to student achievement.

Chong, Klassen, Huan, Wong, and Kates (2010) investigated the relationship between middle school types—that is, based on achievement levels of students—and teacher efficacy beliefs and academic climate. Essentially, they found that a relationship between prior student achievement and teacher and collective efficacies existed. They wrote:

> Where schools have varied student ability groupings, efforts aimed at enhancing teacher efficacy needs to focus on specific school and teacher factors that facilitate student academic performance. The teacher behaviors measured…suggest that the teachers' perceived efficacy was related to their use of instructional strategies, their ability to

> manage their classroom and engage student in learning, and their administering student discipline. (p. 188)

Chong et al. cautioned against assuming that teachers, even those with high efficacy beliefs in their abilities, possessed the desire to change their behavior to increase their efficaciousness with regard to best supporting *all* students. While their differentiation of efficacy beliefs based on situation is aligned with other researchers' views, for example Wheatley (2005), there is a question about whether it aligned to Bandura's (1997) understanding that high teacher perceived efficacy is, by definition, inclusive of teaching to those unmotivated, underperforming students in the face of oppositional influences on learning.

Kelm and McIntosh (2012) addressed the issue of student behavior, discipline, and teacher efficacy in their study on teacher self-efficacy in schools that had implemented School-wide Positive Behavior Support (SWPBS), as compared to the efficacy of teachers in schools without such a program. The results were that teachers in SWPBS schools had significantly higher senses of self-efficacy. The researchers proposed that this heightened sense of efficacy is logical because the basis of the SWPBS program is to increase the organizational health of the learning environment, and thus allow for more on-task behavior and focus on student engagement. This in turn could explain why teachers are able to spend more time on the teaching task. More significantly, Kelm and McIntosh postulated that the increase in efficacy beliefs could be related to professional development provided to the teachers at the onset of SWPBS. They wrote,

> An additional factor that may have enhanced teacher efficacy in SWPBS schools is the approach's emphasis on instruction (e.g., teaching expectations, routines, and social emotional skills). When SWPBS is implemented in a school, teachers are provided with

> effective instructional strategies, such that using SWPBS may have resulted in improved instructional skills in general, which in turn may have lead teachers to report that they were better able to affect student outcomes. In addition, by using behavior support strategies that are used and promoted by fellow teachers and administrators, teachers may have had more confidence in the effectiveness of the strategies that they were using. (p.144)

Verbal persuasion—in essence the behavior strategies "promoted" by colleagues—is a source of efficacy as are the mastery experiences gained by implementing effective instructional strategies. The bolstering of a learning environment through "positive behavior supports" creates an arousal that stimulates efficacy beliefs as well. And during the implementation period of SWPBS, it might be assumed that strategies were modeled for teachers. Therefore, a teacher's efficaciousness would increase. Kelm and McIntosh (2012) noted that although there is significant research that has found a relationship between efficacy and student outcomes, "few studies have examined self-efficacy as a dependent variable" (p. 137). This is critically important to the true underpinnings of how efficacy can effectuate student achievement. Program implementation and professional development have the power to increase efficacy and consequently will lead to increased time on academic material, more on-task student behavior, and, in general, more opportunities for sound teaching and learning. Again, school leaders who are pondering how to fuel change might consider how this healthy learning environment stimulates academic press and ultimately begets increased student achievement.

Brady and Woolfson (2008) conducted a study to examine teachers' beliefs with regard to teaching students with learning difficulties. Central to Bandura's (1997) understanding of a

teacher's sense of efficacy is the teacher's belief in her ability to teach all students. Brady and Woolfson's study supports Bandura's understanding:

> Teachers with a higher sense of efficacy attributed the children's difficulties more to external factors than those with a lower sense of efficacy, suggesting that teachers who feel more competent and have a greater belief in the power of their profession are more comfortable in accepting some responsibility for the children's difficulties. (pp. 539-540).

Such a perspective suggests that an educational institution's efforts to increase efficacious beliefs among their teachers would lead to more students being more academically successful. Brady and Woolfson argued that not only should teacher training include best practice development but it should also tackle teacher beliefs about learners. Their study revealed the need to investigate further the kinds of professional development and training offered to teachers and to identify those that increase a teacher's beliefs about his or her ability to work with students who have difficulty learning.

A similar study that was conducted by Gotshall and Stefanou (2011) revealed the significance of vicarious experience and verbal persuasion, in the form of consultation, on levels of efficacy. These researchers found that, with regard to teachers who work with students with disabilities, on-going consultation supported teachers in feeling better about their teaching and avoiding a feeling of learned helplessness. This support was bolstered by a three-tiered system of Response to Intervention (RtI). Gotshall and Stefanou argued that the effect of the consultative relationship was on teachers' knowledge bases "with regard to making data-based decisions and in choosing appropriate empirically-validated interventions and implementing them with fidelity" (p. 329). As did Brady and Woolfson (2008), they defended the necessity of collaboration—here in the form of consultation—and argue that while training does not

necessarily correlate with positive perceptions about teaching, (a) on-going support will have positive effects on important affective outcomes and (b) further research on training and programs that support an increase in self-efficacy is needed.

Garvis, Twigg, and Pendergast (2011) addressed the issue of pre-service, early childhood, art teacher education and its ability to formulate self-efficacy. Founded on Bandura's (1997) sources of efficacy, Garvis et al. found that supervision for pre-service and novice teachers had a profound effect on the teacher beliefs in their capabilities to teach. Although specifically rooted in arts and early childhood education, the results of this study compel other researchers to continue to identify the ways that professional development increases teachers' perceptions of the worth and capability of their content areas and of learning in general, especially in light of negative views to which through vicarious experiences and verbal persuasions, pre-service and novice teachers are exposed. School leaders are very aware of negative perceptions and often seek ways to measure and cultivate changes in perceptions.

Professional Learning Communities

Ross and Bruce (2007) studied the effects of a professional development (PD) program on teacher self-efficacy. Focusing on standards-based mathematics teaching in Canada, they designed a PD program and administered the program to randomly assigned of sixth grade math teachers. Results of their study showed that the PD program had positive effects on teacher efficacy, although only one component of the study showed statistical significance. Their study revealed that there is a need to further investigate the relationship between professional development and teacher efficacy: "we recommend intensive qualitative studies of the effects of PD on teacher beliefs about their capacity, focusing especially on the extent to which PD influences teacher choices about the sources of efficacy information they attend to and how they

process efficacy information" (p. 59). What is so revealing about their discussion is the acknowledgement that efficacy informants are linked to professional development; yet, professional development here is limited to a formal program served outside the learning community for a limited amount of time. Lacking is the reality that sources of efficacy information exist within the learning community, and that communities of practice promote professional growth more collaboratively and with the intention of tapping into talent already existing in the community.

The research discussed is a call to action: More often teacher efficacy needs to be a dependent variable in studies that examine how and what kinds of professional development (PD) can increase perceptions about teachers' abilities to increase student achievement. While professional development plays an important role in the development of knowledge, it is the interactions—the support and collaboration—that prove most positively to affect a teacher's efficacy, both in terms of his or her belief that teaching makes a difference and his or her ability to effectuate learning outcomes. We can begin to operationalize and provide the empirical research for Bandura's notions that teacher efficacy can lead to increased learning through an increase and consistent effort to provide teachers with the kind of professional experiences that heightens efficaciousness in teaching, such as collaboration and student-centered, learning-driven professional dialogue and experience. Consistent with this idea of PD is the PLC.

Researchers and organizations struggle to operationalize the definition and characteristics of PLCs. Bringing together the commonly cited characteristics by several leaders in the field of collaboration and professional learning communities, The Center for Comprehensive School Reform and Improvement (2009) offered these essential elements of PLCs: (a) shared values and vision, (b) collaborative culture, (c) focus on examining outcomes to improve student learning,

(d) supportive and shared leadership, and (e) shared personal practice. These characteristics align with the Bandura's (1997) four sources of efficacy and DuFour (2004) offered three governing ideas related to PLCs: (a) ensuring that students learn, (b) a culture of collaboration, and (c) a focus on results. By focusing on achievement in collaborative dialogue, not only are teacher acting efficaciously but they are establishing a growth model for collective efficacy and student outcomes. For Bandura (1997) this was understood to be an essential component of collective efficacy, which, in turn, supports the increase of a teacher's own efficacy beliefs.

Sergiovanni's (2004) communities of practice and culture of collaboration supported Gibbs' (2002) argument for opportunities of vicarious experience and the attempt to self-control in order to achieve high performance outcomes and serve as a starting point for considering the idea that professional development can happen in-house through the collaborative efforts of learning through the collective intelligence of the organization. As Goddard et al. (2004) believed that collective efficacy and self-efficacy manifest themselves through much the same process, Sergiovanni's desired a learning community where teachers are empowered to be leaders who believe in and support their professional growth and student achievement and share in the learning and teaching experience. He suggested the need for a "balance of individual autonomy" (p. 17) and collaboration in order to establish a strong community of practice: "Competence in a school is too often divided among different people. That teaching is regarded as an individual practice, in strong contrast to what is found in most other professions, is a perfect example" (p. 17). The assumption here is that strong perceptions and outcomes of self-efficacy can exist only in a culture of collaboration, because vicarious experiences must be created out of the collective intelligence of the organization through professional growth within

the community of practice. Such a notion suggests that administrators have no choice but to consider ways of infusing more collaboration into their school culture.

Lieberman and Miller (2011) synthesized the research that had postulated that professional learning communities (PLCs) are the key to teacher professional growth. They re-establish the definition of a learning community as "on-going groups" that meet regularly. They "create and maintain an environment that fosters collaboration, honest talk, and a commitment to the growth and development of individual members and to the group as a whole" (16). The purpose of this study was to investigate previous research that explored the ways that learning communities transform teaching and learning. Lieberman and Miller analyzed five research studies that argued learning communities are a key element to professional growth and student achievement. Results of the analysis were the bolstering of an understanding of learning communities and their impacts on teaching and learning: "Communities eliminate teacher isolation and start with what teachers know and do. They expose teachers to what they need to know, offering support and opportunities to learn from one another …. Many teachers have significant expertise and can facilitate learning with their colleagues in a learning community" (p.19). The shortcoming of Lieberman and Miller's research is in the researchers' consideration of the various types of PLCs. For example, as 21st century learners in a web2.0 world, must PLC mean face-to-face meetings. As long as there is a forum or medium for regular, on-going, and consistent dialogue, then is there not a PLC?

PLCs and Efficacy Beliefs

The idea of facilitating professional growth through interactions—and specifically for these purposes the talk—with colleagues is directly in line with Gibbs' (2002) postulations about vicarious experiences influencing one's efficacy beliefs with the goal of becoming more

effective. Richmond and Manokore (2011) sought to explore critical elements of functioning and sustainable PLCs in Science departments. Their research was rooted in this problem statement that asked what features characterized talk by participants during PLC meetings and to what extent did PLC membership shape participants' reflection on their own teaching practice. These research questions explored the measurable relationship between PLC membership and participants' reflections about their teaching practices, which is essentially important to building strong perceptions of self-efficacy (Gibbs, 2002). Richmond and Manokore's study revealed the need for a formal sustainable PLC as the underpinning for the successful talk: "teachers identify and value collegiality as crucial for their own professional growth. Participants felt that they learned more about teacher practice from their PLC peers than from discussions with nonproject colleagues" (p. 567). Again, that a theoretical framework—that is, the four sources of efficacy—can effectuate a change in student achievement through collaboration is a compelling call to administrators to consider their professional learning communities.

Fulton and Britton (2011) synthesized research about PLCs among STEM (Science, Technology, Engineering, and Math) content areas. They reviewed several types of research, including empirical and non-empirical research studies, published expert knowledge, advice and descriptions of models, and surveys of practitioner experts. Results revealed several realities: (a) STEM learning teams have positive effects on teaching, (b) students learn math better with STEM teachers who are participating in PLCs, (c) online PLCS are a growing phenomenon, (d) there is universal support of learning teams, and (e) there is a need for more, better, and varied research. Among their comments about organizations' endorsements for and support for the existence of PLCs was "citing PLCs' positive effect teacher practice, school climate, perceptions of self-efficacy, and student achievement" (p. 12).

Fulton and Britton (2011) are right on point in their statement that research on PLCs is limited; although, as a form of professional development and collaboration, the variety of forms and fashions of PLCs makes the labeling of certain collaboration as PLCs difficult. Few studies have elaborated on the finding that PLCs have a positive effect on self-efficacy. Lee, Zhang, and Yin (2011) researched the relationship between PLCs and their effect on collective efficacy in Hong Kong. The results of their study showed that within certain constructs of instructional strategies and student discipline, PLCs increase teachers' collective efficacy. Their study also addressed the positive effect faculty trust in colleagues had on collective efficacy beliefs. This is consistent with Goddard et al. (2000) who noted that trust is a measurement construct of efficacy. Also, Lee et al. (2011) noted the following:

> This means that the teachers in a school with a relatively high degree of trust among the staff will tend to experience high collective efficacy. An educational administrator should cultivate a belief that faculty trust in colleagues is necessary for developing teachers' professionalism, efficacy, and commitment to students. (p.828)

The implication of these statements is that a professional learning community program that is implemented with fidelity to the collaborative and collegial culture that supports trusting relationships is critical to the study of PLCs and their development of collective and self-efficacy. Alas, this is an underserviced area of research, explored less through peer-reviewed research and much more in dissertational studies; the limitation being the questionable fidelity to a pure PLC model. Certainly this seems at odds with the implications on school administrative decision making about how to increase student achievement and professional development models that result in the greatest outputs.

One such study (Romeo, 2010) used two instruments, the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Woolfolk Hoy, 2001) and the School Professional Staff as Learning Community (SPSLCQ), to determine if a relationship between PLCs and perceptions of self-efficacy existed. Teachers in eight Kansas City suburban elementary schools completed these measures. Results of the study showed small, positive relationships between the TSES and the SPSLCQ, suggesting that PLCs had a positive effect on teacher's self-efficacy beliefs. Another dissertation study revealed that professional development activities in the form of collaboration raised self-efficacy beliefs in Title 1 middle school teachers (Rostan 2009).

Several other doctoral candidates, in the absence of peer reviewed research, focused more directly and specifically on the effects of professional learning communities on teacher efficacy. Shetzer (2011) explored the relationship between PLCs and teacher efficacy in an urban high school. His research found no correlation between PLCs and teacher self-efficacy. Nevertheless, what is compelling in this research is the phenomenological evidence found by Shetzer. Citing a sense of frustration, a lack of vision and direction, and a lack of collaboration, participants shared their negative experiences as members of PLCs. Their attitudes reveal a flaw in testing for a teacher's efficacy beliefs under these conditions: The very sources of efficacy found embedded in a true PLC—the collaboration and shared collective belief—were absent. Moreover, the sources serve as a reminder that implementing professional learning communities for the purposes of increasing teacher self-efficacy and collective efficacy must be done mindfully and with fidelity to the constant, consistent, and collegial—not congenial—collaboration that an exemplary professional learning community demands. Shetzer highlighted that a gap in knowledge about a properly implemented professional learning community and the effects on teacher efficacy would be worth further research.

In his doctoral work regarding the differences in teacher perceptions when PLCs were implemented at elementary versus secondary schools, Curry (2010) found that different efficacy beliefs existed, and that these differences could be related to the ways that PLCs were implemented. Hardin's (2010) doctoral work revealed a strong positive relationship between characteristics of PLCs and collective teacher efficacy. This research points to the importance of further investigation of the elements of PLCs, rather than simply the presence of congenial, inconsistent discussions or committees or formal, limited, and transitory outsourced development, which are often misnomered as PLCs.

Dockery (2011) found the construct of collaboration within PLCs as most influential on collective efficacy, which Dockery argued influences student achievement. Dockery's research highlights the need for further consideration of the constructs of PLCs in order to identify program implementation and development fidelity so as to maximize the outcomes on teaching and learning outcomes associated with PLCs.

This trend in doctoral work is a call to action for researchers that there is value in studying efficacy beliefs, both perceptions of one's own teaching and the collective beliefs of a faculty.

Implications

Another compelling force to further investigate the effects of professional learning communities on self-efficacy levels is practical implications of school and district leaders making decisions driven by economic forces—that is, funding and budgetary constraints, and professional growth-forces resulting from new evaluation methods. These necessary decisions often are the result of quantifying the economic value attached to the line item. The answer to the questions of how professional learning communities will contribute to student achievement

and what the value would be in committing funding to teacher efficacy lies in further research that determines whether school administrators need to prioritize professional development that contributes not only to teaching strategies that increase student achievement but also to initiatives that increase teacher efficacy.

Research on teacher self-efficacy has found evidence of a relationship between teacher efficacy and student achievement, even if not a direct one, through the products of efficacious behaviors which promote effective instructional outcomes, thus increasing student achievement. Studies have also found that positive relationships exist between PLCs and teacher efficacy beliefs, if not directly, then through the constructs which serve as the sources of efficacy. The prevailing body of empirical research is still rooted in the theoretical framework established by Bandura (1993, 1997). For example, collaboration is a form of verbal persuasion and vicarious experience that promotes efficacy. Teachers' interaction and exposure to each other's successes, as well as a shared spirit of success, serve as physiological arousal; and the shared instructional practices and inquiry enrich mastery experiences. These constructs beget efficacious behaviors. Alas, these constructs are less explored and unidentified in earlier research on PD and efficacy.

Evans and Tribble (1986) called for more research on the connections between efficacy and PD, especially in secondary education teachers. Lumpe (2007) synthesized research to reconceptualtize PD to provide more collaboration among colleagues for the purposes of sustained inquiry to improve student achievement. This call to practitioners is to embed more PLCs for collaborative, efficacious actions into the educational organizational framework. The call to researchers is to determine more discretely the extent to which these PLCs can increase both faculty collective and also teacher self-efficacies. Because there is evidence that teacher efficacy is not merely a byproduct of student achievement, and therefore, worth more

consideration as a driving variable in learning outcomes, school administrators need to understand the economic value of identifying ways to increase that teacher efficacy in their own buildings.

The gaps in peer-reviewed research seem to be vast. Few studies address the success of professional learning communities in high schools, specifically in urban districts. Moreover, many researchers glance over self-efficacy in favor of identifying a connection between implementing PLCs and improving student achievement; however this correlation is not a direct one. The research to date lacks a focus on domestic, cross-curricular (outside of the STEM classes), professional learning communities in urban high schools. This is a bit puzzling given the perception that low self-efficacy exists among large, urban school district, secondary school faculty. Further research is needed to examine the constructs of PLCs and to evaluate the potential correlations between elements of PLCs and teacher efficacy.

Furthermore, as PLCs become standard practice and as teacher professional growth and the empowerment of teachers through shared leadership and collaboration become even more of a focus of 21st century learning communities, more research is needed to address not just student achievement directly, but the means of improving teaching faculty for the end result of simply efficacious and effective professionals.

Although this study did not aim to empirically demonstrate a relationship between teacher self-efficacy and teacher evaluation, timely to mention for further consideration is the phenomenon that those whose attentions have focused on professional learning communities and the benefits of such, as they relate to efficacy, are referencing key players in growth models of effective instruction, e.g. Danielson (2007). Educational researchers need to further investigate the benefits of the collaborations and reflection on practice that these models demand, through

professional learning communities and through the offering of experiences with the domains of Bandura's (1997) four sources of efficacy. Teachers need time to collaborate, model, talk about teaching, learn and test best instructional practices and strategies, understand the learning needs of all students, ask questions and model practices, all for dual purposes: (a) to increase efficacy beliefs school wide among faculty and within individuals, and so that (b) our teachers excel in achieving desired student learning outcomes. The effectiveness and the fidelity of this kind of program implementation to the specific constructs that support high efficacy beliefs will no doubt beget profound and provocative research investigations. Furthermore, as the prevailing empirical evidence supports focus on increasing teacher efficacy with quantifiable increases in student achievement, school administrators will make informed and sound instructional, operational, and funding-related decisions that will maximize student achievement in their buildings with the support not simply of the underlying theory that teachers who have efficacious beliefs about how they can increase teaching will have high levels of achievement output.

CHAPTER III

METHODS

Design

School leaders who are interested in making decisions about the allocation of time spent in PLCs, and who want to know impact on the perception of the teacher's beliefs in bringing about student achievement will want to understand the degree of the relationship between the two variables, time spent in PLCs and perceived levels of teacher self-efficacy (TSE). Therefore, the purpose of this study was to determine the relationship between time spent in PLCs and TSE. The research questions that motivated the study are,

1. Do teachers who participate in PLCs have higher levels of teacher self-efficacy than teachers who do not participate?
2. Do teachers who participate in PLCs have higher levels of efficacy in student engagement than teachers who do not participate?
3. Do teachers who participate in PLCs have higher levels of efficacy in instructional strategies than teachers who do not participate?
4. Do teachers who participate in PLCs have higher levels of efficacy in classroom management than teachers who do not participate?
5. Does length of time in PLCs have an impact on levels of teacher self-efficacy?
6. Does length of time in PLCs have an impact on levels of efficacy in student engagement?
7. Does length of time in PLCs have an impact on levels of efficacy in instructional strategies?
8. Does length of time in PLCs have an impact on levels of efficacy in classroom management?

This quantitative study aimed to measure and account for variances in various levels of efficacy, including full-scale TSE and subscale scores of efficacy in student engagement (ESE), efficacy in instructional strategies (EIS), and efficacy in classroom management (ECM) with respect to participation and time in PLCs. Data was collected at one time in this quasi-experimental design in which groups were independent and not randomly assigned.

The first four research questions aimed to identify possible variance in efficacy levels and to determine if that variance could be attributed to participation in PLCs. In other words, do teachers who participate in PLCs have significantly different TSE, ESE, EIS, and ECM levels from those who do not participate in PLCs? In order to compare the efficacy means (dependent variable) of two independent groups, or main effects, it is most appropriate to employ an independent sample *t* test.

The last four research questions aimed to identify possible variance of efficacy levels and to determine if that variance could be attributed to the number of days per week teachers spent in PLCs. In other words, do teachers who participate in PLCs 0, 1, 2, 3, 4, and 5 days a week have TSE, ESE, EIS, and ECM levels that differ significantly from one another? In order to compare the efficacy means (dependent variable) of more than two independent groups, or main effects, it is most appropriate to use an analysis of variance (ANOVA). Specifically, because I am comparing variance in efficacy levels based on only one independent variable – time spent in PLCs as measured by number of days per week--I used a one-way ANOVA.

Setting

This study surveyed participants from one of two high schools in a large urban public school district in New Jersey. The New Jersey Department of Education (NJDOE) categorizes each school district into District Factor Groups (DFG); generally based on the wealth and levels

of education in the community. DFG range from A districts in the poorest communities, to J districts in the wealthiest communities. The particular urban school district in this study was designated as part of DFG A.

The two high schools are sister schools that are housed in one large complex. Both schools are designated by the NJDOE Regional Achievement Center as *Focus* schools. This designation is due to a lower than acceptable graduation rate. The demographic profiles of the schools were nearly identical (New Jersey Department of Education, 2014). Each school housed approximately 1100 students and had an economically disadvantaged population of nearly 90%. Both schools had a majority population of Hispanic students (65.6% and 66.8 %). Both schools had a Black population of 26.4%, and approximately 5% of the students were White. Furthermore, both schools had a representative population of students with disabilities (13% and 12% respectively) and limited English proficiency (11.6% and 26.2% respectively). On the Language Arts section of the NJ High School Proficiency Assessment (HSPA), one school achieved 73% proficiency, and the other school achieved 66% proficiency. On the Math section of the HSPA, the achieved proficiency was 54% and 41% respectively.

These two high schools were ideal settings for this study because, as noted previously, little research has explored the effects of PLCs on teacher self-efficacy in urban high schools, especially low-performing urban high schools with significantly sized sub group populations.

Participants

All 208 teachers in both high schools were asked to participate in the survey. There were 109 teachers from one high school and 99 teachers from the other. Participants were solicited by the instructional coaches in each building, who informed the teachers of the survey. Furthermore, emails were sent by the school secretaries to solicit volunteers. Because this study

used human subjects, it was presented to and approved by the Institutional Review Board. The survey data collected did not include any unique identifiers, and all identifying information was kept confidential.

Of the 208 potential respondents, 123 teachers responded to the survey. Although it was not necessary to distinguish which high school each participant was from, not knowing the outcome of the survey, I maintained an identifier for each school, in the event that the data suggested there was something unique going on in one of the buildings that was worth further analysis or investigation. Of those survey participants who responded, 65.7% were teachers at one school, 31.4% were teachers at the other school, and the remaining small percentage of survey respondents taught in both schools.

All teachers were highly qualified and certified in the areas they teach. Tschannen-Moran and Woolfolk Hoy (2007) suggested that although there are various measurements for distinguishing novice teachers from experienced teachers, 3 years was the number of years most accepted. Given that this study relied heavily on Tschannen-Moran's work on this subject (2001, 2007), I decided to use 3 years of teaching to distinguish an experienced teacher from a novice teacher. Using this criterion, of the respondents that answered the question, 17.8% were considered novice teachers and 82.2% were experienced teachers.

Of the teacher survey participants who answered the questions about ethnicity, 57.3% were White, 20.4% were Hispanic, 14.6% identified as Asian or Pacific Islander, and 7.8% were Black or African American. Of those teachers who responded about their gender, 50.9% were female and 49.9% were male.

Instrumentation

Teachers' Sense of Efficacy Scale

The instrument used to measure self-efficacy in this study is the short form, 12-item, Teachers' Sense of Efficacy Scale (TSES), sometimes referred to as the Ohio State Teacher Efficacy Scale constructed by Tschannen-Moran and Woolfolk Hoy (2001). Tschannen-Moran and Woolfolk Hoy indicated that the short form is sufficient in length and is as valid and accurate a measure of self-efficacy as the long form, 24-item TSES. Given the constraints of surveying the teachers at both schools, the short form of the TSES was used. This scale measured the perceptions of how capable a teacher thought he or she was at bringing about student learning. The answers are scaled on a unit continuum from 1 to 9 with anchors at 1 – *None at All*, 3 – *Very Little*, 5 – *Some Degree*, 7 – *Quite a Bit*, and 9 – *A Great Deal*.

This full-scale analysis of efficacy using the TSES can also be analyzed through three categories of efficacy: (a) efficacy in student engagement, (b) efficacy in instructional practice (also referred to as efficacy in instructional strategies), and (c) efficacy in classroom management. To determine subscale scores, Tschannen-Moran and Woolfolk Hoy (year?) have categorized the questions of the short-form TSES into these three factors.

Efficacy in student engagement. This factor measures the extent to which teachers believe that they can engage students in learning. Questions from the TSES that align with this efficacy are as follows:

Item 2: How much can you do to motivate students who show low interest in school work?

Item 4: How much can you do to help your students value learning?

Item 7: How much can you do to get students to believe they can do well in school work?

Item 11: How much can you assist families in helping their children do well in school?

Efficacy in instructional strategies. This factor measures the extent to which teachers believe that they can employ sound instructional practices to bring about student learning. Questions from the TSES that align with this efficacy are as follows:

Item 5: To what extent can you craft good questions for your students?

Item 9: To what extent can you use a variety of assessment strategies?

Item 10: To what extent can you provide an alternative explanation or example when students are confused?

Item 12: How well can you implement alternative teaching strategies in your classroom?

Efficacy in classroom management. This factor measures the extent to which a teacher believes he or she can employ effective classroom management strategies in order to create opportunities for learning. Questions from the TSES that align with this efficacy are as follows:

Item 1: How much can you do to control disruptive behavior in the classroom?

Item 3: How much can you do to calm a student who is disruptive or noisy?

Item 6: How much can you do to get children to follow classroom rules?

Item 8: How well can you establish a classroom management system with each group of students?

Tschannen-Moran and Hoy (2001) have reported the reliabilities for the short-form TSES. Full-scale efficacy survey reliability is .90; reliability for efficacy in student engagement is .81; reliability for efficacy in instructional strategies is .86. Finally, the reliability for efficacy in classroom management is .86. Permission was obtained for use of the TSES from Dr. Megan Tschannen-Moran.

Data Collection

Survey Monkey, a web-based data collection tool, was used for this survey. Survey monkey is accessible from the schools' servers, and it is known to the faculties of both schools because it had been used previous to this study for data collection. The survey included the TSES as well as demographic questions, which included the years taught and school placement. Also, teachers were asked how many days, if any, participants spent in PLCs. The purpose of this study was to look at time spent in PLCs and not at the construct of the PLC program. Therefore, no questions centered on the organization or on the program plan of the PLCs, notwithstanding a few questions regarding satisfaction ratings about PLCs prior to and during this academic year and an open-ended response to said questions that could later provide anecdotal evidence.

Data Analysis

The purpose of this study was to determine whether there statistically significant differences between TSE, ESE, EIS, and ECM levels (the dependent variable) and time spent in PLCs (independent variable). Independent sample *t* tests and one-way analyses of variance (ANOVAs) were the statistical approaches used to analyze the mean differences between and among groups. Data was uploaded from Survey Monkey to Excel to be organized and coded, and so that subscale scores for the three factors (ESE, EIS, and ECM) could be calculated. SPSS was used to conduct the *t* test and ANOVAs.

Tschannen-Moran and Woolfolk Hoy (2007) explored Bandura's (1997) assertions that the greatest impact on efficacy would be at the beginning of a teacher's career. Therefore, correlations were employed to analyze the data among novice teachers (those in the profession or 3 or less years), career teachers (those in the profession for 4 years or longer), and to determine the relevance of demographic data to the study. Revealing nothing significant, the demographics

and the teaching length information, such as gender and years taught, were not considered for further analysis. Chapter IV presents a discussion of the results of the data analysis.

CHAPTER IV

DATA ANALYSIS

Introduction

The purpose of this study was to investigate the effects of time spent in PLCs in urban high schools on teacher self-efficacy, one's belief in their ability to be an effective educator. As educational best practice implicates district and school administrators in decision-making regarding collaboration and high teacher self-efficacy through professional learning communities (PLCs), it is imperative to explore whether PLCs are effective in raising teacher's self-beliefs about their abilities to maximize student learning. Is there a correlation between time spent in PLCs and the extent (positive or negative) of teacher self-efficacy? Do teachers who participate in PLCs have a higher teacher-self efficacy than teachers who do not participate? Do intervals of teacher self-efficacy correlate with time spent in PLCs? If yes, what factor of efficacy—instructional strategies, classroom management, and student engagement—most benefits from time spent in PLCs. Ultimately, should educational researchers invest more time producing empirical research on the ability to change levels of efficacy? Furthermore, should administrators invest resources in cultivating teacher self-efficacy through PLCs? The results of such a study provide educational leaders with a measure by which to determine the value of PLCs as they support the ability to effectuate efficacy beliefs.

The following research questions guided the study:

1. Do teachers who participate in PLCs have higher levels of teacher self-efficacy than teachers who do not participate?
2. Do teachers who participate in PLCs have higher levels of efficacy in student engagement than teachers who do not participate?

3. Do teachers who participate in PLCs have higher levels of efficacy in instructional strategies than teachers who do not participate?
4. Do teachers who participate in PLCs have higher levels of efficacy in classroom management than teachers who do not participate?
5. Does length of time in PLCs have an impact on levels of teacher self-efficacy?
6. Does length of time in PLCs have an impact on levels of efficacy in student engagement?
7. Does length of time in PLCs have an impact on levels of efficacy in instructional strategies?
8. Does length of time in PLCs have an impact on levels of efficacy in classroom management?

The following null hypothesis were presumed:

1. There is no statistically significant difference in teacher self-efficacy ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
2. There is no statistically significant difference in efficacy in student engagement ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
3. There is no statistically significant difference in efficacy in instructional strategies ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
4. There is no statistically significant difference in efficacy in classroom management ratings between teachers who participate in PLCs and teachers who do not participate in PLCs.
5. There is no statistically significant relationship between time spent in PLCs and teacher self-efficacy.

6. There is no statistically significant relationship between time spent in PLCs and efficacy in student engagement.
7. There is no statistically significant relationship between time spent in PLCs and efficacy in instructional strategies.
8. There is no statistically significant relationship between time spent in PLCs and efficacy in classroom management.

Of the 208 potential respondents, 123 teachers responded to the survey. Of those survey participants who responded, 65.7% were teachers at one school, 31.4% were teachers at the other school, and the remaining small percentage of survey respondents taught in both schools. All teachers were highly qualified and certified in the areas they teach. Tschannen-Moran and Woolfolk Hoy (2007) suggested that although there are various measurements for distinguishing novice teachers from experienced teachers, 3 years was the number of years most accepted. Given that this study relied heavily on Tschannen-Moran's work on this subject (2001, 2007), I decided to use 3 years of teaching to distinguish an experienced teacher from a novice teacher. Of the respondents that answered the question, 17.8% were considered novice teachers and 82.2% were experienced teachers.

Of the teacher survey participants who answered the questions about ethnicity, 57.3% of respondents were White, 20.4% of respondents were Hispanic, 14.6% identified as Asian or Pacific Islander, and 7.8% were Black or African American. Of those teachers who responded about their gender, 50.9% were female and 49.9% were male. Data was collected on and uploaded from Survey Monkey in to an Excel spreadsheet so that it could be coded and organized. I grouped efficacy question items by factor and used unweighted means to find the subscale scores for the three represented teaching efficacies—student engagement, instructional

strategies, and classroom management. Full-scale self-efficacy was measured by taking the unweighted mean of all 12 survey items. Then, the measurement of participation in PLCs was reviewed. Given the relatively low number of respondents that indicated that they had participated in PLCs 3, 4, and 5 days a week, I grouped these responses and coded them as 3+. Then, I uploaded the data to SPSS in order to conduct the analysis.

First, I ran Cronbach's Alpha to determine the internal consistency reliability of the composite efficacy score and the factor subscale scores. For the composite teacher self-efficacy (TSE) score, Cronbach's Alpha was .92. This suggests that 92% of the variance in TSE scores is reliable variance. For the subscale score of efficacy in student engagement (ESE), Cronbach's Alpha was .83. In other words, 83% of the variance in ESE scores is reliable variance. For the subscale score of efficacy in instructional strategies (EIS), Cronbach's Alpha was .85. In other words, 85% of the variance in EIS scores is reliable variance. Finally, for the subscale score of efficacy in classroom management (ECM), Cronbach's Alpha was .90. In other words, 90% of the variance in ECM scores is reliable variance. Having established high reliability scores for the composite TSE and subscale ESE, EIS, and ECM scores, I analyzed the data in reference to the research questions.

Research Questions 1 – 4

1. Do teachers who participate in PLCs have a higher teacher self-efficacy than teachers who do not participate?

2. Do teachers who participate in PLCs have a higher level of efficacy in student engagement than teachers who do not participate?

3. Do teachers who participate in PLCs have a higher level of efficacy in instructional strategies than teachers who do not participate?

4. Do teachers who participate in PLCs have a higher level of efficacy in classroom management than teachers who do not participate?

In order to determine if there was a significantly different level of teacher self-efficacy between teachers who participated in PLCs and teachers who did not participate in PLCs, I employed an independent sample *t* test. This statistical approach is appropriate because the research questions called for the comparison of the mean TSE levels (the dependent variable) of two independent groups. The independent sample *t* test was conducted to compare composite teacher self-efficacy (TSE) score means and factor score means for efficacy in student engagement (ESE), efficacy in instructional strategies (EIS), and efficacy in classroom management (ECM). Those teachers that did not participate in PLCs were coded as 0; those that did participate in PLCs were coded as 1. Table 1 shows the group statistics, including number of respondents, mean efficacy scores, and standard deviations.

Table 1

Mean and Standard Deviation Comparing Two Participation in PLCs Groups on Full-scale Teacher Self-Efficacy (TSE), Efficacy in Student Engagement (ESE), Efficacy in Instructional Strategy (EIS), Efficacy in Classroom Management (ECM)

	Participation in PLCs	*N*	*M*	*SD*
TSE	0	16	6.3656	1.0290
	1	99	6.7736	1.1646
ESE	0	16	6.0625	1.0227
	1	99	6.3384	1.3995
EIS	0	16	6.7344	1.0102
	1	99	7.1608	1.2490
ECM	0	16	6.2969	1.2457

	1	99	6.8333	1.2498

A test of homogeneity of variances using Levene's statistics was conducted. This test ran automatically as part of the independent sample *t* test, and it checked the assumption that the variances of the two participation in PLCs groups was equal. The test for equal variances in TSE between the two participation in PLCs groups was not found to be statistically significant (p = .488). The test for equal variances in ESE between the two participation in PLCs groups was not found to be statistically significant (p = .104). The test for equal variances in EIS between the two participation in PLCs groups was not found to be statistically significant (p = .208). The test for equal variances in ECM between the two participation in PLCs groups was not found to be statistically significant (p = .910). Therefore, in all four cases, the assumption that the variances of the two groups were equal was not violated.

The results of the independent sample *t* test was analyzed using the equal variances assumed data as a result of the Levene's test for equality of variances. Table 2 shows the results of this test. The mean difference in TSE scores between those that did and those that did not participate in PLCs was not statistically significant (t (113) = -1.320, p = .190). The mean difference in ESE scores between those that did and those that did not participate in PLCs was not statistically significant (t (113) = -.755, p = .452). The mean difference in EIS scores between those that did and those that did not participate in PLCs was not statistically significant (t (113) = -1.297, p = .197). The mean difference in ECM scores between those that did and those that did not participate in PLCs was not statistically significant (t (113) = -1.594, p = .114). In other words, those that participate in PLCs do not have statistically significantly higher full-scale or factor efficacy levels than those that did not participate in PLCs.

Table 2

Independent Sample t test comparing Participation in PLCs groups on Full-scale Teacher Self-Efficacy (TSE), Efficacy in Student Engagement (ESE), Efficacy in Instructional Strategy (EIS), Efficacy in Classroom Management (ECM)

	t	*df*	*p*	Mean Difference
TSE	-1.320	113	.190	-.4080
ESE	-.755	113	.452	-.2759
EIS	-1.297	113	.197	-.4264
ECM	-1.594	113	.114	-.5365

Research Question 5

Does length of time in PLCs have an impact on levels of teacher self-efficacy?

In order to determine whether length of time had an impact on levels of teacher self-efficacy (TSE), I conducted an analysis of variance (ANOVA). This statistical technique is appropriate because more than two categorical groups or main effects, number of days a week in PLCs, and their main effect on *TSE* (the dependent variable) were compared. For this research questions, only impact on the composite, full-scale efficacy score was considered.

I ran descriptive statistics for this analysis. Table 3 shows the number of teacher respondents for each group, as well as the means and standard deviations for the four groupings. There were 28 individuals (teachers) who did not participate in PLCs (coded as 0). The mean TSE score for this group was 6.3143 and the standard deviation was 1.2553. Forty-seven teachers participated in a PLC 1 day per week (coded as 1). The mean TSE score for this group was 6.8549 and the standard deviation was 0.9465. There were 28 teachers who participated in

PLCs twice per week (coded as 2). The mean TSE score for this group was 6.5961 and the standard deviation was 1.3086. Eleven teachers participated 3 or more days per week in a PLC (coded as 3+). Their mean TSE score was 7.3975 and the standard deviation was 0.9387.

Table 3

Mean and Standard Deviation Comparing Number of Days Per Week in a PLC Groups on Teacher Self-Efficacy (TSE)

Days/Week in a PLC	*N*	*M*	*SD*
0	28	6.3143	1.2553
1	47	6.8549	0.9465
2	28	6.5961	1.3086
3+	11	7.3975	0.9387
Total	114	6.7169	1.1512

A test of homogeneity of variances was conducted using the Levene statistic. This test checked the assumption that the variances of the four days per week in PLCs groups (main effects) were equal. The Levene test for days per week in PLCs was not found to be statistically significant ($p = .429$); therefore, the assumption was not violated.

An ANOVA was conducted to determine if there were statistically significant different TSE means among days per week in PLCs groups. Results of the ANOVA are displayed in Table 4. The results were that there are statistically significant differences among mean TSE levels between groups, $F(3,111) = 3.020$, $p = .033$. The effect size was relatively small ($\eta^2 = .08$). In other words, only 8% of the variance in TSE scores can be attributed to the variance in the number of days a week in PLCs.

Table 4

One-Way Analysis of Variance Summary Table Comparing Days per Week in PLCs groups on Teacher Self-efficacy (TSE)

Days/week in a PLC	***df***	***SS***	***MS***	***F***	***p***
Between Groups	3	11.401	3.800	3.020	.033
Within Groups	111	139.684	1.258		
Total	114	151.085			

In order to determine between the statistically significant differences that existed between groups, a post hoc test was conducted. Because Levene's test of homogeneity of variances was not statistically significant, a Tukey HSD was conducted. Table 5 displays the results of this analysis.

Table 5

Tukey HSD Post Hoc Test Comparing Mean Efficacy (TSE) Levels Between Four Days Spent in PLCs Groups

Days/week in a PLC	Days/week in a PLC	Mean Difference	Std. Error	*p*
0	1	-.5406	.2678	.187
	2	-.2818	.2998	.783
	3	-1.0832*	.3871	.030
1	0	.5406	.2678	.187
	2	.2588	.2678	.769
	3	-.5426	.3628	.444

Days/week in a PLC	Days/week in a PLC	Mean Difference	Std. Error	*p*
2	0	.2818	.2998	.783
	1	-.2588	.2678	.769
	3	-.8014	.3871	.169
3	0	1.0832*	.3871	.030
	1	.5426	.3628	.444
	2	.8014	.3871	.169

*Mean difference significant at the .05 level

A statistically significant difference was found between those that did not participate in PLCs and those that participated 3 or more days per week in PLCs. Those that did not participate in the PLCs (coded as 0, $M = 6.3143$) and those that participated 3 or more days per week (coded as 3+, $M = 7.3975$) were found to have significantly different TSE levels ($p = .030$). The mean difference in TSE levels between those that did not participate and those that participated 3 or more days a week was 1.0832. This mean difference is statistically significant at the .05 level. In other words, those that participated in PLCs 3 or more days per week were found to have significantly higher levels of teacher self-efficacy than those that did not participate in PLCs. To determine the effect size for the statistically significant results on the post hoc test, Cohen's *d* was calculated. The effect size found was relatively large ($d = .97$). The effect size is considerable because this is the only statistically significant group difference. The significant variance was attributed to all of the variance explained by the ANOVA.

There were no statistically significant differences in the mean TSE levels between those that did not participate in PLCs and those that participated in PLCs 1 day per week ($p = .187$) nor between those that did not participate in PLCs and those that participated in PLCs 2 days per week ($p = .783$). Likewise, there were no statistically significant differences in mean TSE levels between those that participated in PLCs 1 day per week and those that participated in PLCs 2

days per week (p = .769). Likewise, there were no statistically significant variances in mean TSE levels of those that participated 1 day per week in PLCs with those that participate 3 days per week in PLCs (p = .444). Finally, there were no statistically significant differences in mean TSE levels between those that participated in PLCs 2 days per week and those that participated in PLCs 3 days per week (p = .169).

In other words, there was no statistically significantly higher teacher self-efficacy levels among those that participated in PLCs 1 or 2 days per week than those that did not participate. Furthermore, there were no significantly higher levels of efficacy for those that participated 3 or more days relative to those who participated only 1 or 2 days.

Research Question 6

Does length of time in PLCs have an impact on levels of efficacy in student engagement?

In order to determine the impact of time spent in PLCs on efficacy in student engagement (ESE), an analysis of variance (ANOVA) was used for the composite TSE score. As was true for the full-scale TSE score, more than two groups, number of days a week in PLCs, were compared as main effects on ESE (the dependent variable). A one-way ANOVA was used because this analysis examines the impact of one variable on the efficacy factor.

Descriptive statistics were calculated for the ANOVA of time spent in PLCs on ESE. Table 6 shows the number of instances, means, and standard deviations for the four groupings. Of the 114 people who responded, 28 responded that they did not participate in PLCs (coded as 0). The mean ESE score was 5.7024 and the standard deviation was 1.3862. Forty-seven people participated in a PLC 1 day per week (coded as 1). The mean score of ESE was 6.4628 and the standard deviation was 1.1039. There were 28 people who participated in PLCs twice a week (coded as 2). The mean ESE score for this group was 6.2976 and the standard deviation was

1.5976. Eleven people participated in 3 or more days in a PLC (coded as 3+). The mean ESE score was 7.1364 and the standard deviation was 1.1355.

Table 6

Mean and Standard Deviation Comparing Number of Days Per Week in a PLC Groups on Efficacy in Student Engagement (ESE)

Days/Week in a PLC	*N*	*M*	*SD*
0	28	5.7024	1.3862
1	47	6.4628	1.1039
2	28	6.2976	1.5976
3+	11	7.1364	1.1355
Total	114	6.3004	1.3589

A test of homogeneity of variances was performed using Levene's statistics. This test checked the assumption that the variances in ESE of the four days per week in PLCs groups are equal. The test for days per week in PLCs was not found to be statistically significant ($p = .179$); therefore, the assumption was not violated.

An ANOVA was conducted to determine if there were statistically significant differences between the means of ESE levels among days per week in PLCs groups. Results of the ANOVA are displayed in Table 7. The results indicate that there A statistically significant difference in means was found for ESE levels between groups, $F(3,110) = 3.660$, $p = .015$. The effect size found was relatively medium ($\eta^2 = .09$). In other words, 9% of the variance in ESE scores is attributed to the variance in the number of days per week in PLCs.

Table 7

One-Way Analysis of Variance Summary Table Comparing Days per Week in PLCs groups on ESE

Days/week in a PLC	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	18.940	6.313	3.660	.015
Within Groups	110	189.735	1.725		
Total	113	208.675			

In order to determine between what groups those statistically significant differences were I ran a post hoc test. Because Levene's test of homogeneity of variances was not statistically significant, the Tukey HSD was the appropriate comparison test. Table 8 displays results of this analysis.

Table 8

Tukey HSD Post Hoc Test Comparing Mean Efficacy in Student Engagement (ESE) Levels Between 4 Days Spent in PLCs Groups

Days/week in a PLC	Days/week in a PLC	Mean Difference	Std. Error	*p*
0	1	-.7604	.3135	.078
	2	-.5952	.3510	.331
	3	-1.4340*	.4673	.014
1	0	.7604	.3135	.078
	2	.1652	.3135	.952
	3	-.6736	.4399	.422

Days/week in a PLC	Days/week in a PLC	Mean Difference	Std. Error	*p*
	0	.5952	.3510	.331
	1	-.1652	.3135	.952
	3	-.8387	.4673	.281
3	0	1.4340*	.4673	.014
	1	.6736	.4399	.422
	2	.8387	.4673	.281

*Mean difference significant at the .05 level

A statistically significant difference in variance of ESE levels was found between two days per week in a PLC groups. Those that did not participate in the PLCs (coded as 0, M = 5.7024) and those that participated 3 or more days in a week (coded as 3+, M = 7.1364) were found to have significantly different ESE levels (p = .014). The mean difference in ESE levels between those that did not participate and those that participated 3 or more days a week was found to be 1.4330. This mean difference is statistically significant at the .05 level. In other words, those that participated in PLCs 3 or more days a week had significantly higher levels of ESE than those that do not participate in PLCs. To determine the effect size for this result on Cohen's d was calculated. The effect size is very large (d =1.09). The effect size is considerable; because this is the only statistically significant group difference, the significant variance is attributing to all variance explained by the ANOVA.

There were no statistically significant differences in the mean ESE levels between those that did not participate in PLCs and those that participated in PLCs 1 day per week (p =.078), nor between those that did not participate in PLCs and those that participated in PLCs 2 days per week (p = .331). Likewise, there were no statistically significant differences in mean ESE levels between those that participated in PLCs 1 day per week and those that participated in PLCs 2 days per week (p = .952). Likewise, there were no statistically significant variance in mean ESE

levels of those that participated 1 day per week in PLCs with those that participate 3 days per week in PLCs (p = .422). Finally, there were no statistically significant differences in mean ESE levels between those that participated in PLCs 2 days per week and those that participated in PLCs 3 days per week (p = .281).

In other words, there was no statistically significantly higher ESE levels among those that participated in PLCs 1 or 2 days a week than those that did not participate at all. Furthermore, there were no significantly higher ESE levels for those that participated 3 or more days relative to those who participated only 1 or 2 days.

Research Question 7

Does length of time in PLCs have an impact on levels of efficacy in instructional strategies?

In order to determine the impact of time on efficacy in instructional strategies (EIS) an analysis of variance (ANOVA) was performed for the composite TSE score. As was true for the full-scale TSE score, more than two groups, number of days a week in PLCs, as main effects on EIS (the dependent variable) were compared. I employed a one-way ANOVA because this analysis reveals the impact of one variable on the efficacy factor.

Descriptive statistics were compiled for the ANOVA of time spent in PLCs on efficacy in instructional strategies (EIS). Table 9 shows the number of instances, means, and standard deviations for the four groupings. Of the 114 participants, there were 28 teachers who did not participate in PLCs (coded as 0). The mean EIS score was 6.8155 and the standard deviation was 1.3210. Forty-seven people participated in a PLC 1 day a week (coded as 1). The mean score of EIS was 7.2004 and the standard deviation was 1.0379. Twenty-eight people participated in PLCs twice a week (coded as 2). The mean EIS score for this group was 6.9167

and the standard deviation was 1.3642. Eleven people participated in 3 or more days in a PLC (coded as 3+). Their mean EIS score was 7.8636 and the standard deviation was 1.1692.

Table 9

Mean and Standard Deviation Comparing Number of Days Per Week in a PLC Groups on Efficacy in Instructional Strategies (EIS)

Days/Week in a PLC	*N*	*M*	*SD*
0	28	6.8155	1.3210
1	47	7.2004	1.0379
2	28	6.9167	1.3642
3+	11	7.8636	1.1692
Total	114	7.1001	1.2290

Next, a test of homogeneity of variances was completed using Levene's statistics. This test checked the assumption that the variances of the four days per week in PLCs groups was equal. The test for days per week in PLCs was not found to be statistically significant ($p = .768$); therefore, the assumption was not violated.

An ANOVA was conducted to determine if there were statistically significant different EIS means among the groups for days per week in PLCs groups. The results of the ANOVA are displayed in Table 10. No statistically significant variance of mean EIS levels was found between groups ($F(3, 110) = 2.305$, $p = .081$).

Table 10

One-Way Analysis of Variance Summary Table Comparing Days per Week in PLCs groups on Efficacy in Instructional Strategies (EIS)

Days/week in a PLC	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	10.096	3.365	2.305	.081
Within Groups	110	160.587	1.460		
Total	113	170.683			

Post hoc testing was unnecessary because the findings of the ANOVA presented no statistically significant variance of mean EIS scores among days per week in PLCs groups. In other words, time spent in PLCs did not increase ECM levels.

Research Question 8

Does length of time in PLCs have an impact on levels of efficacy in classroom management?

In order to determine the impact of time on efficacy in classroom management (ECM) an analysis of variance (ANOVA) was conducted for the composite TSE score. As was true for the full-scale TSE score, more than two groups were compared, number of days a week in PLCs, as main effects on ECM (the dependent variable). I employed a one-way ANOVA because this analysis examines the impact of one variable on the efficacy factor.

Descriptive statistics were calculated of time spent in PLCs on ECM. Table 11 shows the number of instances, means, and standard deviations for the four groupings. Of the 114 participants, there were 28 teachers who did not participate in PLCs (coded as 0). The mean ECM score was 6.4286 and the standard deviation was 1.4008. Forty-seven people participated in a PLC 1 day a week (coded as 1). The mean ECM score was 6.9078 and the standard

deviation was 1.0842. There were 28 people who participated in PLCs twice a week (coded as 2). The mean ECM score for this group was 6.5804 and the standard deviation was 1.3778. Eleven people participated in 3 or more days in a PLC (coded as 3+). There mean ECM score was 7.3939 and the standard deviation was 1.1193.

Table 11

Mean and Standard Deviation Comparing Number of Days Per Week in a PLC Groups on Efficacy in Classroom Management (ECM)

Days/Week in a PLC	*N*	*M*	*SD*
0	28	6.4286	1.4008
1	47	6.9078	1.0842
2	28	6.5804	1.3778
3+	11	7.3939	1.1193
Total	114	6.7566	1.2630

Next, a test of homogeneity of variances was conducted using Levene's statistics. This test checked the assumption that the variances of the four days per week in PLCs groups were equal. The test for days per week in PLCs was not statistically significant ($p = .577$); therefore, the assumption was not violated.

An ANOVA was conducted to determine if there were statistically significant different ECM means among the days per week in PLCs groups. Results of the ANOVA are displayed in Table 12. No statistically significant differences of mean ECM levels between groups were found ($F(3, 110) = 2.023$, $p = .115$).

Table 12

One-Way Analysis of Variance Summary Table Comparing Days per Week in PLCs Groups on Efficacy in Classroom Management (ECM)

Days/week in a PLC	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	9.425	3.142	2.023	.115
Within Groups	110	170.841	1.553		
Total	113	180.266			

Post hoc testing was unnecessary because the ANOVA found no statistically significant variance of mean ECM scores among days per week in PLCs groups. In other words, time spent in PLCs did not increase ECM levels.

Summary of Findings

The first research question asked whether teachers who participated in PLCs had a higher teacher self-efficacy (TSE) than teachers who did not participate. Data was analyzed using an independent sample *t* test, and the results were that there were no statistically significant differences in mean TSE levels. The null hypothesis that there is no statistically significant difference in TSE ratings between teachers who participate in PLCs and teachers who do not participate in PLCs is retained. I conclude that participation in PLCs does not necessarily mean higher TSE levels.

The second research question asked whether teachers who participated in PLCs had a higher efficacy in student engagement (ESE) than teachers who did not participate. Data was analyzed using an independent sample *t* test, and the results were that there were no statistically significant differences in mean ESE levels. The null hypothesis that there is no statistically significant

difference in ESE ratings between teachers who participate in PLCs and teachers who do not participate in PLCs is retained. I conclude that participation in PLCs does not necessarily mean higher ESE levels.

The third research question asked whether teachers who participated in PLCs had a higher efficacy in instructional strategies (EIS) than teachers who did not participate. Data was analyzed using an independent sample *t* test, and the results showed that there are no statistically significant differences in mean EIS levels. The null hypothesis that there is no statistically significant difference in EIS ratings between teachers who participate in PLCs and teachers who do not participate in PLCs is retained. I conclude that participation in PLCs does not necessarily mean higher EIS levels.

The fourth research question asked whether teachers who participated in PLCs had a higher efficacy in classroom management (ECM) than teachers who did not participate. Data was analyzed using an independent sample *t* test, and the results showed that there were no statistically significant differences in mean ECM levels. The null hypothesis that there is no statistically significant difference in ECM ratings between teachers who participate in PLCs and teachers who do not participate in PLCs is retained. I conclude that participation in PLCs does not necessarily mean higher ECM levels.

The fifth research question asked whether the number of days per week in a PLC affected levels of full-scale teacher self-efficacy (TSE). Data was analyzed using a one-way analysis of variance (ANOVA). The results were that the TSE levels for those that participated 3 or more days in PLCs were significantly higher than the levels for those that did not participate in PLCs. There were no statistically significant differences in TSE levels among those that participated 1 and 2 days, as compared with those who participated 3 or more days, or with those who did not

participate at all. The null hypothesis is rejected, and it is concluded that higher TSE levels are more likely when those who have not participated participate in PLCs 3 or more days per week.

The sixth research question asked whether the number of days per week in a PLC affected levels of efficacy in student engagement (ESE). Data was analyzed using a one-way ANOVA and it was found that the ESE levels for those that participated 3 or more days in PLCs were significantly higher than that of those who did not participate in PLCs. There were no statistically significant differences in ESE levels among those that participated 1 and 2 days, as compared with those who participated 3 or more days or with those who did not participate at all. The null hypothesis is rejected, and it is concluded that higher ESE levels are more likely when those who have not participated participate in PLCs 3 or more days a week.

The seventh research question asked whether number of days per week in a PLC affected levels of efficacy in instructional strategies (EIS). Data was analyzed using a one-way ANOVA. The results showed no statistically significant difference in means among the four days per week in PLCs groups. The null hypothesis is retained, and it is concluded that the time spent in PLCs did not impact EIS levels.

The eighth research question asked whether the number of days per week in a PLC affected levels of efficacy in classroom management (ECM). The data was analyzed using a one-way ANOVA. The results showed no statistically significant difference in means among the four days per week in PLCs groups. The null hypothesis is retained, and it is concluded that the time spent in PLCs did not impact ECM levels.

Implications of these findings is discussed in Chapter V.

CHAPTER V

IMPLICATIONS

The purpose of this study was to investigate the effects of time spent in PLCs on teacher self-efficacy—one's belief in their ability to be an effective educator—on teachers in urban high schools. As educational best practice implicates district and school administrators in decision making about increased student achievement through means such as collaboration in professional learning communities (PLCs) and teacher self-efficacy, it is imperative to explore whether PLCs are effective in raising teacher's self-beliefs about their abilities to maximize student learning. The study aimed to identify whether participation and number of days a week in PLCs could yield higher efficacy beliefs, ultimately resulting in a potential for gains in student achievement.

Should educational researchers invest more empirical research on the ability to change levels of efficacy? Furthermore, should administrators invest resources in cultivating teacher self-efficacy through PLCs? The results of such a study provide educational leaders with a measure by which to determine the value of PLCs as they support the ability to effectuate efficacy beliefs.

Summary of Results: Research Questions 1 – 4

The first research question asked whether teachers who participated in PLCs had higher teacher self-efficacy (TSE) levels than teachers who did not participate in PLCs. The results of an independent sample *t* test revealed that there were no significantly different levels of TSE among respondents, regardless of whether they participated in a PLC, $t\ (113) = -1.320$, $p = .190$. In other words, participation in PLCs did not yield higher TSE levels than no participation in PLCs.

The second research question sought to determine if teachers who participated in PLCs had higher levels of efficacy in student engagement (ESE) than teachers who did not participate in PLCs. Similar to the findings for TSE levels, there were no significantly higher ESE levels among those who participated in PLCs (t (113) = -.755, p = .452), when using an independent sample t test to determine variance in means. In other words, participation in PLCs did not yield higher ESE levels than no participation in PLCs.

The third and fourth research questions produced the same results. Using an independent sample t test to determine variance in mean, there was no significantly higher efficacy in instructional strategies (EIS) levels (t (113) = -1.297, p = .197) for those who participated in PLCs, as compared to those that had not. Nor were significantly higher efficacy in classroom management (ECM) levels found (t (113) = -1.594, p = .114) among those that participated in PLCs as compared to those that did not participate in PLCs.

The results of all four independent sample t tests to examine variance—for the purpose of answering the first four research questions—are quite surprising. Lieberman and Miller (2011) synthesized research to show that PLCs are the key to professional growth and to collaboration and a commitment to the development of individual teachers and the collective faculty. This collaboration is what Tschannen-Moran (2007) and Gibbs (2002) called *verbal interactions*, a source of efficacy. Furthermore, Goddard, Hoy, and Hoy (2000) and Hoy, Sweetland, and Smith (2002) argued that collective efficacy and self-efficacy not only manifest themselves in much the same way, but also they are mutually beneficial. Thus, what is done in collaboration as a whole, that is, the collective faculty, would support the development of TSE and its various factors. The vicarious experiences of understanding others' teaching and the physiological arousal that results, should be enough to stimulate a teacher to work on mastery experiences. The result

should naturally be higher TSE, ESE, EIS, and ECM results. Why then, did these sources of efficacy not manifest themselves and produce efficacy-altering PLCs?

One reason might be the relatively low number of respondents who did not participate in a PLC ($N = 16$). The extent to which this played a factor in the results of the study is unknown; however, the assertion that PLC participation does not make a difference in teachers' efficacy beliefs—as a composite score and using factor analysis—seems universally inconclusive without further studies of larger respondent pools.

Another reason may have to do with another focus: the PLC program itself. The aim of this study was not to evaluate the constructs of a PLC program in urban high schools. Nevertheless, it is compelling that teacher respondents had, on average, higher efficacy levels (123 respondents had a mean efficacy score of approximately 6.75 out of 9) than they were satisfied with PLCs (111 respondents had a mean PLC satisfaction rating of approximately 4.44 out of 9). PLC participation had no significantly effect on teacher self-efficacy. Anecdotal evidence collected during the study revealed insight into this finding: Several respondents indicated that PLCs were more like faculty meetings and not collaborative. The Center for Comprehensive School Reform and Improvement (2009) asserted that a successful PLC program has to be a collaborative community and must have supportive and shared leadership.

One shortcoming of the construct of this study is the possibility that the PLC program at the two surveyed high school was not successful. Lieberman and Miller (2011) considered PLCs to be "on-going groups" that meet regularly. They suggested that a true PLC would be a collaborative environment that fosters growth. With a mean satisfaction rating falling short of the *somewhat satisfied* level on a 9-point scale, is this PLC program meeting teachers need for

collaboration, essential for developing the four sources of efficacy which lead to increased beliefs about teaching ability and student outcomes?

As an administrator in one these buildings and privy to knowledge of the PLC program in the other building, my perception is that the PLC programs are not implemented with fidelity. This study exposed PLCs as faculty meetings during which information is disseminated en masse via an administrator or an instructional coach. That is not to say that the information cannot stimulate efficacy development or that it is not relevant to the cause of teaching and learning; however, especially for those teachers who are only in PLCs 1 day per week, collaboration time for teachers to process and own such information seems lacking. A well-constructed PLC program is critically important to the growth of efficacy beliefs for this very reason. Verbal persuasions, assessed as the interactions with and support from colleagues and other learning community members (Tschannen-Moran & Woolfolk Hoy, 2007), are naturally occurring key elements of a well-implemented PLC program. Consequently, they are a source of increasing efficacy. If PLCs are not collaborative, this critically essential source of efficacy is nonexistent, stifled, or limited.

Summary of Results: Research Questions 5 – 8

The fifth research question was intended to reveal whether the amount of time, as measured by days in a week, in PLCs had effect on TSE levels. An analysis of variance (ANOVA) revealed statistically significantly differences in TSE levels ($F(3,111) = 3.020$, $p = .033$). Post hoc testing revealed that those teachers who participated in PLCs 3 or more days per week ($M = 7.3975$) had significantly higher TSE levels than those who did not participate ($M = 6.3143$). This result ~~was welcome and~~ suggests that PLC participation is potentially beneficial for increasing TSE levels; however, significant time a week for collaboration is necessary to

create significantly higher beliefs about one's ability to effectuate learning. As in the independent sample *t* test, from a respondent pool of 114, only 11 participated in PLCs 3 days or more. This is a small tested group. A larger teacher participant group representing those in PLCs more days a week would help research draw conclusions about the extent to which collaboration must be many days a week to benefit TSE levels.

The sixth research question asked whether the amount of time in PLCs, as measured by days per week, had effects on ESE levels. An ANOVA revealed ~~that there are~~ statistically significant differences in ESE levels ($F(3,110) = 3.660$, $p = .015$). Post hoc testing revealed that those teachers who participated in PLCs 3 or more days a week ($M = 7.1364$) had significantly higher ESE levels than those who did not participate ($M = 5.7024$). From a respondent pool of 114, only 11 teachers participated in PLCs 3 days or more. This is a small group. As with TSE levels, to draw conclusions about ESE levels, a larger teacher participant group that represents more days a week in PLCs would add to results.

The seventh and eight research questions asked whether the amount of time in PLCs, as measured by days in a week, had effects on EIS and ECM levels, respectively. An ANOVA revealed that there were no statistically significant differences in EIS levels ($F(3, 110) = 2.305$, $p = .081$) and ECM levels ($F(3, 110) = 2.023$, $p = .115$), among various days spent in PLCs groups. In other words, more days in PLCs was not a statistically significant indicator of higher EIS and ECM levels. In both measurements of variance, respondent pool size was small ($n = 114$). As was the case with other results, conclusions would best be drawn after testing a larger sample size.

A thought-provoking result is that there were statistically higher efficacy scores in student engagement (ESE), and not in instructional strategies (EIS) nor in classroom

management (ECM) that resulted from several days a week in PLCs. I could have, but did not, gather evidence about the content and topics of the PLCs to understand why EIS, over the other two factors—EIS and ECM—would have benefited from time in PLCs. Over the last 4 years, a focus of the school district in which both schools are located has been the implementation of Danielson's *Framework for Teaching* (*FFT*). Danielson (2007) has indicated that the power component of the whole *FFT* is *3C: Engaging students in learning*. The school district adopted this component as one of its power components. Much professional development has been prescribed to address deficiencies in 3c and increase potential student engagement. With this focus, it is not surprising that ESE levels are significantly higher in situations where teachers are receiving student engagement-increasing professional development. Still, there is no research precedent for expecting ESE significant differences when there would not be EIS or ECM variance; is there something unique to these PLCs that make them more focused on student engagement?

Another surprise is the contrast between the results from comparing mean efficacy levels in participation in PLCs groups and comparing mean efficacy levels among days per week in PLCs groups. Participation in a PLC was not enough to account for the variance in full-scale or factor efficacy levels. Rather, all statistically significant variances in TSE and ESE levels occurred only when comparing those that had participated in PLCs 3 or more days per week with those that did not participate in PLCs at all. Further questioning the fidelity of the PLC program at the surveyed sites is the fact that PLCs were only meeting, for the most part, one or two times a week. Unclear is what dictates what Lieberman and Miller (2011) called "regular" and "on-going" meetings, and whether one to two times per week is sufficient to meet this definition;

especially if lacking is the collaboration and honest talk to which faculty meeting-like PLCs do not lend themselves.

Implications for Further Research

This study aimed to examine the impact of time spent in cross-curricular PLCs on teacher the self-efficacy of teachers in urban high schools not only because research, specifically peer-reviewed research, has not much explored efficacy as a dependent variable, but also because of gaps in the literature on professional learning communities and their impacts. The value in more research is the critical eye with which educational researchers examine the so-called PLCs against the benchmark of a well-constructed PLC program. To use time spent in PLCs as a predictor or independent variable without doing so could, in fact, provide inaccurate assumptions concerning certain dependent variables.

Furthermore, educational research needs to challenge the status quo by conducting more quantitative analyses on the determinants and benefits of consistent collaboration on variables other than student achievement, such as teacher self-efficacy.

Tschannen-Moran and Hoy (2001) acknowledged that teacher efficacy is an elusive construct. It is necessary for researchers to deconstruct the sources of efficacy into quantifiably measurable indicators, such that determinants of teacher self-efficacy do not remain also so elusive. Tschannen-Moran and Chen (2014) recently suggested a focus on the sources of efficacy beliefs on the changing face of professional development. Tschannen-Moran and McMaster (2009) explored professional development in terms of the four sources of efficacy, and they demonstrated that there are complexities between professional development and efficacy that need to be explored.

Similarly, a call to researchers is the need to first measure the constructs of a successful PLC based on the four sources of efficacy, and then to analyze these PLCs using the four sources of efficacy as measured in well-constructed PLCs. Then can efficacy levels among various participation and time spent in PLCs groups be analyzed to gain true measurements of impact of PLCs on efficacy.

With regard to the constructs of this study, researchers might consider conducting a longitudinal study of similar design to determine whether participation and time spent in PLCs impact efficacy levels over time. A repeated measures study, whereby efficacy levels are measured over the course of participation in a PLC program, could yield interesting results. Greater insight might be gleaned from a study that examines efficacy levels in relation to PLC participation in various educational settings; for example, urban and suburban public school districts; public, charter, magnet, and private school settings. Aligned with collecting data about efficacy levels would be an exploration of the sources of efficacy among survey participants. Do environmental factors affect mastery experiences or vicarious experiences, physiological arousals, or verbal persuasions?

Implications for Educational Leaders

In a study that aimed to determine the most efficacy-benefiting approach to implementing a new instructional strategy, Tschannen-Moran and McMaster (2009) examined successful professional development formats according to the extent to which sources of efficacy manifested themselves. They found the best professional development method to be the mastery experience associated with collaboration.

Indeed, this study is a call to educational researchers to further explore the sources of efficacy in professional development, such as PLCs. But also implicit is an appeal to educational

administrators to consider the approach of professional development and the extent to which these approaches are engaging the sources of efficacy in teacher belief systems.

A compelling quandary is whether school administrators are able to articulate the extent to which their teachers are engaging in verbal persuasion (i.e. teacher talk) during professional development, especially in PLCs. And, are PLCs allowing teachers to have vicarious experiences during which they are developing beliefs in their practice based on hearing and observing others' successes? Are PLCs opportunities for teachers to engage in perfecting their practices (i.e. developing mastery experiences through collaboration)? And finally, are PLCs causing teachers to experience physiological arousal; an affective response to the cause of great teaching and student achievement?

Furthermore, the results of this study have implications for the allocation of time for PLCs for the school administrators who make fiscal and instructional decisions about implementing or bolstering PLCs. The findings of this study suggest that PLCs could yield higher efficacy levels if the collaboration time per week is high. Especially in those cases in which the PLC program is not implemented with fidelity, only 1 or 2 days in PLCs may not be sufficient time to affect teacher self-efficacy. Time is a treasured and limited resource in public education: Do administrators measure the value of that time again potential increases in teachers' beliefs about their abilities?

Hoy et al. (2002) highlighted the reciprocal relationship between self-efficacy and collective efficacy in the following statement: "It seems that personal teaching efficacy promotes collective efficacy, which reinforces personal teaching efficacy" (p.91). Therefore, educational administrators might note that what time is allocated toward increasing self-efficacy levels will result in increased collective efficacy. This benefit increases academic optimism in the building.

Hoy, Tarter, and Woolfolk Hoy (2006) examined student achievement and found it to be a function of academic optimism; a latent construct inclusive of collective efficacy, faculty trust, and academic emphasis. Therefore, educational administrators can expect gains in student achievement by focusing on teacher self-efficacy.

Goddard et al. (2000) encouraged administrators to "systematically develop teacher efficacy" (p.483) because collective efficacy and student achievement benefitted from such systematic development. While collective efficacy was not a focus of the present study, administrators can exploit the reciprocity and mutual benefit between self-efficacy and collective efficacy. The resulting advantage serves as justification for allocating resources toward time in PLCs and toward efforts to increase sources of efficacy in professional development activities, like PLCs.

Conclusion

Tschannen- Moran and Woolfolk Hoy (2007) articulated the nature of teacher self-efficacy in the following statement: "Teachers' sense of efficacy is a little idea with big impact. Teachers' judgment of their capability to impact student outcomes has been consistently related to teacher behavior, student attitudes, and student achievement" (p. 954). The paramount focus and objective for any educational researcher and school leader is student achievement.

That practitioners can drive learning outcomes through increasing efficacy beliefs of teachers must compel us to identify ways to appeal to sources of efficacy. Educational leaders can drive student achievement; but at the same time they drive student achievement, they can promote increased efficacy beliefs. We can effectively increase the confidence level of teachers through PLCs, such that teachers are no longer just doers; teachers become leaders. They can impact the learning in their classroom and transform their beliefs into actions and behaviors.

Teachers who can become leaders can assume and share the awesome responsibility that is student achievement.

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