SELF-EFFICACY BELIEFS OF K-12 TEACHERS:
THE EFFECTS OF A PROFESSIONAL DEVELOPMENT PROGRAM
THAT IS AlIGNED WITH THE COMMON CORE STATE STANDARDS FOR
LITERACY

By

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ABSTRACT

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In response to the need to train teachers to effectively integrate Common Core 
State Standards (CCSS) for ELA/Literacy into elementary and secondary education, a 
program funded by a state department of education provided a year-long professional 
development program to K-12 teachers. This study investigated two questions: the 
impact of this program on 154 participants' self-efficacy in learning about and 
implementing both CCSS literacy standards and instructional strategies aligned with the 
CCSS, and the differential effects of this program on participants' self-efficacy due to 
contextual variables such as the content area or the grade level of the participating 
teacher. For question one, the data analyses from the pre-post- surveys revealed that 
the state-funded program significantly increased participants' teacher self-efficacy in 
literacy and Core-aligned instructional strategies. For the second question, no 
significant difference was found on program effects between participants with different 
contextual variables. Conclusions and discussion of the results suggest that teacher 
self-efficacy can substantially increase for participants regardless of grade level or 
content area when professional development is intentionally designed with five core 
characteristics.
(Keywords: active learning, content focus, coherency, collective participation, Common Core State Standards, duration, instructional strategies, K-12, literacy, self-efficacy, teacher professional development, teacher self-efficacy)
To the students who daily inspired me to be my best for them. To their teachers I now seek to serve and whose work undergirds this study.
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INTRODUCTION

While I have taught high school English Language Arts since 1999, it wasn’t until 2004 that I began facilitating professional development for teachers. Since then, I have been co-facilitator and lead facilitator for a variety of professional development opportunities, ranging from 75-minute workshop presentations to on-going, 100+ hour, intensive programs. Effective professional development is different from traditional classroom learning in many ways. The most marked difference lies in the goal: effective professional development should not simply impact the participating teacher but also result in higher student achievement.

There are few who would argue the desirability of having an effective teacher for one’s own child. But does the quality of a teacher actually matter? Research shows that the presence of having a high quality, effective teacher is the most powerful predictor of student success (Kaplan & Owings, 2004), and that lower achieving students are the first to benefit as teacher effectiveness increases (Sanders & Rivers, 1996). One way to facilitate growth and increase teacher quality is through professional development. In fact, high quality professional development has a greater impact on student achievement than either higher teacher salaries or smaller teacher-to-student ratios (Vogel, 2006). Not all professional development is the same, however. And simply attending professional development does not ensure a high-quality, effective learning experience for the teacher.

My experience in both attending professional development as a teacher and providing professional development to teachers fostered many questions regarding teacher effectiveness, program quality, and student achievement. My questions often
centered on program structure and facilitator role, such as how can a facilitator structure professional development to engage and motivate teachers as learners? What can a facilitator do in order to encourage reflection, critical thinking, and rigorous engagement with content? How can a facilitator create time and space for teachers to productively struggle, support teachers as they actively construct their own meaning, and then serve as a thinking partner as those teachers make meaningful adaptations and modifications to content and transfer learning to their own contexts, content areas, and grade levels?

Other questions, however, focused on the role of the learner. As I facilitated professional development, I noticed that some teachers were deeply engaged, making direct connections to their practice and applying what they had learned. Other teachers were less so, and transfer to the classroom seemed negligible. This prompted me to seek answers to questions such as the following: what determines the degree to which a given teacher learns? the degree to which a given teacher integrates newly learned instructional practices or strategies into the classroom? the degree to which a given teacher perseveres past the first roadblock or challenge when integrating newly learned strategies?

Each of these questions evokes a multitude of possible answers. It was this curiosity and this desire to improve my own craft that led to exploration of theories and constructs that might provide insight. I started with the topic of professional development, combing through studies that reported significant effects for both change in teacher practice and increase in student achievement scores. A growing number of studies reported that there was a significant increase in student achievement scores when professional development incorporated a set of five core features into its design.
These studies began to answer some of the questions that I had even as they prompted more. A couple of these studies linked participation in professional development to an increase in teacher self-efficacy. As I pursued this new line of research, I found studies that drew significant connections between increases in teacher self-efficacy, integration of strategies in the classroom, and student achievement scores. The coalescence of these two topics, effective professional development and teacher self-efficacy, shimmered expectantly, inviting further exploration. As a facilitator of professional development and as a scholar, I am deeply interested in high-quality professional development that impacts teacher efficacy.

This study focuses on the effect of effective professional development on teacher self-efficacy, as well as the relationship of certain contextual variables with that effect. In the next section, I draw on the current research of both the core features of effective professional development and teacher self-efficacy to describe the existing problems in teacher learning.
CHAPTER 1

Statement of the Problem

Researchers claim that when professional development is designed to include five core features, there is a greater likelihood of impact on both teacher classroom behavior and student achievement (Blank & de las Alas, 2009; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). These five core features are as follows: (a) sufficient duration of the professional development; (b) focus on content; (c) the provision of active learning strategies; (d) collective participation of teachers; (e) and the coherency of the professional development to teachers’ needs and beliefs.

The reality of most professional development programs, of course, is that very few incorporate all five of these features. Over the past sixteen years, I have experienced both productive and unproductive professional development sessions, each with varying levels of success as defined by change in my classroom practice. The most impactful professional development program that I participated in was a 2002 Summer Institute at one of the many sites of the National Writing Project. These Summer Institutes incorporate many of the core features of effective professional development (Dierking & Fox, 2012; Lieberman & Wood, 2002; Sun, Penuel, Frank, Gallagher, & Youngs, 2013), and it was this experience that provided me with a lens through which to view all subsequent professional development. The desire to more fully understand effective professional development prompted me to examine the literature around this topic and, subsequently, to design a professional development program that intentionally integrated all five features.
In addition to how professional development is structured, an integral part of the potential success of a professional development session involves the teachers, themselves. Their view of their own ability to enact the new learning in their classrooms has a significant impact on what takes place after the professional development. Bandura’s Social Cognitive Theory (1977, 1986, 1997) has evolved over the past thirty-five years, with contributions from many researchers shaping the meaning and measure of what is now called teacher efficacy or teacher self-efficacy (Goddard, Hoy, & Woolfolk-Hoy, 2000). Research has linked higher levels of teacher self-efficacy beliefs to greater efforts made by those teachers and greater performances in the classroom (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998), as well as directly correlated it to students’ academic achievement levels (Caprara, Barbaranelli, Steca, & Malone, 2006; Ross & Bruce, 2007; Tschannen-Moran & Woolfolk Hoy, 2007; Tschannen-Moran et al., 1998). However, there is a scarcity of research concerning the effect of effective professional development on teacher self-efficacy. While several researchers indicate that professional development can positively influence teacher efficacy (Cantrell & Hughes, 2008; Ingvarson, Meiers, & Beavis, 2005), few studies can be found that focus on the effect that intentionally designed professional development, incorporating the five core features of effective professional development, has on teacher self-efficacy.

Researchers have also examined whether participant characteristics or influences of context have an impact on teaching self-efficacy. Current studies provide insight into how these contextual variables may influence teacher self-efficacy. For example, a recent study suggests that elementary school teachers may have higher teacher efficacy than middle or high school teachers (Beauchamp, Klassen, Parsons,
Durksen, & Taylor, 2014), while another provides evidence that early career teachers are more likely to experience a change in self-efficacy while experienced teachers have more static efficacy (Powell-Moman & Brown-Schild, 2011). Content teachers may experience high teacher self-efficacy in their field of teaching but lower teacher self-efficacy when considering ways to integrate content literacy strategies into a lesson (Cantrell & Hughes, 2008). Finally, the grade level taught can moderate the effect that years of teaching can have on teacher efficacy (Lee, Cawthon, & Dawson, 2013). This suggests that the influence of a given professional development program may differ, depending upon the grade level taught or even the content area of the teacher. Can a professional development program that intentionally integrates all five core features of effective professional development have a positive effect on teacher self-efficacy in participating teachers regardless of grade level or content area?

An opportunity to grapple with this question in an authentic context is presented by our current educational reality in the United States. With 42 states adopting and using the Common Core State Standards, the Common Core State Standards for ELA/Literacy are a current and pressing reality for many teachers across the nation. Teachers are expected to align curriculum to these newly adopted standards and teach using Core-aligned instructional strategies, often with little to no support or training in how to do so. As the research shows, when teachers are expected to change the way they teach, the skills they teach, and/or the content of what they teach, they may experience a dip in teacher self-efficacy.

Providing teachers with effective professional development that targets Common Core literacy and Core-aligned teacher strategies is an important first step. However,
measuring the effect of that professional development on teacher self-efficacy for Common Core literacy provides both a significant contribution to the field of teacher self-efficacy and a relevant extension into the field of K-12 educational research. To date, studies that address teacher self-efficacy as a component of teaching the literacy standards of the Common Core do not exist.

**Purpose of the Study**

In this study, I consider whether a professional development program intentionally designed to include the core features of effective professional development has an effect on teacher self-efficacy. Additionally, I consider whether certain contextual variables, such as content area and grade span, have a relationship with that effect. I argue that the extensive body of research on teacher self-efficacy should be considered when evaluating the effectiveness of professional development programs and that a measure of effectiveness should include an increase in teacher efficacy.

This study provides one way to bridge the gap between what is currently understood regarding how teacher self-efficacy can be positively influenced through professional development and whether professional development can affect the teaching self-efficacy of all participants, regardless of grade level or content area. Given the widespread challenge around the creation of Core-aligned curriculum and subsequent implementation in the classroom, such a study makes a substantial contribution to those interested conducting professional development for typical school populations (i.e. multiple grades and multiple content areas), measuring growth across school populations, and addressing what is newly expected of the K-12 educator teaching in a state that has adopted the Common Core. A goal of this study is to close
the gap between what is currently known about teacher self-efficacy and ways to measure teacher self-efficacy as it relates to Core-aligned teaching. Specifically, the research questions for this study are as follows:

1. What is the effect of the Core Teacher Program on teacher self-efficacy related to Core-aligned teaching?
2. What is the relationship of the teachers’ content area or grade span with the effect on teacher self-efficacy toward Core-aligned teaching?
CHAPTER 2

Literature Review

I begin by examining the research on effective professional development, explaining the core features that impact both teacher learning and student achievement. Then I consider research on teacher self-efficacy, a body of work that informs what we know about teacher behavior and student achievement.

Research to Inform Professional Development

The Need for Professional Development

While teacher professional development is a widely accepted method to improve classroom teaching, the history of said professional development has a somewhat dismal track record with varying levels of success (Guskey, 1986; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). As Kennedy (2010) points out, “the zeal to reform American education has reached such a pitch that teachers are confronted with one or more new initiatives every year” (p. 596). Consequently, there has been a clear need for identifying the characteristics of effective professional development that both impacts teacher learning and increases student achievement scores.

Features of Effective Professional Development

Large-scale evaluation studies have focused specifically on changes in teachers’ instructional practices and their impact on student achievement scores. The literature on effective professional development shows a consensus around core features that impact teacher learning and also indicate an increase in student achievement. In the past decade, large-scale program evaluations have emphasized the following five core features as essential: (a) content focus; (b) active learning; (c)
collective participation; (d) coherence; and (e) sufficient duration. Subsequent research studies have begun including this set of core features (e.g. Greenleaf et al., 2010; Penuel et al., 2007; Penuel et al., 2011) or subsets (e.g. Sun et al., 2013). The move toward consistently measuring these core features in both empirical studies and meta-analyses (e.g. Blank & de las Alas, 2009), as advocated by Desimone (2009), has resulted in moving the field forward.

**Content focus.** Much of the research literature indicates that the most influential feature of high-quality, effective professional development is the focus on content. A focus on content means providing teachers with professional development sessions that are subject-area focused and also ensuring that the content is anchored to practice (Blank & de las Alas, 2009; Desimone, 2009; Garet et al., 2001; Greenleaf et al., 2010; Penuel et al., 2007; Sun et al., 2013). In essence, effective professional development has been found to improve teachers’ pedagogical content knowledge (Shulman, 1987) by providing them with both deeper knowledge and understanding in their content area and those strategies most effective for teaching the particular subject. Additionally, content focus has been found to provide teachers with the time and requisite information to explore what students should know, how students acquire specific content knowledge and skills, how students best learn in specific content areas, and the nature of common student misconceptions within the subject area (Garet et al., 2001; Guskey & Yoon, 2009; Penuel et al., 2010). It has also been found that sessions focused on content and content-focused strategies are more effective than those focused on teaching technique or various areas of classroom management (Garet et al., 2001; Greenleaf et al., 2010; Kennedy, 1998). Empirical studies have revealed that a
strong content focus is essential to effective professional development, showing significant, positive associations between content focus and teachers’ self-reported increase in content knowledge, content-related teaching strategies, and best instructional practices (Penuel et al., 2011; Sun et al., 2013). Thus, the design of an effective professional development program should include a feature that focuses teachers on specific content, as well as those related strategies shown to be most effective for teaching that content.

**Active learning.** This core feature is closely related to the effectiveness of professional development. When teachers are actively engaged in constructing their own knowledge, learning is more meaningful, more connected, and more likely to be integrated into classroom teaching. Active learning within the professional development context can take many forms: examples that appear in the literature include planning, enacting, and revising curricular units (Penuel et al., 2007); leading discussions or participating in discourse around problems of practice (Blank & de las Alas, 2009; Desimone, 2009; Greenleaf et al., 2010); engaging in written work (Garet et al., 2001); reviewing student work (Desimone, 2009); and observing other teachers and being observed (Blank & de las Alas, 2009; Desimone, 2009). Actively inquiring into instructional practice, planning lessons, and considering the underpinning content area principles, as well as collectively developing assessments, leading instruction, and participating in professional networks are additional forms of active learning. As long as teachers are actively engaged in sense-making, inquiry, and meaningful analysis of their teaching and/or learning, they have a higher likelihood of learning and the impact on student learning is strong.
Recent research also shows a strong indirect, or spillover, effect for active learning (Sun et al., 2013). The spillover effect of professional development refers to the effect of professional development on the instructional practices of those teachers who have not participated in the same professional development. These findings suggest that teachers’ expertise not only has the potential to change peers’ instructional behavior, but that it also continues to spread to other teachers even after the initial professional development session is completed. When teachers participate in professional development designed with the core feature of active learning, the effect they have on their non-participating peers is close to that of direct exposure. In other words, even though their peers haven’t participated in the professional development session themselves, the effect is almost as though they had. There is something about active learning that translates to deeper knowledge acquisition for participating teachers and a stronger ability to transfer that to others. Including this feature, then, in an effective professional development program is essential.

Collective participation. This feature involves the participation of teachers from the same school, grade level, or department. The benefits of collective participation are many, especially in the area of providing teachers with a professional learning community in which they can collaborate, share curriculum and resources, discuss shared students, and sustain changes in practice over time (Garet et al., 2001). When teachers participate in professional development together, there is potential for additional interactions and discourse around problems of practice during the school day (Desimone, 2009; Garet et al., 2001; Greenleaf et al., 2010). There is additional evidence that collective participation can lead to enhanced trust, focus, and motivation
(Penuel et al., 2007) as teachers collaborate and work towards school wide implementation. This creates a shared professional culture. Much of the research in this area, however, has examined the benefits of collective participation in the restructuring of schools (e.g. Newmann & Associates, 1996). And while the benefits of collective participation are many, it may not be essential to effective professional development. In a meta-analysis of 16 empirically designed research studies of effective programs, Blank and de las Alas (2009) analyzed the effect of teacher professional development on student achievement outcomes. They found mixed support for collective participation. While several studies were clearly implemented at the school-level, many of the others were not. Yet all programs showed clear gains in student achievement. This may be explained, in part, by the findings from Desimone et al. (2002) that simulations of collaborative interaction can be achieved through the facilitation of discourse among participants around problems of practice. Interactions among participants in the form of discussion, shared learning around videos cases and student work, and co-creation of lessons and assessments can result in powerful teacher learning and may achieve the same desired result as collective participation from the same school, grade, or department. Regardless of whether collective participation is met through a selection of teachers from the same educational setting or through simulations of collaborative interaction, the design of an effective professional development program should certainly incorporate this core feature of collective participation.

**Coherency to teachers’ needs and beliefs.** A program is coherent when the professional development sessions are consistent with teachers’ prior knowledge,
emphasize alignment with content area standards and assessments, and support
teachers through a professional learning community or network of similarly focused
teachers (Blank & de las Alas, 2009; Desimone, 2009; Garet et al., 2001). A common
criticism of ineffectual professional development is the propensity for one-and-done
workshops, conference sessions, and keynote speakers, unrelated to an overarching
goal or objective. When professional development is a “piece” of the coherent “whole,” it
is more likely to provide deep, authentic learning for teachers. Teachers know the
objectives, whether they are in the form of school reform or state standards and
instructional objectives and assessments, and they know that each subsequent
professional development session will build upon the previous. In determining the
perceived coherency of a program with their own beliefs, their school culture, and their
students’ needs, teachers will commit to enacting or resisting, adopting or adapting
(Penuel et al., 2007). Thus, it may be important to clearly delineate the coherence of a
professional development program and to provide teachers the time to consider the
implications of such a program in their own professional lives.

A commitment to coherence is not to be confused with a rejection of new learning
outside of teachers’ experiences. As teachers learn new content and teaching
strategies, they begin the messy process of assimilating them into their current
understandings and knowings. As they adjust their current practices to accommodate
this new knowledge, they can experience cognitive dissonance and may need coaching
and support. Providing teachers with the requisite tools and strategies for implementing
this new learning is essential (Greenleaf et al., 2010). As long as each successive
professional development session builds upon the last, aligned with the same goals and
objectives, it is more likely to be coherent with teachers’ needs. As related in their meta-analysis, (Blanks & de las Alas, 2009), coherence can be measured by consistency, congruency, and compatibility:

A professional development activity or program is more likely to be effective if it is a) consistent with the teacher’s school curriculum or learning goals for students and/or aligned with state or district standards for student learning or performance, b) congruent to the day-to-day operations of schools and teachers, and c) compatible with the instructional practices and knowledge needed for the teachers’ specific assignments. (p. 24).

These aspects of coherence, however, emphasize the culture of the school, itself, as having primacy over the specific needs of the teacher at hand. This is consistent with the research on teacher change and the need for a support system, whether that is in the form of a professional learning community, a network of teachers, or the school system itself (Beauchamp et al., 2014; Blank & de las Alas, 2009; Desimone, 2009; Fives, Hamman, & Olivarez, 2007, Garet et al., 2001). An effective professional development program should be designed in ways coherent to the participating teachers, responding both to local constraints and those of the larger picture, whether that is generated by the district, state legislation, or federal directives.

**Sufficient duration.** A great body of literature spanning the last fifteen years has advocated for professional development of sufficient duration. Subsequent research has determined that the number of contact hours, the amount of time the professional development sessions spans, and the frequency with which the sessions occur all exert a substantial influence on the effectiveness of the professional development, as well as
the impact on student learning (Blank & de las Alas, 2009; Desimone, 2009; Garet et al., 2001; Greenleaf et al., 2010; Penuel et al., 2007; Sun et al., 2013). No consensus has been reached regarding a requisite number of contact hours, how frequently the sessions should occur, or over how long a period the sessions should span. Some research indicates that results are consistent only when teachers receive over 100 hours of professional development time (Banilower et al., 2006, quoted in Blank & de las Alas, 2009, p. 18); however, some researchers feel that 20 or more hours spread out over time (six months or more) may be sufficient (Desimone, 2009).

Perhaps the most important aspect of duration is that it allows time for the type of necessary professional development activity to take place. Active and engaged learning activities, such as collaborative discussions around student work or planning, enacting, and revising curricular units, require a significant time commitment. When professional development sessions are long enough, it allows teachers to participate in those activities shown to have the greatest impact on students. Distributing workshops across a significant amount of time allows teachers to go back to the classroom, teach a lesson or experiment with a newly learned strategy, reflect upon the process and outcomes, and then come back to the professional development workshop in order to debrief, troubleshoot, and share experiences with other teachers. The frequency with which professional development sessions occur increases teacher focus on, awareness of, and interaction with the workshop content which then leads to a greater connection between the professional development and fulfilling teachers’ learning needs.

The amount of time dedicated to professional development is not, in itself, enough to improve teacher knowledge and impact student learning. How that time is
utilized is actually the determining factor in determining effectiveness. For example, Blank and de las Alas (2009) found a statistically significant positive correlation between frequency and professional development that had at least two markers of coherency, a key feature of effective professional development previously discussed. When professional development is of sufficient duration, there is enough time for teachers to interact with content-focused knowledge and teaching strategies, engage in active learning, and participate collectively with peers.

Finally, in their research examining spillover effect, Sun and colleagues (2013) found that the duration of the program had a significant impact, with those programs of longer duration resulting in higher impact on those peer teachers who had not participated in the professional development sessions. In other words, when teachers participate in professional development sessions of sufficient duration, they impact the teaching behavior of peer teachers who did not participate at all. This has significant implications for designers of professional development in two ways: first, effective professional development must include these three attributes of duration (frequency, span, and contact hours); secondly, program facilitators should integrate time and space for collegial interactions, both formal and informal, and encourage participants to share their new learnings with non-participating colleagues. Any effectively designed professional development program, then, should consider integrating all three attributes of this core feature.

Including these core features of effective professional development is consistent with a large body of empirical research concerning this topic, and Desimone
(2009) provides a convincing argument for accepting these features as a basis for further research of effective professional development.

**What’s Missing?**

In summary, the five core features of effective professional development have been shown to increase both teacher learning and student achievement. Across these studies, researchers have demonstrated strong effect sizes for professional development that emphasized active learning around specific content over a sufficient duration of time and contact hours. Yoon et al.’s (2007) review of empirical studies that meet the What Works Clearinghouse evidence standards (only nine of more than 1,300 potential contenders met those standards) revealed that when teachers receive substantial professional development, they “can boost their students’ achievement by about 21 percentile points” (p. 1). However, a meta-analysis of multiple studies (Blank & de las Alas, 2009) also revealed that achievement outcomes are more likely to be positive when student measures directly aligned with the treatment goals. Said differently, when student achievement was measured by large-scale statewide assessments, the effect is less apparent.

**Research Regarding Teacher Efficacy**

**Self-Efficacy: The Import and Impact**

Self-efficacy, a key construct of social cognitive learning theory, refers to one’s belief in one’s capability within a specific domain. Introduced by Bandura (1977) and extended by subsequent researchers, self-efficacy is comprised of one’s confidence in one’s ability to carry out a given task or produce a specific outcome. Because self-efficacy refers to “context-specific assessment of competence to perform
a specific task” (Pajares, 1997, p. 15), it is possible to simultaneously entertain both low and high self-efficacy. For example, an individual might have high self-efficacy in the area of teaching the scientific method to 7th graders and low self-efficacy in the area of integrating literacy strategies into the science classroom. Such an individual holds divergent efficacy beliefs (Tschannen-Moran & Johnson, 2011). Bandura (1997) suggests that self-efficacy can be a powerful motivating force, an impetus for action, effort, persistence, and resilience. These beliefs can be more predictive than actual ability in terms of motivation, affective states, and/or actions. Self-efficacy is future oriented and can be a strong predictor of behavior (Bandura, 1997). Consequently, a teacher who does not believe that she will be successful in integrating literacy strategies into her science class will likely dedicate less time, effort, and preparation into lesson planning, identifying writing and reading assignments of value, designing rubrics, and facilitating these learning opportunities with her students. Even if she made the initial effort to integrate literacy strategies, she might be less likely to persist in the face of textual difficulty or student confusion. Her willingness to act, expend effort, persist in the face of difficulty, and choose resiliency in the face of setbacks is dependent upon her perceived self-efficacy in the area of integrating literacy strategies into her science classroom. Thus, self-efficacy relates to one’s perception of competency in a given area instead of actual ability. Overestimating or underestimating one’s competency, then, has implications for choices that one makes and actions one takes. As Bandura notes, perceived self-efficacy “is concerned not with what one has but with belief in what can do with whatever resources one can muster” (Bandura, 2007, p. 646).
Bandura (1977) identified four main sources of information that have the potential to positively or negatively influence self-efficacy expectations. These are listed in order of power or impact and are as follows: performance accomplishments (also called mastery experiences in the literature), vicarious experience, verbal persuasion (also called social persuasion), and physiological states (also called emotional arousal or affective states).

Mastery experiences are those that come from our own direct experiences and, as such, are the most powerful. Successful experiences raise self-efficacy, while failure, especially if occurring early within the sequence of events, lowers self-efficacy (Bandura, 1977). Successfully integrating a literacy strategy such as close reading into a science lesson and witnessing increased student achievement can increase a teacher’s sense of self-efficacy in terms of science literacy instruction. Failure is not always a defining element, however. If one experiences an occasional failure and is able to overcome that earlier failure through determined effort, then this event might actually strengthen one’s motivation and willingness to persist. For example, if a science teacher experiences success with this literacy strategy in several classes before experiencing failure, she may be more willing to persist and search for ways to problem-solve the failure event. She may ascribe the failure to the fact that the failed event happened in 5th period, right after lunch, or that it occurred with a low level text in a group of above-grade-level readers. She is less likely to ascribe failure to her own inadequacy for providing science literacy instruction. In addition to our direct experiences, mastery experiences can be emulated through the following: participant
modeling, performance desensitization, performance exposure, and self-instructed performance (Bandura, 1977).

Vicarious experiences are those in which one watches someone else model the behavior or accomplishment (Bandura, 1977). The more closely that the individual can identify with the one modeling, the greater the impact will be. If the model performs well and experiences success, self-efficacy increases. If the model performs poorly and experiences failure or defeat, self-efficacy decreases. If our 7th grade science teacher watches another teacher successfully facilitate an integrated literacy lesson, it is likely that her self-efficacy will be enhanced. The vicarious experience of modeling a behavior can even lessen the effects of personal failure by modeling persistence in the face of failure (Brown & Inouye, 1978). In the case of our 7th grade science teacher, in observing science teacher conduct an integrated literacy lesson, she witnesses a breakdown in student understanding. The modeling teacher persists and leverages the strategy in a different way. While some students understand, others do not. The modeling teacher does not halt the literacy lesson but instead provides appropriate scaffolding, and the students demonstrate understanding of the concept. Such an event would likely enhance the observing teacher’s sense of self-efficacy since she witnessed another science teacher (i.e. someone with whom she can closely identify) persist in the face of failure and find a way to succeed. Bandura (1977) identifies both live modeling and symbolic modeling as forms of vicarious experience.

Verbal persuasion is, essentially, the act of persuading an individual that s/he is capable of mastering a given difficult situation (Bandura, 1977). While another’s opinion or words can often be dismissed in the midst of failure, there are ways to increase the
likelihood of impact and counter the occasional setback. The credibility, trustworthiness, and expertise of the one providing the verbal persuasion are all essential elements. Additionally, specific performance feedback that is authentic in nature may lead to increased self-efficacy which translates into extra effort and a willingness to try new strategies when combined with goal-setting (Bandura, 1983). However, if the message is artificial, undeserved, or non-credible, self-efficacy can be diminished (Pajares, 2005). Bandura (1977) writes of the importance of the “interactive nature” of verbal persuasion, suggesting that it is the combination of providing specific feedback or particular aids or strategies and social persuasion that can make it effective. In the case of our 7th grade science teacher, her mentor and teacher model could provide both encouragement and concrete strategies for integrating science literacy lessons more effectively. She could observe the 7th grade science teacher and provide specific performance feedback. Such verbal persuasion would likely increase the teacher’s self-efficacy because it came from someone she trusted, someone she felt was an expert, and someone who provided concrete strategies, as well as specific feedback. Bandura identifies suggestion, exhortation, self-instruction, and interpretive treatments as forms of verbal persuasion.

Physiological arousal includes both physical responses such as heart rates and emotional responses such as feelings of anxiety, depression, or elation (Bandura, 1977; Pajares, 2002). The more anxious a person feels in relation to a specific task, the more likely his or her self-efficacy will be diminished. The more excited, the more likely the self-efficacy will be increased. There are several caveats to this source of self-efficacy, however. Physiological arousal is directly dependent upon our past experiences with similar situations (Bandura, 1977) and the increase or decrease of self-efficacy is not
dependent upon the intensity of the affective state, but rather upon the individual’s interpretation of said state (Pajares, 2007). If an individual interprets this affective state as a personal inadequacy, then self-efficacy may diminish; if an individual interprets this affective state as a common and transitory reaction, then self-efficacy will in all likelihood remain unaffected. If our 7th grade science teacher feels a sense of anxiety but attributes it to the fact that she is trying something new instead of her own inadequacy, she is more likely to expend both effort and persistence in the task – both of which will increase her likelihood of success. If she engenders a sense of excitement in trying the new task, she is likely to experience increased self-efficacy. Bandura (1977) identifies attribution, relaxation and biofeedback, symbolic desensitization, and symbolic exposure as ways to diminish negative affective states.

Teacher Efficacy

The focus on teacher efficacy began with the RAND studies of school-preferred reading programs and reading instruction in high minority, low socioeconomic urban schools (Armor et al., 1976). This early research sought to explain differences in the effectiveness of certain teachers and certain methods. In looking to account for variations in reading achievement among these students, they found that teacher self-efficacy had a positive relation. Their findings greatly influenced further research into the efficacy of teachers. For nearly forty years, researchers have worked to more fully refine the construct of teacher efficacy, develop ways of measuring it, and determine its true impact on teacher behavior and student achievement (Tschannen-Moran et al., 1998).

Tschannen-Moran et al. (1998) define teacher self-efficacy as, “the teacher’s belief in his or her own capability to organize and execute courses of action required to
successfully accomplish a specific teaching task in a particular context” (p. 233). This belief is a powerful predictor of future actions, both in the classroom and during preparation time. As previously noted, teaching self-efficacy is specific to the specific teaching task within a given context. Teachers can experience high self-efficacy in some contexts, some classes, and in some subject areas while still holding low self-efficacy views in other contexts, classes, and subjects.

The impact of teachers with high self-efficacy is significant. Research has linked higher levels of teacher efficacy beliefs to greater efforts made by those teachers which results in greater diligence in the classroom (Tschannen-Moran et al., 1998), as well as directly correlated to students’ academic achievement levels (Caprara, Barbaranelli, Steca, & Malone, 2006; Ross & Bruce, 2007; Tschannen-Moran & Woolfolk Hoy, 2007; Tschannen-Moran et al., 1998). Researchers have found that teachers with high self-efficacy tend to believe that they can reach even the most difficult students. They are willing to work harder and persist longer, regardless of student behavior, and therefore this higher teacher self-efficacy appears to be correlated with student achievement (Hoy & Woolfolk, 1990; Tschannen-Moran, Woolfolk Hoy, 2001; Tschannen-Moran et al., 1998; Woolfolk & Hoy, 1990). Teachers with high self-efficacy in classroom management are also less likely to experience burnout (Browers & Tomic, 2000; Fives et al., 2007). Thus, teachers with high self-efficacy are particularly important to the educational and academic well-being of a school.

Teacher efficacy does not have to be static. In fact, a multitude of studies over the past 15 years has underscored the finding that professional development can positively influence teacher efficacy (Garet, Porter, Desimone, Birman, & Yoon, 2001;
Ingvarson et al., 2005; Power-Moman & Brown-Schild, 2011, to name a few). When teachers experience positive change in their teaching self-efficacy, they begin to transfer this confidence (and recently learned strategies or knowledge) into their classroom practice, as well. In a study involving K-2 teachers in 16 districts in northern California, researchers found that an increase in teacher efficacy in teaching science significantly correlated with instructional changes in the classroom (Sandholz & Ringstaff, 2014). More specifically, as teachers gained a significant increase in teacher efficacy in teaching science, this led to more positive attitudes. With this increase in confidence in science knowledge and in instructional strategies, they increased their use of hands-on science investigations and scientific investigations (a focus on the professional development program under study).

**Contextual variables.** Researchers in the field of teacher self-efficacy have sought to ascertain the degree to which teacher efficacy might be influenced by such contextual variables as highest degree attained, number of years teaching, race, or gender. These studies have provided a deeper understanding of the complex and multifaceted nature of teacher efficacy.

It is important to examine these contextual variables at a granular level, however, in order to tease out the nuances of influence. For example, a recent study with a sample of 1,430 practicing teachers showed that general teaching self-efficacy increases with years of experience, peaks around 23 years of experience, and then begins declining in later years (Klassen & Chiu, 2010). Another study, however, found no decline in later years of teaching. A recent study of 648 elementary and middle school teachers found that the number of years of teaching experience was unrelated to
teachers’ self-efficacy beliefs for literacy instruction (Tschannen-Moran & Johnson, 2011). In their study of the impact of the Kenan Fellows program and the mediation of contextual variables (called *participant characteristics* in their study), Powell-Moman and Brown-Schild (2011) found no correlation between post-efficacy scores and the number of years teaching (there was a positive correlation between pre-efficacy scores and number of years teaching, however).

The differing variable between the former study and the latter two, however, might be the focus of the self-efficacy measures, themselves. The first was general; the latter two were targeted and specific. The Klassen & Chiu (2010) measure examined three more general domains of self-efficacy (instructional strategies, classroom management, and student engagement) while the Tschannen-Moran & Johnson (2011) examined self-efficacy for literacy instruction and the Powell-Moman and Brown-Schild (2011) study studied self-efficacy for inquiry-based instruction related to STEM. Another difference between these studies lies within the purpose: the first focused on examining the relationships among certain contextual variables for a sample of 1,430 teachers with no intervention. The latter two focused on examining the effect of professional development on the pre- and post- measures of targeted self-efficacy on participating teachers. This small but significant detail may have implications beyond the scope of this study. The important take-away for us, however, is that an intervention can be effective for all teachers, regardless of their years of experience.

These studies also examined the effect of other contextual variables, such as gender, race, and highest degree attained. While these variables are often included in studies, some researchers claim that there are no theoretical reasons to indicate that
these contextual variables would predict the self-efficacy beliefs of teachers
(Tschannen-Moran & Hoy, 2007). Studies continue to back this claim up. For example,
studies show that gender does not seem to have a strong effect on teacher self-efficacy
(Powell-Moman and Brown-Schild, 2011; Tschannen-Moran & Hoy, 2007; Tschannen-
Moran & Johnson, 2011), and neither does race (Tschannen-Moran & Hoy, 2007;
Tschannen-Moran & Johnson, 2011). In addition, no significant difference in teacher
efficacy was found based on the highest degree teachers had achieved, either (Powell-
Moman and Brown-Schild, 2011; Tschannen-Moran & Johnson, 2011). Additionally,
while it might be counterintuitive, the contextual variable of teaching in an urban school
versus a suburban school does not seem to effect teacher self-efficacy (Tschannen-
Moran & Hoy, 2007). Understanding what contextual variable does or does not impact
teacher self-efficacy is particularly important, however, as it can inform the development
and approach of a professional development program.

One contextual variable that might influence teacher self-efficacy is the newness
of a teacher. Early career teachers (defined as having taught 3 years or less) have a
unique variability in teacher self-efficacy as opposed to more experienced teachers. For
example, one study showed that there is a jump in teacher self-efficacy scores at the 3
year mark, indicating that teachers have either left the field of teaching or have
experienced a significant increase in teacher self-efficacy (Tschannen-Moran & Hoy,
2007). This study also revealed that access to teaching resources made a significant
independent contribution to explaining the variance for teacher self-efficacy for early
career teachers while it made no impact on experienced teachers (Tschannen-Moran &
Hoy, 2007). Additionally, support from administrators, colleagues, and the community is
significant for early career teachers while it makes little contribution to the self-efficacy of experienced teachers. There is also evidence, that early career teachers are more likely to experience a change in self-efficacy while experienced teachers have more static teacher self-efficacy (Powell-Moman and Brown-Schild, 2011).

**Content area.** Teaching self-efficacy is specific to a particular task or context (Graham, Harris, Fink, & MacArthur, 2001). Therefore, teachers can experience high self-efficacy in the content area in which they teach and experience low self-efficacy with a particular instructional strategy or even a specific class. In particular, content area teachers may feel highly efficacious when teaching their content (e.g. history, science, music) but experience low teacher self-efficacy for integrating content literacy instruction in to their lessons (Cantrell & Hughes, 2008; Greenleaf et al., 2010).

There is little research that examines the relationship between content area and teacher self-efficacy. Studies that seek to examine the relationship between professional development, content area, and/or teacher self-efficacy tend to focus on one target population at a time. Examples of these target populations by study include high school biology teachers (Greenleaf, et al. 2010), sixth and ninth grade content-area teachers (Cantrell & Hughes, 2008), elementary and secondary teachers and drama-based instruction (Lee, Cawthorn, & Dawson, 2013), elementary science teachers (Sandholtz & Ringstaff, 2014), or K-12 teachers integrating engineering into their classes (Yoon, Evans, & Strobel, 2014). Studies that examine the relationship between content area and teacher self-efficacy for Common Core literacy are even more difficult to find. Furthermore, no studies that examine the relationship of teacher self-efficacy for
Common Core literacy instruction with ELA teachers, content-area teachers, and elementary teachers have been found.

**Predominant grade span.** Another contextual variable is the grade level taught. Previous research has shown that the grade level span within which a teacher teaches may influence self-efficacy scores. In their study of 800 teachers in elementary and secondary schools, elementary teachers consistently reported higher teacher self-efficacy (Beauchamp, et al., 2014). Other studies support this finding, showing that elementary teachers have higher self-efficacy for teaching literacy than middle school teachers (Tschannen-Moran & Johnson, 2011), as well as having higher teacher self-efficacy than high school teachers (Lee, Cawthon, & Dawson, 2013). In a study of 1,430 practicing teachers, Klassen & Chiu (2010) found that Kindergarten and elementary teachers possess higher levels of self-efficacy for classroom management and student engagement than those teaching middle school and high school. The contextual variable of grade level may also impact the sense of self-efficacy that even experienced teachers have. For example, experienced teachers who teach lower grades have a higher sense of teacher self-efficacy than those experienced teachers at the upper grade levels (Tschannen-Moran & Hoy, 2007). These studies indicate that the grade span level of the teacher may impact the level of self-efficacy that a teacher experiences.

There are few studies that examine the relationship between grade span level and teacher self-efficacy for literacy in general, however. Most studies examine a target population, such as first through third grade teachers (Graham et al., 2001), early elementary (Sandholtz & Ringstaff, 2014), or elementary and middle school literacy...
teachers (Tscannen-Moran & Johnson, 2011). Furthermore, no studies that examine the relationship of teacher self-efficacy for Common Core literacy instruction across all grade spans of K-12 teachers have been found.

As more research is conducted around the contextual variables influencing teacher efficacy, we are gaining greater insight into how we might support teachers, create professional development opportunities that increase teaching self-efficacy, and provide interventions for teachers experiencing low teaching self-efficacy. In order to accomplish this, studies that examine the relationship of a teacher’s content area or grade span level with teacher self-efficacy for Common Core literacy instruction are needed.

**Measuring teacher self-efficacy.** Because self-efficacy is a domain-specific construct, measurement of teacher efficacy is constrained by the particular domain or topic under study. Part of the challenge, then, is to utilize a measure that avoids both extremes of highly general or highly specific (Bandura, 2006; Pajares, 1996). Measures must be tailored for the situation specifically under study but must also maintain predictive power beyond the specific context being studied. To meet this challenge, measures have been developed to measure teacher efficacy in terms of responsibility for student achievement (Guskey, 1981), responsibility for student success (Rose & Medway, 1981), and overall teacher efficacy (Bandura, 1997). Because teachers can hold varied efficacy beliefs depending upon the teaching context, these varied scales measure specific contexts. This has resulted in various measurements being created for teaching science, engineering, and literacy, to name a few.
The role of teacher self-efficacy and its impact on teacher motivation, behavior, and classroom decision has proven to be a powerful construct. Determining the effect of professional development on teacher self-efficacy, measuring this effect, and determining the relationship of such contextual variables as content area or grade span becomes an important next step.

**The Effect of Professional Development on Teacher Efficacy**

Professional development can have a significant impact on teacher efficacy. Multiple studies suggest that professional development can result in moderate to significant gains in teacher self-efficacy (Cantrell & Hughes, 2008; Powell-Moman & Brown-Schild, 2011; Tschannen-Moran & McMaster, 2009; Watson, 2006). Particularly intriguing are findings that teacher efficacy can be increased through professional development regardless of teaching experience or individual interest in the task (Velthuis, Fisser, & Pieters, 2014), that teacher efficacy can remain improved even years after the professional development is completed (Watson, 2006), and that participation in professional development can increase the self-efficacy of novice teachers to the same levels of experienced teachers (Powell-Moman and Brown-Schild, 2011). Increasing a teacher’s self-efficacy is important because evidence suggests that teachers with higher self-efficacy are more willing to transfer skills and strategies learned in professional development to the classroom (Bray-Clark & Bates, 2003). This provides impetus for considering both the type of professional development that impacts teacher efficacy as well as the specific effects that quality professional development can have on teacher efficacy.
While professional development can increase a teacher’s sense of self-efficacy, a review of these recent studies discloses two items of interest. First, quality matters. There is a relationship between teachers’ ratings of the quality of professional development they had received and their self-efficacy (Tschannen-Moran & Johnson, 2011). Secondly, most studies exploring the impact of professional development on teacher self-efficacy describe their programs in terms of Bandura’s four main sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological arousal. Very few overtly consider the role of the core features of professional development in the structure or format of their program.

The role of core features of professional development on teacher efficacy. As previously described, there are five core features of effective professional development that are associated with gains in student achievement scores. In review, these are (a) content focus; (b) active learning; (c) collective participation; (d) coherence; and (e) sufficient duration.

It may also be the case that these same core features have implications for professional development programs that increase teacher efficacy. While few studies describe their professional development in terms of the core characteristics of effective professional development, those with the highest gains very clearly adhered to the criteria described in the literature. Whether intentional or not, upon examining these studies, it can be determined that those with the highest gains integrate at least 3 or more features (Ingvarson, Meiers, & Beavis, 2005; Powell-Moman & Brown-Schild, 2011; Sandholtz & Ringstaff, 2014; Velthuis, Fisser, & Pieters, 2014; and Watson, 2006). In particular, an analysis of these successful programs (as defined by an
increase in teacher efficacy) reveals that they were content focused and engaged
teachers in deepening their knowledge in a particular content such as science, content
literacy, or teaching science or math with the Internet. Those studies that found
increased teacher efficacy also employed active learning, most often engaging teachers
in designing curriculum or developing unit plans and collaboratively problem-solving
student work or misunderstandings. In terms of collective participation, in most cases,
teachers were participating with either colleagues from the same school or district or
colleagues who taught a similar content area. The content of the professional
development programs under study could be described as coherent with teachers' 
needs due to an administrator goal, school curriculum, or teacher application to a 
competitive fellowship. And finally, those studies that indicated an increase in teacher 
efficacy were of sufficient duration: they often contained a summer institute, consisted of 
many hours, and occurred over time. Table 1 examines four recent teacher efficacy 
studies through the lens of the core features of professional development.
## TABLE 1

**Core Features Found in Teacher Efficacy Studies**

<table>
<thead>
<tr>
<th>Study</th>
<th>Result</th>
<th>Content</th>
<th>Active Learning</th>
<th>Collective Participation</th>
<th>Coherence</th>
<th>Sufficient Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cantrell &amp; Hughes (2008)</td>
<td>Increase in both personal efficacy for teaching literacy and implementation of emphasized content literacy techniques.</td>
<td>Focused on content literacy and techniques, strategies, and activities that engaged students in deep learning.</td>
<td>Apprentice ship approach; explanation &amp; modeling; teacher participation; group work</td>
<td>Teachers included 22 6th and 9th grade teachers from 8 targeted schools. Groups were formed with school, cross-disciplinary, and within discipline.</td>
<td>Coherent with school goal: participants were chosen based on administrator’s expressed interest.</td>
<td>Year-long, including a week-long summer institute, two follow-up regional meetings, and monthly on-site coaching.</td>
</tr>
<tr>
<td>Study</td>
<td>Methodology</td>
<td>Teacher Participation</td>
<td>Curriculum Impact</td>
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<tr>
<td>Powell-Moman &amp; Brown-Schild (2011)</td>
<td>Increase in both self-efficacy in inquiry-based teaching and greater focus on depth of content.</td>
<td>Focused on STEM and inquiry-based teaching.</td>
<td>Teachers are participating with other STEM teachers and university-based partners. There is no focus on collective participation from common schools.</td>
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<tr>
<td>Sandholtz &amp; Ringstaff (2014)</td>
<td>Significant increase in teacher efficacy after just 1 year; continued increase each subsequent year. Gains corresponded with changes in instructional practices.</td>
<td>Adult-level science content in three areas over three years (physical, earth, life) &amp; content-pedagogical strategies.</td>
<td>Teachers included 39 K-2 teachers from 16 schools. They collaborated in grade-level teams.</td>
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</tbody>
</table>
Table 1 (cont’d)

| Watson (2006) | Improved self-efficacy remained high even after seven years; combining summer institute with online course shows significant difference in some aspects of self-efficacy. | Integrating the Internet in math and science curriculum | Skill-based training on specific Internet tasks; unit development featuring usage of Internet by students. | Not enough detail provided: 389 teachers who had participated in West Virginia’s K-12 RuralNet Program. | Not enough detail provided regarding participants. | Year-long: five-day summer institute and two supplemental online courses. |

**When core features of professional development are missing.** Learning is complex. Acquiring new knowledge, applying it to one’s specific teaching content, and transferring it to one’s own teaching context takes time. As a stark reminder of the importance of the core feature of duration is one study in particular. In the Ross & Bruce (2007) randomized field trial examining the effects of professional development on teacher efficacy, the professional development under study was content-focused (standards-based mathematics), provided active learning strategies (facilitator modeled; teachers collaboratively created Grade 6 tasks; they returned to class to teacher and gather student artifact, and returned to professional development sessions to discuss and share experiences with colleagues), included collective participation (included 85% of all 6th grade teachers from all elementary schools in a single district), and was coherent with teachers’ needs (teachers facing accountability pressures and the stakes
to increase scores are high). However, in terms of duration, the professional development only consisted of one day, plus 3 sessions consisting of 2-hours each. While the span of the professional development covered one semester, an important decision that allowed for teachers to learn and collaborate, return to their classroom to teach and gather student work, then return to share their experiences with colleagues in subsequent professional development sessions, the research literature indicates that 13 hours of contact time may not be enough to increase student achievement scores (Blank & de las Alas, 2009). The only statistically significant increase in teacher efficacy occurred in teacher confidence in managing students, certainly not the focus of the professional development program in question.

Another recent study that examined 4 different professional development formats revealed that professional development can even result in a decrease in teacher efficacy (Tschannen-Moran & McMaster, 2009). Participants were 97 primary teachers in 9 schools (core feature of collective participation) who were provided instruction in a reading strategy (core feature of content focus). The treatments varied and were as follows: Treatment 1 received a one-time 3-hour lecture. Treatment 2 received the same workshop but 20 minutes were devoted to a demonstration of the strategy with struggling readers (providing strategies for struggling readers is coherent with teachers' needs). Treatment 3 received the same workshop and demonstration, as well as a one-and-a-half practice session where they worked in groups to develop lessons and practice the strategies (active learning). Treatment 4 received everything that Treatment 3 did, but added to this was a small-group review of the strategy (30 minutes), a one-on-one coaching session (15 minutes), and a coaching session in the teacher's classroom.
(30 minutes). Treatment 4 had a total of 5 hours and 45 minutes of contact time). While a steady increase in teacher efficacy was expected by treatment, this was not the finding. Over half of the teachers in Treatment 3 evidenced declines in self-efficacy for reading instruction (20% had losses of more than a standard deviation). This study also tested the relationship between self-efficacy and strategy implementation. No relationship was found. While the researchers discuss the implications of their findings in terms of Bandura’s (1997) sources of influence on self-efficacy, it may behoove us to examine this study in terms of the core features of effective professional development. Without the core feature of duration, which provides opportunities for intensive training, time to engage in active learning, collaboration around lesson design and student work, and teacher reflection, there is not the requisite time for deep learning or substantive change (as measured by strategy implementation) to occur. The implications of this research suggest that an increase in teacher efficacy is not enough to result in an increase in strategy implementation. Both of these studies suggest that without the core feature of duration, there may not be enough time for sufficient learning and practice around content and active learning strategies.

This study works to extend what is currently known by examining the intersection of the core features of effective professional development and the current research on teacher efficacy. Through this study, I seek to more deeply understand changes in teacher self-efficacy through a pre- and post- measurement, as well as whether contextual variables such as content area or predominant grade-span taught have a relationship with those changes. Ultimately, this study seeks to inform professional
development program design even as it adds to the rich conversation regarding the influence of teacher professional development on teacher efficacy.

Summary

The research surrounding effective professional development shows that designers of professional development can directly influence teacher outcomes and student achievement by intentionally crafting programs that integrate five core features. A professional development program that includes these five core features will make every effort to (a) ensure the sessions are content-specific; (b) engage teachers in active learning strategies; (c) invite collective participation from the same school, district, or grade level; (d) ensure that the sessions align with teachers’ goals or administrative directives; and (e) provide sufficient duration, which includes sufficient contact hours, sufficient frequency, and occurrence over an adequate span of time.

The research from the field of teacher efficacy reminds us that high quality professional development can increase teacher efficacy when it is specific to the content taught, integrates active learning strategies, and focuses on specific teacher behavior. The reading also reminds us of some important considerations regarding the malleability of teacher efficacy, including years of teaching experience, grade level taught, and content area.
CHAPTER 3

Methods

In Chapter 2, I reviewed the literature on effective professional development and presented compelling research on the importance and malleability of teacher efficacy. I argued that leveraging the research on teacher efficacy in regards to professional development could extend current thinking in both arenas. In this chapter, I outline the methods for the study.

The data source used to answer each research question is outlined in the table below:

TABLE 2.

<table>
<thead>
<tr>
<th>Research Question and Data Source</th>
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<tbody>
<tr>
<td>Research Question #1: What is the effect of the Core Teacher Program on teacher self-efficacy related to Core-aligned teaching?</td>
</tr>
<tr>
<td>Research Question #2: What is the relationship of the teachers’ content area or grade span with the effect on teacher self-efficacy toward Core-aligned teaching?</td>
</tr>
</tbody>
</table>

Participants

Participants included K-12 educators from every region of a Northwestern state who applied for and were accepted into the Core Teacher Program during the 2013-2014 school year. These participants represented a diversity sample of educators, from classroom teachers, special services teachers (e.g. special education, music, and art), instructional coaches, administrators, online course builders and instructors, college
faculty, and many others. They also represented the various content areas and specialized services available in the state’s charter, online or digital, juvenile correctional, and public education systems. While a total of 248 educators participated in some aspect of the program and completed the first survey, only those 154 teachers who completed both a pre- and a post- survey were included in the study for data analysis.

**Setting and context**

The study took place in a Northwestern state that is geographically isolated, mostly rural with very few urban centers, and sparsely populated. Per student funding is among the lowest in the United States. Teachers participating in this study took part in a year-long professional development program sponsored by the state’s Department of Education in the area of Common Core State Standards for Literacy. This program is called the Core Teacher Program and focuses on Common Core literacy, unit-building, and research-based instructional strategies across content areas and grade levels. It provides participating educators with a common professional development experience around a common topic and is designed to teach educators about the Common Core State Standards for literacy, as well as specific research-based instructional strategies that best address these standards.

In full disclosure, I am co-director for the statewide program, as well as a Regional Professional Development Coach for a specific region. I was invited, along with a co-director, to spearhead this initiative with the express direction of creating a statewide program that provided impactful professional development for K-12 teachers in the area of Common Core literacy. Beyond the expectation that the EQuIP rubric
(Achieve, 2013) would be used in training (I served on the Idaho EQuIP team at that time), we started with a blank slate, a great deal of autonomy, and few resources. I have drawn overtly and continually upon the research literature and experiences within my doctoral journey (e.g. courses on design thinking, motivation theory, cognition and technology, as well as experiences such as serving as an instructor for a MAET online course for two semesters) as well as my professional ties with both the National Writing Project (e.g. past co-director of our local Writing Project and co-facilitator for the Invitational Summer Institute) and with classroom teachers to collaboratively design the Core Teacher Program into what it is today. My fellow co-director and the Regional Professional Development Coaches have been integral to the process and it is due to their tenacity, insights, commitment to our objectives, and optimism in the face of obstacles that we have experienced the success that we’ve enjoyed thus far. We have also experienced an inordinate level support and collaborative participation from the Idaho State Department’s Content Director and ELA/Literacy Coordinator, who play key roles in budgetary, legislative, and logistical arenas, as well.

Given the design of the Core Teacher Program, it was used for this study for two reasons. First, the Core Teacher Program collects data on its teachers’ self-efficacy through pre- and post- surveys. This survey aligns with the specific tasks and skills of the program and is specialized to measure those distinct constructs that are specifically important to the program to measure. Secondly, the Core Teacher Program was intentionally designed from the ground up with all five core features of effective professional development. Previous studies have typically integrated only one or several features. These core features contribute to a design that has the potential to
impact positive change in the classroom and increases in student achievement. While the scope of this study does not analyze teacher behavior in the classroom or student achievement data, research on teacher self-efficacy shows that it is directly correlated with higher levels of student achievement (Tschannen-Moran & Woolfolk Hoy, 2007; see Goddard, Hoy, & Hoy, 2000 for significant and positive associations between collective teacher efficacy and school-level student achievement). Additionally, research shows that professional development can have an impact on classroom practice (Gersten, Dimino, Jayanthi, Kim, & Edwards Santoro, 2010), as well as improved student achievement (Blank & de las Alas, 2009; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). The instructional goals and activities of this program made it an ideal site to explore the relationship between participation in the Core Teacher Program and participants’ perceived self-efficacy in regards to Core-aligned teaching.

Instrumentation

The study used one measure for the two research questions, a self-efficacy survey, the Core-Aligned Teaching Self-Efficacy Scale (CAT-SES). A pilot of this measure revealed strong validity and reliability for the areas under consideration. It also has a high level of internal consistency, as determined by Cronbach’s alpha which, for the full 58 item scale, is $\zeta = .976$. (Cronbach’s alpha for the Common Core State Standards for Literacy 6-item subscale is $\alpha = .844$; for the Key Shifts 17-item subscale $\alpha = .952$; for the Instructional Supports 24-item subscale $\alpha = .948$; and for the Assessments 11-item subscale $\alpha = .923$.)
The CAT-SES contains 58 items on a 6-point Likert scale ranging from 1= strongly agree to 6 = strongly disagree. This scale (Appendix A) asks teachers to rate how confident they are in their ability to accomplish each skill, ranging from (a) Strongly Agree, (b) Agree, (c) Slightly Agree, (d) Slightly Disagree, (e) Disagree, to (f) Strongly Disagree. These 58 items are divided into four subscales: efficacy for the Common Core State Standards for Literacy (6 questions), efficacy for the Key Shifts of the Common Core (17 questions), efficacy for Core-Aligned Teaching Practices (24 questions), and efficacy for Standards-Based Assessments (11 questions). Sample items include:

Efficacy for Common Core State Standards for Literacy

- I am confident in my ability to create and teach a lesson or unit that targets a set of grade-level CCSS ELA/Literacy standards.
- I am confident in my ability to provide students with a clear and explicit purpose for instruction.
- I am confident in my ability to select texts that measure within the grade-level text complexity band AND are of sufficient quality and scope for the lesson’s purpose.

Efficacy for the Key Shifts of the Common Core

- I am confident in my ability to teach my students to successfully read text closely, examine textual evidence, and discern deep meaning.
- I am confident in my ability to create a sequence of specific, thought-provoking, and text-dependent questions.
- I am confident in my ability to facilitate rich and rigorous evidence-based discussions around a common text.
Efficacy for Core-Aligned Teaching Practices

- I am confident in my ability to provide all students with multiple opportunities to engage with appropriately complex text.
- I am confident in my ability to include appropriate scaffolding so that all students directly experience the complexity of the text.
- I am confident in my ability to teach my students to focus on the most challenging sections of the text through discussion questions and other supports.

Efficacy for Standards-Based Assessments

- I am confident in my ability to use formative assessments to guide lesson revision.
- I am confident in my ability to use summative assessments to accurately assess student proficiency and/or interpret student performance.
- I am confident in my ability to teach students to successfully use self-assessment measures.

This scale may be valuable for professional development programs targeting the Common Core, as well as those states who have adopted the EQuIP rubric (Achieve, 2013) since the measure includes key indicators or criteria from the rubric. At last count, 26 states have participated in the EQuIP quality review process as facilitated by Achieve, an organization founded in 1996 by leading governors and business leaders (Achieve, 2015). (It should be noted that many Achieve staff and consultants were instrumental in the writing and support of the Common Core State Standards, the assessments evaluating student achievement in the standards, as well as the K-12 Next Generation Science Standards.) States, districts, and even vendors have used the
EQuIP rubric for various purposes and in multiple ways, from unit development to curriculum revision to evaluation of open education resources (Gerwertz, 2014; Pease, 2015; Piehler, 2015).

**Scoring.** Reverse scoring is required. Given the 1= *strongly agree* format, it is necessary to reverse scores in order for a high score to indicate a strong sense of self efficacy. This means that a “strongly agree” response to the statement, “I am confident in my ability to use formative assessments to guide lesson revision” must be reversed so that the respondent receives a score of 6 instead of 1.

By reversing the scoring of the self-efficacy items, this will mean that for all four dimensions of self-efficacy, the higher the score of the participant, the higher the level of teaching self-efficacy. To score the survey, no transformation of data is needed. The items are computed with simple arithmetic average of individual items, average of sub-scales, and average of the measure as a whole. While this survey allows the researcher to determine the self-efficacy of a given teacher regarding Core-Aligned Teaching as a construct, it also allows for sub-scale score interpretations for each of the four subgroups, and individual item score interpretations for individual skills or tasks. Individual items are a total of 6 points each.

**Score interpretation.** Score ranges were established by exploring quartiles of participant’s scores. From this data, it was possible to extract information regarding the impact of the intervening months of professional development on a teacher’s self-efficacy. This provided data for analysis that addressed both Research Questions 1 and 2.

**Data Collection**
The study used data from an existing data source in order to answer the Research Questions: that data was taken from the results of a pre- and post-survey on the self-efficacy of teaching Core-Aligned literacy strategies (i.e. CAT-SES). These surveys also included a demographic questionnaire that requested information such as content taught, grade level taught, and number of years teaching.

This is existing survey data that is routinely collected by the Core Teacher Program. Within the Core Teacher Program, the CAT-SES is administered and data is collected via the online Qualtrics survey program. The study included the data collected at two points during the 2013-2014 school year via pre- and post- survey deployments.

The pre- CAT-SES survey was deployed via a hyperlink in the first online course module of the Core Teacher Program, and teachers were instructed to take the survey before going on to Module Two. This occurred in September-October 2013. Regional Professional Development Coaches followed up individually with teachers who did not complete the survey in a timely manner.

The post- CAT-SES survey was administered via hyperlink in an email that each Regional Professional Development Coach sent to his or her Core Teachers after completion of the four-day summer wrap-up workshop (in either June or July 2014). Once again, Regional Professional Development Coaches followed up individually with teachers who did not complete the survey in a timely manner.

The procedures associated with this study were reviewed and approved by Michigan State University’s Institutional Review Board, IRB# x14-151e (Appendix B). Participants’ rights and contact information were safeguarded and protected as confidential. Responses used in this study were stripped of names and any identifying
personal information and coded with only participant numbers. While survey data is available to schools, districts, or individuals, no specific names or schools is provided, nor can it be determined from the data available. The survey directions provided information assuring participating educators that their names and schools would not be associated with any reports or presentations.

**Independent Variables**

The independent variables for this study were the contextual variables of the content area of the teacher and the predominant grade span taught. The intention was not to replicate previous studies focused on teaching self-efficacy but rather to serve as an extension of the important work that has already taken place by other researchers in the field. Prior research has focused on independent variables such as gender, ethnicity, highest degree attained, and/or the number of years a teacher has taught. With the goal of extending such previous work into domains less vigorously explored, the independent variables of content area and grade span seemed to be the most promising.

**Content area.** Teaching self-efficacy is specific to a particular task or context. The background that teachers have when they come into the Core Teacher Program and the expertise that they have already developed is important to their existing teacher self-efficacy. Because the focus of this professional development program is on Common Core literacy, teachers with a strong background in literacy (e.g. middle or high school *English Language Arts* (ELA) teachers and elementary teachers) may have different scores from those teachers without a background in literacy (e.g. content-area teachers or non-ELA teachers). This creates a situation where some participants may
enter the program with higher or lower teaching self-efficacy than other participants. The demographic data of the teachers were analyzed to determine the area in which the teacher taught. Four subsets were identified: content-area (non-ELA) teachers, ELA teachers, elementary teachers, and administrators/instructional coaches.

Analysis of the data provided insight into the relationship of content area with the effect on teacher self-efficacy toward Core-aligned teaching. For example, both ELA and elementary teachers may possess initial higher self-efficacy because of their literacy backgrounds. Content area teachers may experience lower self-efficacy for Common Core literacy instruction because literacy is not within the traditional purview of the content area teacher. Of particular interest, however, is the change over time for each subset of teachers, as demarcated by content area. This study sought to determine whether there was a relationship of the content area of teachers with the effect over time as determined by the pre- and post-teacher self-efficacy survey data.

**Predominant grade span.** Previous research has shown that the grade level that a teacher teaches within may influence self-efficacy scores and malleability. However, that research has often focused on limited grade levels at a given time or target populations. This study examined the broad spectrum of teachers engaging in the same professional development program to determine if subsets of teachers experience varying levels of impact. In the case of the Core Teacher Program, the professional development focus is on Common Core literacy.

Analysis of the data provided insight into the relationship of predominant grade span with the effect on teacher self-efficacy toward Core-aligned teaching. For example, K-2 teachers often focus on teaching students how to read and may have higher self-
efficacy in terms of literacy, while 3rd grade teachers begin focusing on reading to learn. Non-ELA middle and high school teachers are often masters of content and do not typically teach literacy strategies.

Grade span was selected instead of a specific grade level. Because this program runs in a rural state where educators often teach multiple grade levels within a day and/or teach multiple grade level students within the same class, identifying a span of grades was a better fit than identifying individual grade level. Additionally, educators such as special education teachers or music teachers, or specialized teachers often teach much larger grade spans, such as K-5 or 6-12. Categories for this Independent Variable are as follows: K-2, 3-5, 6-8, 9-12, K-5, 6-12, and administrator / instructional coach.

Of particular interest to this study was the change over time for each subset of teachers along grade span groups. This study sought to determine whether there was a relationship of the predominant grade span of teachers with the effect on teacher self-efficacy toward Core-aligned teaching.

**Dependent Variables**

The dependent variables for this study came from the measure itself. There were five within group dependent variables: the CAT-SES total score (58 items; $\alpha = .976$), Alignment to the Core (subscale 1; with 6 items; $\alpha = .844$), Key Shifts (subscale 2; with 17 items; $\alpha = .952$), Core-Aligned Instructional Supports (subscale 3; with 24 items; $\alpha = .948$), and Assessments (subscale 4; with 11 items; $\alpha = .923$).

**Data Analysis**
Data analysis was conducted on the data collected through the administration of the measurement in Fall 2013 and Summer 2014. Analysis of that data is described in Chapter 4.

**Analysis of results.** This study analyzed survey data collected at two points during the 2013-2014 school year. While surveys were deployed to all Core Teachers, this study only included data from those participants who completed surveys for both the pre- and the post- administrations.

In order to answer the research questions, I conducted a mixed ANOVA. For Research Question 1, a mixed ANOVA was conducted to compare the effect of Core-aligned professional development training on teachers who participated in the Core Teacher Program. From there, a dependent samples \( t \)-test was performed on the pre- and post- measurement data as a whole, as well as each of the four subscales, revealing that it is appropriate to statistically conclude that the Core Teacher Program impacted the teaching self-efficacy of the participants. This analysis is reported in depth in Chapter 4.

In order to answer Research Question 2 and analyze the independent variables of content area and predominant grade span, I ran a mixed ANOVA to determine the relationship for each independent variable for the CAT-SES. This data analysis is described in detail in Chapter 4.

**Conclusion**

Providing teachers with professional development is a common practice in the K-12 educational community. The goal is often to impact teacher change within the classroom, increase use of specific strategies, or provide training within a given
program or curriculum. Evidence suggests that teachers are more likely to increase strategy usage, try new teaching methods, and/or persist when facing daunting challenges when they have higher self-efficacy for the tasks at hand (Bray-Clark & Bates, 2003; Sandholz & Ringstaff, 2014). Previous studies have shown that professional development can increase teacher self-efficacy (Cantrell & Hughes, 2008; Powell-Moman & Brown-Schild, 2011; Tschannen-Moran & McMaster, 2009; Watson, 2006). It is not clear from the extant research, however, whether an intentionally designed professional development program can positively impact teachers of all grade levels and content areas in terms of teaching self-efficacy. Using the 2013-2014 CAT-SES data from the Core Teacher Program, this study seeks to answer two research questions, determining the effect of the Core Teacher Program on teacher self-efficacy for K-12 teachers as related to Core-aligned teaching, as well as the relationship of certain contextual variables such as content area or predominant grade span with the effect on teacher self-efficacy toward Core-aligned teaching. Analysis of the teaching self-efficacy scores on the CAT-SES determines the impact of the Core Teacher Program on participating teachers.
CHAPTER 4

Results

Introduction

This study examined the impact of a Core-aligned literacy intervention on teacher self-efficacy. Data gathered from the pre- and post-survey results provided valuable information regarding 154 educators who participated in a year-long professional development program that intentionally incorporated the five core features of effective professional development. The data was analyzed in two ways. First, this data was analyzed to determine the effect of the program on teacher self-efficacy related to Core-aligned teacher self-efficacy. Second, the data was analyzed to determine the relationship of teachers’ grade level or content area with this effect. Chapter 4 addresses the two research questions of the study by reporting on the results of the data analysis conducted on pre- and post-measurements.

Review of Research Questions

The questions guiding this study address the knowledge gap between what is currently known about general teaching efficacy and Core-aligned teacher self-efficacy. The research questions were as follows:

1. What is the effect of the Core Teacher Program on teacher self-efficacy related to Core-aligned teaching?

2. What is the relationship of the teachers’ content area or grade span with the effect on teacher self-efficacy toward Core-aligned teaching?

Research Question 1
To answer the first research question, I analyzed the survey data that was collected at two points during the 2013-2014 school year. While surveys were administered to all educators who participated in the Core Teacher Program, this study only included data from those participants who completed both survey deployments (n = 154). See Table 3 for descriptive statistics.

**TABLE 3**

*Descriptive Statistics for Teacher Self-Efficacy across all Participants*

<table>
<thead>
<tr>
<th>Efficacy Subscale</th>
<th>Pre-Survey</th>
<th>SD</th>
<th>Post-Survey</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT-SES (Full Scale)</td>
<td>4.39</td>
<td>.61</td>
<td>5.24</td>
<td>.44</td>
</tr>
<tr>
<td>CCSS Unit Planning</td>
<td>4.65</td>
<td>.69</td>
<td>5.49</td>
<td>.42</td>
</tr>
<tr>
<td>Key Shifts</td>
<td>4.30</td>
<td>.71</td>
<td>5.25</td>
<td>.48</td>
</tr>
<tr>
<td>Core-Aligned Instructional Supports</td>
<td>4.41</td>
<td>.65</td>
<td>5.20</td>
<td>.47</td>
</tr>
<tr>
<td>Assessments</td>
<td>4.33</td>
<td>.70</td>
<td>5.18</td>
<td>.52</td>
</tr>
</tbody>
</table>

N = 154.

To determine whether there was a difference in teacher self-efficacy among educators after participation in the professional development program, I conducted a mixed ANOVA (see Table 4). This allowed me to compare the effect of Core-aligned professional development training on all educators who participated in the Core Teacher Program. There was a significant effect for the full CAT-SES, $F(1, 141) = 170.750, p < .000$, partial $\eta^2 = .548$. 
To estimate the size of this effect, I ran a paired samples t-test, \( t(153) = -18.066, \ p < .000, \) and then calculated Cohen’s \( d \). The effect size for this analysis \( (d = 1.505) \) was found to exceed Cohen’s (1988) convention for a large effect \( (d = .80) \). Because this is a repeated measures for within-subjects design, Morris and DeShon’s (2002) equation 8 was applied, which corrects for dependence between the means.

A significant effect was also found for each of the four subscales: CCSS Unit Planning, \( F(1, 141) = 131.490, \ p < .000, \) partial \( \eta^2 = .483; \) Key Shifts, \( F(1, 141) = \)
165.399, \( p < .000 \), partial \( \eta^2 = .540 \); Core-Aligned Instructional Supports, \( F(1, 141) = 143.036, \ p < .000 \), partial \( \eta^2 = .504 \); and Assessments, \( F(1, 153) = 91.431, \ p < .000 \), partial \( \eta^2 = .393 \). Thus, for both the full CAT-SES survey and for each of the subscales, the changes from the beginning of the program to the end of the program represented significant increases in teacher self-efficacy.

Thus, the increase in teacher self-efficacy as measured by the CAT-SES from the beginning to the end of teacher participation in the Core Teacher Program is statistically significant. Taken together, these results suggest that the Core Teacher Program had a significant effect on participants’ self-efficacy.

**Research Question 2**

To answer the second research question, I analyzed the survey data that was collected at two points during the 2013-2014 school year. While surveys were administered to all educators who participated in the Core Teacher Program, this study only included data from those participants who completed both survey deployments (\( n = 154 \)).

**Group characteristics regarding content area.** Prior to conducting the mixed ANOVA, the assumptions of normality was evaluated and determined satisfied because the four groups' distributions were associated with skew and kurtosis less than \( |2.0| \) and \( |9.0| \), respectively (see Table 5). For the pre-CAT-SES, scores were normally distributed for all Grade Spans except for the Grade 3-5 span; they were not normally distributed at the \( p > .05 \). Calculating studentized residuals for the pre-CAT-SES revealed one outlier. After filtering out the outlier and re-running the descriptive analysis, it was clear that the outlier did not make a significant difference in effect. (Including the outlier in the results
provided values of 2.19 - 5.81 with a mean of 4.3871. Filtering the outlier resulted in values of 2.35 - 5.81 with a mean of 4.44. Skewness improved slightly from -.785 to -.620 and kurtosis improved from 1.439 to .997.) The decision was made to include the outlier, and the statistics reported in subsequent analysis and tables include the outlier.

From the table, it can be seen that Content Area (non-ELA) teachers were associated with the numerically smallest mean level of teacher self-efficacy (M = 4.22, SD = .65) in the pre-survey, while ELA teachers were associated with the numerically smallest mean level of teacher self-efficacy (M = 5.22, SD = .45) in the post-survey.

To examine the post-survey data, a Shapiro-Wilk’s test (p > .05) and a visual inspection of their histograms were conducted. Normal Q-Q plots and box plots showed that the post-survey scores were approximately normally distributed for all four content focus groups. For Elementary teachers, the data shows a skewness of -0.086 (SE = 0.306) and a kurtosis of -0.719 (SE = 0.604). For ELA teachers, the data shows skewness of -0.039 (SE = 0.337) and a kurtosis of -0.908 (SE = 0.662). For Content Area teachers (Non-ELA), the data shows a skewness of -0.377 (SE = 0.409) and a kurtosis of -0.25 (SE = 0.798). For the Instructional Coaches / Admin, the data shows a skewness of 0.071 (SE = 0.687) and a kurtosis of -0.089 (SE = 1.334). Calculating studentized residuals for the post-CAT-SES revealed no outliers. Furthermore, the assumption of homogeneity of variances was tested and satisfied based upon Levene’s F test, F(3, 150) = .078, p = .972. Thus, the analysis reveals that the distribution of means across the population of each of the four groups is distributed normally and that the mixed ANOVA is a good fit for this data set.
TABLE 5

Descriptive Statistics for Teacher Self-Efficacy across the Content Focus Groups

<table>
<thead>
<tr>
<th>Content Focus</th>
<th>N</th>
<th>Pre-M</th>
<th>Pre-SD</th>
<th>Post-M</th>
<th>Post-SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Multiple subjects</td>
<td>61</td>
<td>4.32</td>
<td>.62</td>
<td>5.29</td>
<td>.42</td>
<td>-.086</td>
<td>-.719</td>
</tr>
<tr>
<td>Secondary ELA</td>
<td>50</td>
<td>4.57</td>
<td>.57</td>
<td>5.22</td>
<td>.45</td>
<td>-.039</td>
<td>-.908</td>
</tr>
<tr>
<td>Secondary Content Area* (Non-ELA)</td>
<td>33</td>
<td>4.22</td>
<td>.65</td>
<td>5.23</td>
<td>.45</td>
<td>-.377</td>
<td>-.250</td>
</tr>
<tr>
<td>Instructional Coach / Admin</td>
<td>10</td>
<td>4.43</td>
<td>.45</td>
<td>5.10</td>
<td>.45</td>
<td>.071</td>
<td>-.089</td>
</tr>
</tbody>
</table>

N = 154.

* Includes teachers of science, social studies, art, music, and others, who are not ELA and elementary teachers.

**Relationship of content area on teacher self-efficacy.** To analyze the relationship between the participant’s content focus and the effect of the program, a mixed ANOVA was performed. The within-subjects factor was the pre-/post-survey scores. The between-subjects factor was content area and grade span. The mixed ANOVA assumes that there are equal variances between the levels of the between-subjects factors, Content Area and Grade Span. In this case, there was homogeneity of variances, as assessed by Levene’s test of homogeneity of variance (p > .05). Levene’s test confirmed that the variances in CAT-SES scores for the Content Area groups in both the pre-survey (p = .656) and the post-survey (p = .986) were statistically
equivalent. A further assumption of the mixed ANOVA is that there are similar covariances. In this study, there was also homogeneity of covariances, as assessed by Box’s test of equality of covariance matrices ($p = .558$).

A review of the Tests of Within-Subjects Effects table (see Table 4) revealed that there was no statistically significant interaction between the intervention and Content Area on CAT-SES scores, $F(2, 141) = 1.264$, $p = .286$, partial $\eta^2 = .018$. Thus, no differences were detected, and only 1.8% of the variance in teacher self-efficacy scores could be accounted for by content area. In reviewing the Tests of Between-Subjects Effects table, it was apparent that the main effect of Content Area did not show a statistically significant difference in CAT-SES scores $F(2, 141) = .320$, $p = .727$, partial $\eta^2 = .005$. Taken together, these results suggest that the content area of the participant did not influence the considerable effect of participating in the Core Teacher Program on teacher self-efficacy. Specifically, these results suggest that the Core Teacher professional development program had similar effects for participating teachers of all content areas, as well as instructional coaches and administrators.

**Group characteristics regarding grade span.** Prior to conducting the mixed ANOVA, the assumptions of normality was evaluated and determined satisfied as the four groups’ distributions were associated with skew and kurtosis less than |2.0| and |9.0|, respectively (see Table 6). From the table, it can be seen that K-2 teachers were associated with the numerically smallest mean level of teacher self-efficacy ($M = 4.27$, $SD = .55$) in the pre-survey, while instructional coaches / administrators were associated with the numerically smallest mean level of teacher self-efficacy ($M = 5.10$, $SD = .45$) in the post-survey.
To examine the post-survey data, a Shapiro-Wilk’s test ($p > .05$) and a visual inspection of their histograms were conducted. Normal Q-Q plots and box plots showed that the post-survey scores were approximately normally distributed for all grade span categories. For Instructional Coaches / Administrators, the data shows a skewness of 0.071 (SE = 0.687) and a kurtosis of -0.089 (SE = 1.334). For K-2 teachers, the data shows skewness of -0.269 (SE = 0.564) and a kurtosis of -0.727 (SE = 1.091). For 3-5 teachers, the data shows a skewness of 0.10 (SE = 0.393) and a kurtosis of -1.053 (SE = 0.768). For 6-8, the data shows a skewness of -0.069 (SE = 0.434) and a kurtosis of -0.80 (SE = 0.845). For 9-12, the data shows a skewness of -0.294 (SE = 0.378) and a kurtosis of -0.794 (SE = .741). For K-5, the data shows a skewness of -0.065 (SE = 0.637) and a kurtosis of -0.312 (SE = 1.232). For 6-12, the data shows a skewness of 0.769 (SE = 0.637) and a kurtosis of 0.702 (SE = 1.232). Calculating studentized residuals for the post-CAT-SES revealed no outliers. Furthermore, the assumption of homogeneity of variances was tested and satisfied based upon Levene’s $F$ test, $F(6, 147) = 1.009$, $p = .422$. This analysis reveals that the distribution of means across the population of each of the seven grade span groups is distributed normally and that the one-way between subjects ANOVA is a good fit for this data set.
TABLE 6

**Descriptive Statistics for Teacher Self-Efficacy across Grade Span Groups**

<table>
<thead>
<tr>
<th>Grade Span</th>
<th>N</th>
<th>Pre-M</th>
<th>Pre SD</th>
<th>Post-M</th>
<th>Post SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Coach / Admin</td>
<td>10</td>
<td>4.43</td>
<td>.45</td>
<td>5.10</td>
<td>.45</td>
<td>.071</td>
<td>-.089</td>
</tr>
<tr>
<td>K-2</td>
<td>16</td>
<td>4.27</td>
<td>.55</td>
<td>5.24</td>
<td>.52</td>
<td>-.269</td>
<td>-.727</td>
</tr>
<tr>
<td>3-5</td>
<td>36</td>
<td>4.29</td>
<td>.69</td>
<td>5.32</td>
<td>.38</td>
<td>.100</td>
<td>-1.053</td>
</tr>
<tr>
<td>6-8</td>
<td>29</td>
<td>4.36</td>
<td>.58</td>
<td>5.20</td>
<td>.46</td>
<td>-.069</td>
<td>-.800</td>
</tr>
<tr>
<td>9-12</td>
<td>39</td>
<td>4.46</td>
<td>.72</td>
<td>5.24</td>
<td>.47</td>
<td>-.294</td>
<td>-.794</td>
</tr>
<tr>
<td>K-5</td>
<td>12</td>
<td>4.63</td>
<td>.43</td>
<td>5.21</td>
<td>.43</td>
<td>.065</td>
<td>-.312</td>
</tr>
<tr>
<td>6-12</td>
<td>12</td>
<td>4.39</td>
<td>.38</td>
<td>5.25</td>
<td>.32</td>
<td>.769</td>
<td>.702</td>
</tr>
</tbody>
</table>

**Relationship of grade span on teacher self-efficacy.** As previously mentioned, to analyze the relationship between the participant’s content focus and the effect of the program, a mixed ANOVA was performed. The within-subjects factor was the pre-/post-survey scores. The between-subjects factor was content area and grade span. The mixed ANOVA assumes that there are equal variances between the levels of the between-subjects factors, Content Area and Grade Span. In this case, there was
homogeneity of variances, as assessed by Levene’s test of homogeneity of variance ($p > .05$). Levene’s test confirmed that the variances in CAT-SES scores for the Grade Span groups in both the pre-survey ($p = .429$) and the post-survey ($p = .596$) were statistically equivalent. A further assumption of the mixed ANOVA is that there are similar covariances. In this study, there was also homogeneity of covariances, as assessed by Box’s test of equality of covariance matrices ($p = .558$).

A review of the Tests of Within-Subjects Effects table (see Table 4) revealed that there was no statistically significant interaction between the intervention and Grade Span on CAT-SES scores, $F(5, 141) = 1.075$, $p = .377$, partial $\eta^2 = .037$. Thus, no differences were detected, and only 3.7% of the variance in teacher self-efficacy scores could be accounted for by grade span. In reviewing the Tests of Between-Subjects Effects table, it was apparent that the main effect of Grade Span did not show a statistically significant difference in CAT-SES scores $F(5, 141) = .545$, $p = .742$, partial $\eta^2 = .019$. Taken together, these results suggest that the grade span of the participant does not influence the effect of participating in the Core Teacher Program on teacher self-efficacy. Specifically, these results suggest that the Core Teacher Program had similar effects for all participating educators, regardless of the grade in which they teach or whether they happen to be instructional coaches and administrators.

Conclusion

Analysis of the data reveals that teachers who participated in the Core Teacher Program experienced a statistically significant increase in teacher self-efficacy. Furthermore, Cohen’s effect size value ($d = 1.505$) suggests that this increase has a large practical significance, as well. Additional data analysis indicates that the Core
Teacher Program had similar effects for participating teachers of all content areas, as well as all grade spans. No differences in self-efficacy were detected when analyzed for content focus or grade span.
CHAPTER 5

Discussion

Research indicates that teachers with a higher sense of teacher self-efficacy are more likely to put greater effort into planning, preparation, and teaching. They are more likely to persist in the midst of difficulty, persevere in the face of daunting challenges, and believe that their actions make a difference for even the most hard-to-reach student. Possessing high teacher self-efficacy has also been directly correlated to students' academic achievement levels (Caprara, Barbaranelli, Steca, & Malone, 2006; Ross & Bruce, 2007; Tschannen-Moran & Woolfolk Hoy, 2007; Tschannen-Moran et al., 1998). The evidence to date indicates that developing and sustaining teacher self-efficacy is in the best interest of the teacher herself, the students in her classroom, and the school community at large.

The most frequently used approach for developing teacher self-efficacy has been high-quality, relevant professional development. Multiple studies suggest that professional development can result in moderate to significant gains in teacher self-efficacy (Cantrell & Hughes, 2008; Powell-Moman & Brown-Schild, 2011; Tschannen-Moran & McMaster, 2009; Watson, 2006). When teachers are provided with high-quality professional development that increases their teacher self-efficacy, both the teacher and the student profit.

The study described in the previous pages follows in this line of work. Its unique focus, though, is on the effect of a Common-Core-based, year-long professional development program that aims to develop teacher self-efficacy. The goal was to determine whether the program increased teacher self-efficacy and whether there was a
relationship between certain categorical variables, such as content area or grade level, and the effect of the program on their teacher self-efficacy. The impact of the program was examined in three ways: (a) by measuring the change in teacher self-efficacy pre-and post-surveys and determining the effect size, (b) by investigating the relationship between the participants’ content area and the effect of the program, and (c) by investigating the relationship between the participants’ teaching grade and the effect of the program. As reported in the previous chapter, the results from this study suggest (a) the Core Teacher Program had a statistically significant effect on the change in teacher self-efficacy from pre- to post-program, and the effect size is large, and (b) neither the content focus nor the grade span of the participant had a relationship with the effect of the program.

**Research Question 1: Effect of Core Teacher Program on Participants**

In regards to research question 1, the data from this study indicates that teachers who participated in the year-long Core Teacher Program experienced a statistically significant increase in teacher self-efficacy related to Core-aligned teaching, as measured by the CAT-SES. The large effect size between the pre-post difference ($d = 1.505$) indicates the impact of the program on Core Teacher participants. The question that begs to be answered, of course, is why did the program have such a large effect? What mechanisms might have been at play to substantially increase the teacher self-efficacy of program participants? Based on prior work, I think two explanations are plausible: the five core features of professional development and the four main influences on self-efficacy. A brief discussion of each explanation, in light of this study’s findings, follows.
Five core features of professional development. The first explanation for why the Core Teacher Program had such a large effect on teacher self-efficacy comes from a decade of multiple large-scale evaluation studies and meta-analyses that focused specifically on the impact of professional development programs that have included the five core features of effective professional development. Programs that have included these features -- which are (a) content focus; (b) active learning; (c) collective participation; (d) coherence; and (e) sufficient duration -- have reported changes in teachers' instructional practices and increases in student achievement scores (Blank & de las Alas, 2009; Desimone, 2009; Garet et al., 2001; Greenleaf et al., 2010; Penuel et al., 2007; Sun et al., 2013). The results of this current study suggest the same: a well-designed professional development program that intentionally integrates the five core features of effective professional development can significantly increase teacher self-efficacy.

The Core Teacher Program intentionally integrated these five core features of effective professional development in the following ways: the content focus was on CCSS for ELA / Literacy; active learning strategies were modeled in each workshop and teachers created units, provided feedback via the EQuIP rubric on units others developed, and taught those units in the classroom; collective participation was met through grade level and content area grouping within the workshops, as well as participation from multiple teachers coming from the same school or district; the program was coherent to teachers’ needs since it focused on state-adopted standards, as well as built material directly for classroom use; and the program was of sufficient
duration as it provided 84 face-to-face contact hours, met on a monthly basis, and spanned the course of 9 months.

Thus, the first explanation for why the Core Teacher Program had such a large effect on teacher self-efficacy is that it was intentionally designed to integrate all five core features shown in previous research to be effective for professional development interventions. While the focus of this study did not center on the effect of all five core features on teacher self-efficacy compared to a control group, the pre-test/post-test change of self-efficacy suggests that the combined effect of the features deserves further study using an experimental design.

**Four influences on self-efficacy.** The second explanation for why the Core Teacher Program had such a large effect on teacher self-efficacy comes from a deeper understanding of theory. Self-efficacy is domain specific. It can be influenced by four domain-specific sources of information (Bandura, 1977): mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states. In terms of this study, this means that professional development has the potential to increase teacher self-efficacy when it intentionally incorporates active learning strategies that target domain specific mastery experiences and vicarious experiences, coaching that uses domain specific verbal persuasion, and reflection activities that provide domain specific opportunities for processing one’s physiological and emotional states. An explanation for how each of the information sources relates to the large teacher effect found in this study follows.

**Mastery experiences within the Core Teacher Program.** Participants in the Core Teacher Program engaged in three distinct mastery experiences. First, every
participant created a unit and taught it. This was a year-long, facilitated process whereby teachers were taught key components of unit building through an online course and experienced them through active learning strategies in the workshops. They integrated these components into their own units, until the unit was ready to teach. Both the creation process and the teaching process contributed to the mastery experience.

Secondly, every participant received substantive feedback from three other teachers about their unit. This provided them with the opportunity to provide feedback based upon their expertise, experience, and learnings from the program. Thirdly, every participant created and facilitated a professional development session for his or her colleagues back at his/her home school (e.g. team, department, school, or district). By providing teachers with the opportunity to utilize learning in their own classes (through unit design), for other curriculum (through peer feedback), and in other contexts (through facilitating professional development), we reasoned that they would experience an increase in both confidence and competence, which, in turn, would increase their teacher self-efficacy.

**Vicarious experiences within the Core Teacher Program.** Participants in the Core Teacher Program engaged in three distinct vicarious experiences. First, each regional professional development facilitator had recently been a classroom teacher. As they modeled teaching strategies and engaged teachers in active learning, reflection, and collaboration, they drew on their classroom experience for anecdotes, student examples, and challenges. This emphasized the similarity between program participants and the facilitator, an important component of vicarious experiences. The greater the similarity between teacher and the one modeling (in this case, the regional facilitator),
the more persuasive the experience will be (Tschannen-Moran & McMaster, 2009).

Participating in professional development led by a teacher recently out of the classroom contributed to the vicarious experience. Secondly, active learning strategies were integrated into workshops that provided teachers opportunities to learn from one another. These varied by region and included such activities as panels, round tables, Socratic seminars, and mini-conferences. Because the ones modeling the strategies were teachers themselves, the vicarious experience was a strong one with great implications for persuasion. By providing participants with the opportunity to learn from facilitators with similar or like backgrounds, we reasoned that they would experience an increase in confidence which would lead to an increase in teacher self-efficacy.

**Verbal persuasion experiences within the Core Teacher Program.**

Participants in the Core Teacher Program were provided three distinct verbal persuasion experiences. First, every participant answered questions and provided reflections in an online (Google) dialogue notebook shared with his/her regional facilitator. The regional facilitator provided comments, coaching questions, and feedback on a bi-weekly basis. This on-going dialogue served to provide encouragement, support, and constructive feedback, all forms of verbal persuasion. Secondly, multiple opportunities were provided throughout the program for participants to discuss common challenges, problem-solve them, and reflect on application or transfer to their own contexts. While less formal than the dialogue notebook, these opportunities for discussion gave teachers the opportunity to be encouraged by one another, a form of verbal persuasion. Thirdly, each participant received substantive feedback on the unit s/he created from three separate teachers and her/his regional
facilitator. This process included a rubric so that teachers had specific criteria to reference as they provided feedback. This constructive feedback provided both affirmation of criteria met and ideas for criteria not yet met. Whether teachers received affirmation or suggestions, they experienced verbal persuasion that they were in the midst of accomplishing this very difficult thing and that they had the potential to further improve it. By providing teachers with the opportunity to correspond in dialogue notebooks with their regional facilitators, participate in discussions around problems of practice with program participants, and receive criterion-referenced feedback on their units, we reasoned that they would experience an increase in both confidence and competence, resulting in increased teacher self-efficacy.

**Physiological and emotional experiences within the Core Teacher Program.** Participants in the Core Teacher Program engaged in three distinct strategies aimed at mitigating physiological and emotional experiences. First, each regional facilitator began his or her workshops with a Writing into the Day activity aimed at activating prior knowledge, eliciting personal connections, and providing teachers with an opportunity to write, reflect, and share their writing with table partners. This created a sense of community and collegiality, an effect that resulted in decreased anxiety and increased comfort. Secondly, many activities were structured in ways that allowed for deep learning, collaboration, and application of learning. Teachers were encouraged to try activities in their classrooms and then come back and discuss both highlights and challenges. This provided an engaging and motivating atmosphere where teachers were excited to try things out and share the results. This energy and excitement added to the positive physiological and emotional experiences of the program. Thirdly, regional
facilitators provided sessions and articles on growth mindset and feedforward, two concepts intended to alleviate anxiety and focus on both process and growth. By providing teachers with opportunities to collaborate around challenges or difficulties, share celebrations and success stories, and reflect upon their own progress, we made certain that they were prepared to process their physiological and emotional experiences. This would increase their confidence and competence, which would, in turn, increase their teacher self-efficacy.

**Conclusion.** Thus, the second explanation for why the Core Teacher Program had such a large effect on teacher self-efficacy is that it provided participants with mastery experiences, vicarious experiences, verbal persuasion, and physiological / emotional experiences that both nudged and moved teachers toward an increased sense of teacher self-efficacy. While the focus of this study did not center on the effects of targeting the four sources of influence themselves, the association is promising and suggests the need to further investigate this relationship using an experimental design. Even more intriguing is an investigation that combines the five core features of professional development and these four influences on self-efficacy.

**Research Question 2**

**Relationship of content area and effect.** In regards to research question 2, the data from this study indicates that teachers who participated in the year-long Core Teacher Program showed a statistically significant increase in teacher self-efficacy related to Core-aligned teaching, as measured by the CAT-SES. However, there was no relationship between the content area of the teacher and the effect. This finding seems counterintuitive. Wouldn’t teachers with greater background knowledge in the area of
literacy (such as ELA teachers) have higher teacher self-efficacy in this area? Wouldn’t teachers who have little background knowledge (such as content area teachers) begin with little teacher self-efficacy but experience substantial growth? Given these questions about the finding, further discussion follows. I present two possible explanations for this counterintuitive finding: the newness of the CCSS for all teachers and the impact of the four sources of influence on self-efficacy.

**The newness of the CCSS.** Because self-efficacy is domain specific, teacher self-efficacy beliefs are dependent upon the content area and the teaching environment in which they are embedded (Bandura, 1997). The CAT-SES measure was designed to target a very specific domain of content related to the CCSS and the instructional strategies closely aligned with it. However, the state of Idaho had only adopted the CCSS and required teachers to align curriculum and teach it in the 2013-2014 school year. In essence, the content of the program -- the CCSS for ELA/Literacy, the EQuIP rubric, and accompanying Core-aligned instructional strategies -- was relatively new literacy content to all teachers, regardless of content area (e.g. English, science, social studies, math, art, etc.). While ELA teachers might feel more confident with such literacy content as literary analysis or narrative writing, the CCSS requires significantly different content and processes, such as argument instead of the commonly taught persuasive genre, using the Internet to produce and publish writing and to interact and collaborate with others, and others, as identified by the Key Shifts. This argument also applies to elementary teachers: while they might feel more confident teaching students how to read, the CCSS has changed the equation by requiring a balance of informational and literary texts, for example. Thus, all participants in this study, regardless of the content
area in which they taught, could feel less efficacious in regards to Core-aligned teaching strategies and the CCSS. Participating in professional development that targets CCSS for ELA/Literacy, then, might result in similar increases across the board, regardless of content area.

**Mastery experiences within the Core Teacher Program.** How might ‘the-newness-of-the-CCSS’ explanation be understood by the construct of mastery experiences? Self-efficacy can be increased or decreased through experiences. One way to increase self-efficacy is through positive and successful mastery experiences (Bandura, 1997). As earlier described, participants in the Core Teacher Program developed grade level units that they then taught in their classes. While each unit integrated Common Core Standards for Literacy / ELA, these units also targeted the content focus of the participant, whether it was social studies, science, literature, or a professional development session for other teachers. The majority of participants received feedback on these units from similar content area peers. (Participants who handed in their units after the deadline were paired with other tardy participants. In cases such as these, both content area and grade level were considered when possible. There may have been cases when no close match was possible and participants reviewed units not within their content area or grade level.) After teaching these units, participants came back together for a four-day summer institute where they examined the resulting student work with content-area colleagues, participated in content-area conversations, and named strengths and areas for growth within their units.
By participating in unit design, engaging in discussions with content-area colleagues, and teaching these units with their students, Core Teachers engaged in mastery experiences. Designing units not only increases self-efficacy (Powell-Moman & Brown-Schild, 2011) but also contributes to maintained self-efficacy over time. Watson (2006) found that teachers who engaged in unit development maintained their increased self-efficacy even after seven years had passed. Other studies have found increased student achievement when teachers develop curriculum (Penuel, et al., 2007; Penuel et al., 2011), lead discussions or participate in discourse around problems of practice (Blank & de las Alas, 2009; Desimone, 2009; Greenleaf et al., 2010), and review student work (Desimone, 2009). While these studies do not focus on teacher self-efficacy, they reveal the significant impact of these activities.

One possible explanation for the lack of a relationship between content area and teacher self-efficacy might be these rich mastery experiences that every Core Teacher participated in. While the newness of the CCSS created a similar starting point for all program participants, the mastery experiences were differentiated for the teachers, based upon their grade level and content area. By participating in mastery experiences that targeted the overlap between the CCSS and their content area, participants' needs were met, regardless of content area.

Vicarious experiences within the Core Teacher Program. How might ‘the-newness-of-the-CCSS’ explanation be understood by the construct of vicarious experiences? Self-efficacy can also be increased through positive and successful vicarious experiences (Bandura, 1997). These vicarious experiences can take the form of live modeling and symbolic modeling (Bandura, 1977). Recent studies have shown
that professional development that incorporates explicit modeling from instructors increases teacher self-efficacy (Cantrell & Hughes, 2008; Sandholz & Ringstaff, 2014). Another study shows that those programs that are most effective at improving student scores are those in which participating teachers receive explicit modeling of teaching and assessing learning in a way that supports the design of instructional experiences for students (Penuel et al., 2011). When teachers see evidence that their teaching results in increased student achievement, their own self-efficacy increases.

As described previously, the Core Teacher Program integrated vicarious experiences through explicit modeling of Core-aligned literacy strategies by the regional professional development facilitators. Because program facilitators were recently former teachers, participants may have closely identified with them and were more likely to experience a greater positive impact from the vicarious experience. While these program facilitators did not reflect the content area focus of all teachers, each facilitator provided structured time for writing, reflection, and discussion around application and transfer of these explicit modeling experiences to the participants’ unique teaching contexts. Teachers were encouraged to consider the ways in which they could adapt, modify, or transfer the explicitly modeled strategies directly to their own classrooms and content areas. This careful attention to modeling and transfer may have contributed to the increased self-efficacy for all teachers, regardless of content area. Core Teachers also participated in roundtable sessions that were led by other Core Teachers, another form of vicarious experience led by individuals that they closely identified with. Thus, a possible explanation for the lack of a relationship between content area and teacher self-efficacy might be these vicarious experiences provided within the Core Teacher
While the CCSS was new for all participants, it was also new for the program facilitators. Experiencing professional development that integrated this new content (CCSS literacy) that was facilitated by former teachers provided all participants, regardless of content area, with a positive and successful vicarious experience.

**Verbal persuasion experiences within the Core Teacher Program.** How might ‘the-newness-of-the-CCSS’ explanation be understood by the construct of verbal persuasion? Another source of influence on self-efficacy is verbal persuasion (Bandura, 1997). Perhaps because this source is a weaker influence than either mastery experiences or vicarious experiences, few studies have aggressively targeted its impact in increasing teacher self-efficacy. Studies also define verbal persuasion differently. Some indicate that a lecture format qualifies (Tschannen-Moran & McMaster, 2009), while others categorize frequent assurances from program facilitators as sufficient (Ross & Bruce, 2007), while another indicates that constructive feedback from colleagues is verbal persuasion (Chong & Kong, 2012).

The Core Teacher Program integrated verbal persuasion in many ways as described previously. For the purposes of this focus, verbal persuasion and content area, teacher self-efficacy may have been influenced the fact that content area teachers were intentionally grouped with one another. They provided constructive feedback on units to one another within the context of their specific content areas. They collaborated with one another, encouraged one another, and participated in conversations about applying specific instructional strategies to their content areas with one another. It is possible, then, that the lack of a relationship between content area and teacher self-efficacy could be explained through these verbal persuasion experiences provided within the Core Teacher Program.
Because all groups, regardless of content area, were tasked with collaboratively problem-solving, discussing, and applying the newness of the CCSS to their teaching contexts, no one content area (i.e. ELA teachers) was singled out as having all the answers. All content areas were provided new learning within the context of the CCSS and challenged to integrate these new learnings into their unit design, dialogue notebook, and conversations with colleagues. The feedback they received served as a form of verbal persuasion that mitigated the newness of the CCSS and contributed to increases in teaching self-efficacy.

**Physiological and emotional experiences within the Core Teacher Program.**

How might ‘the-newness-of-the-CCSS’ explanation be understood by the construct of physiological and emotional experiences? While the least influential source, both physiological and emotional experiences can influence self-efficacy (Bandura, 1997). Because it can be difficult to directly attend to these sources, reflection activities that provide opportunities for teachers to process their physiological and/or emotional responses can be helpful. Some professional development programs seek to alleviate uncertainty, doubt, and anxiety through collaborative work (Chong & Kong, 2012) or through indirect measures such as lesson sequencing (Ross & Bruce, 2007). By grouping content area teachers together for discussions and reflection, by matching like content area teachers for reviewing units, and by providing an on-going dialogue notebook between program facilitator and participant, the Core Teacher Program sought to increase self-efficacy through this source of influence. The lack of a relationship between content area and teacher self-efficacy, then, might be explained through these physiological and emotional experiences provided through the Core
Teacher Program. Because the CCSS was new to all participants, regardless of content area, these reflection activities that targeted metacognitive moves, opportunities to process emotional responses, and the documentation of growth and achievement also provided participants of all content areas to productively grapple with the newness of the CCSS and come to terms with their physiological and emotional responses to adopting new standards.

**Relationship of grade span and effect.** Just as there was no relationship between the content area of the teacher and the effect of the Core Teacher Program on teacher self-efficacy, neither was there a relationship between grade span and program effect. This finding seems to contradict recent research that indicates that elementary teachers have higher self-efficacy than do middle school or high school teachers (Beauchamp, Klassen, Parsons, Durksen, & Taylor, 2014; Lee, Cawthorn, & Dawson, 2013; Tschannen-Moran & Johnson, 2011). These results, then, invite further exploration. I present three areas of existing research that can help clarify this apparent contradiction in the current study’s finding: the lack of similar studies, collective participation, and the impact of the four sources of influence on self-efficacy.

**Similar studies.** First, there are few studies that focus on the relationship between grade span and the effect of professional development on teacher self-efficacy. In fact, the dearth of research on this relationship motivated the inclusion of this contextual variable in the current study. The three studies which focus on teachers of K-12 populations do not provide analyses of the relationship between grade span and program effect (Lee & Tsai, 2010; Watson, 2006; Yoon, Evans, & Strobel, 2014). The Lee & Tsai (2010) study, for example, examined elementary through high school
teacher self-efficacy in terms of Technological Pedagogical Content Knowledge-Web (TPCK-W). The Watson (2006) study looked at the integration of the Internet into math and science curriculum. And the Yoon et al. (2014) study validated an engineering self-efficacy scale. While each study considered the effectiveness of the professional development program, none of these studies considered grade span implications for their targeted content or desired outcomes. Thus, while not explicitly addressed in any of the studies, this study provides a basis for future research to examine the relationship between the grade level or span that the participant teaches in and the effect of the program on teacher self-efficacy for that specific grade span.

**Collective participation.** Secondly, the contextual variable of grade span was included in this study because of the need to understand more clearly whether or not all teachers of all grade levels could experience similar gains in self-efficacy. Because self-efficacy is specific to content and context (Bandura, 1997), providing all teachers with the same professional development experience, regardless of grade level, had the potential to result in very different effects for varying grade levels. However, because the program focused on integrating such core features of effective professional development as collective participation, teachers were intentionally provided opportunities to discuss, learn, and reflect with teachers who taught in similar grade spans. By providing grade-level and content-area teachers with these multiple opportunities to collaborate with one another, we structured the program to be experienced through the lens of their specific grade or content. These intentional content-focused activities, sequenced over the course of the year-long program, could
have provided the needed context for teachers, resulting in increased self-efficacy scores across all grade spans.

**Sources of influence on self-efficacy within the Core Teacher Program.** As previously discussed, self-efficacy can be increased or decreased through mastery experiences, vicarious experiences, verbal persuasion experiences, and physiological and emotional experiences (Bandura, 1997). The mastery experiences described previously in reference to the Core Teacher Program and content area have implications for grade span, as well. Participants developed units that were specific for their grade level. They were also grouped by grade span and unit reviews were also matched by grade level, whenever possible. Therefore, because teachers participated in a mastery experience around their particular grade span, this may account for the lack of relationship between grade span and teacher self-efficacy.

Similar to the vicarious experiences described within the content area section, participants experienced explicit modeling from program facilitators who had recently been teachers, themselves. While the program facilitators’ former grade level might not correlate exactly with every participant, it may be sufficient that they had once been K-12 teachers. It is also important to note that the active learning strategies involved active participation, discussion, and modeling from the participants, themselves. Because of this, they often saw one another providing explicit modeling. When a Kindergarten teacher, for example, sees another Kindergarten teacher adapt a strategy for her students and providing explicit modeling in this adaptation, this can increase the first Kindergarten teacher’s self-efficacy. It might not matter that the strategy was first presented by a program facilitator, generic of grade level.
The verbal persuasion experiences described within the content area section also have implications for grade span. Through intentional grouping of teachers by grade span, matching of units for review by grade span, and EQuIP rubrics provided by grade span (two rubrics that cover K-2 and 3-5, 6-12 respectively; see Appendix C), participants experienced multiple opportunities for verbal persuasion experiences within the Core Teacher Program. The opportunity to participate with teachers of similar grade spans may have ameliorated the effect of grade span on teacher self-efficacy, instead resulting in increases across all grade spans.

Finally, the lack of a relationship between grade span and teacher self-efficacy might be explained through the physiological and emotional experiences provided through the Core Teacher Program. Through intentional grouping with teachers of similar grade spans, structured time for reflection and processing in regards to their specific teaching context, and the opportunity to receive encouragement and feedback from other grade level participants, teachers were provided positive physiological and emotional experiences within the context of their grade span partners.

**Conclusion.** Participation in the Core Teacher Program had a significant effect on all participants, regardless of content area or grade level. While this might be explained by the content of the professional development (i.e. the CCSS, a relatively new topic for most participants), there is little hard evidence in the existing research to explain the lack of relationship between the program effect and the contextual variables of content area or grade level. However, the lens of self-efficacy provides a nuanced view of how the possible impact of both content area or grade level might be
ameliorated through an intentionally designed program that accounts for the four main sources of influence on self-efficacy.

**Limitations.**

Several limitations constrain the generalizability of the study. First, because they applied to be in the program, participants are likely to be more highly motivated and invested in their professional learning than teachers in the general population. However, these teachers did come from a variety of schools in the state, with approximately similar numbers coming from each of the six regions in the state, so they do represent a cross-section of such teachers statewide. Secondly, because this was not an experimental design study, there was no comparison group to determine whether the increase in teacher self-efficacy was due solely to the intervention of the program. Analysis of the data showed a statistically significant effect, however, with a robust effect size. The large effect on program participants is promising and suggests the need for future studies that incorporate an experimental design. Thirdly, the use of a non-published instrument could limit the claims that can be made in this study, although a preliminary analysis of the measure provided strong validity and reliability for those areas under consideration (Common Core State Standards for Literacy, the key shifts, instructional practices aligned to the Core, and assessments). There is great potential for further studies due to the publishing of this instrument. This survey is now available to the field and is ripe for further refinement. Such a contribution to the field may result in better measurement in the field of K-12 Common Core literacy professional development.

**Implications**
Implications for design of professional development. This study offers three contributions to the field of professional development for teachers. First, the study provides evidence that an intentionally designed professional development program can produce a strong effect on participating teachers’ self-efficacy scores. Secondly, the study also provides evidence that an intentionally designed professional development program can positively impact all teachers in terms of teacher self-efficacy, regardless of grade levels and content areas. By providing a more nuanced understanding of the ways in which teacher self-efficacy can be increased through effective professional development without regard to the teachers’ content area or grade level in which they teach, not only can this study expand scholars’ understanding of this important construct, but it can support teachers, administrators, program evaluators, and other practitioners in fostering teachers’ sense of efficacy for Common Core literacy instruction. Thirdly, because the evidence shows that the Core Teacher Program had an effect on the teaching self-efficacy of all teachers, regardless of content area or predominant grade span taught, there are direct implications for those in charge of creating professional development at the state, district, and/or school level, regardless of the content area. While creating professional development for only a certain grade level or content area can be time-consuming and costly, this study shows that a program can increase teacher self-efficacy in the area of Core-aligned teaching without such tailoring. The financial ramifications for district budgets in terms of staffing and resources can be significant. Thus, this study has implications for the design of professional development for K-12 teachers of all content areas, instructional coaches,
building-level and district-level administrators, state department directors, and professional development facilitators.

**Implications for pedagogical content knowledge.** Based on the evidence that teacher self-efficacy beliefs in the area of Common Core literacy are unrelated to the content area in which they teach, it seems judicious to explore the boundaries of what is known as pedagogical content knowledge (Shulman, 1987). Pedagogical content knowledge refers to what teachers know about their content and what they know about teaching methodology. The intersection involves what teachers know about the teaching methodologies of their particular content area. For example, while a 7th science teacher deeply knows her content, perhaps major cell organelles, for example, she also knows pedagogical teaching strategies for the students she teaches, including, perhaps, jigsaws, Cornell notes, and small grouping strategies. Because of the intersection of these two, however, she also knows the teaching strategies that best align with her content and may select labs, diagrams, or physical modeling to ensure her students learn about the hierarchy, function, and purpose of cells, tissues, organs, organ systems, and organisms. On the one hand, the teacher possesses the declarative knowledge of her content area and on the other hand, she possesses the declarative knowledge of pedagogical strategies. The intersection reveals a complex interaction between content knowledge and pedagogical knowledge and moves into the realm of procedural knowledge: she understands the skills, strategies, and processes for teaching her content and that’s what shows up in the classroom. How does this relate to the current study? This study juxtaposes the “content” of literacy against this theoretical construct of pedagogical content knowledge. In our program, teachers use what they
know about their content (i.e. science, ELA, history, etc.) to create literacy-rich units for their students. The “content” of literacy is moved into the realm of pedagogy, and teachers are provided literacy strategies that serve as pedagogical approaches to teaching their particular content. Because many of the CCSS for ELA / Literacy require students to exhibit procedural knowledge, program participants are provided modeling and assignments that require them to practice this procedural knowledge, as well as to integrate it into their curriculum design. This study did not explore what dimensions of pedagogical content knowledge capture or explain the construct of literacy. This topic provides a fertile area for further research and has implications for teacher preparation programs as they consider the appropriate pedagogical strategies for teachers of all content areas. It seems appropriate, considering the literacy-rich world in which we live and the widespread adoption of CCSS, to address the place of literacy in pre-service teacher coursework.

**Implications for higher education.** The study of effective teaching strategies is not limited to the world of K-12 education. It extends to higher education institutions, as professors grapple with the pedagogical implications of a rapidly changing world. Both scholars and practitioners are committed to providing undergraduate and graduate students with a high quality education that results in deep learning, transfer of knowledge, and application to new and novel domains. Inter-collegiate organizations like the Center for the Integration of Research, Teaching, and Learning make it their mission to “enhance excellence in undergraduate education through the development of a national faculty committed to implementing and advancing effective teaching practices for diverse learners as part of successful and varied professional careers” (CIRTL,
Because this study examined whether a single professional development program could meet the diverse needs of various content areas and grade levels, there are implications for those in higher education for the development and continuation of professional development of faculty across the disciplines.

**Implications for policy.** The implications of this study also reach into policy on professional development. First, policymakers must consider both access to and funding for high-quality professional development programs. What measures are necessary for all teachers to have equitable access to a professional development program that has the breadth and depth of the Core Teacher Program? Are such measures feasible? And if there are feasible measures, would the effects be as robust at such a large scale? Could sufficient funding for robust teacher professional development be found and sustained?

Second, policymakers must prioritize which mandates they want teachers to focus on and systematically target those priorities with funded professional development. By reducing the number of directives, policymakers allow teachers to focus on learning the prioritized content. While the purpose of teacher professional development is to engender increased teacher confidence and competence, policymakers must keep in mind that professional development programs need to be both coherent and cohesive as they target a prescribed set of teacher outcomes and steadily build toward those ends. Thus, policies that result in targeted professional development that iteratively grows teacher knowledge, skills, and transfer to the classroom will have the most impact. When policies increase teacher access to professional development programs that empower teacher leadership, build teacher
capacity, and increase their competence and confidence, they are fostering both teacher success and student success.

Third, policies should be written with the understanding that they are implemented at the local level. While certain features of a program should remain core (e.g. core features of effective professional development), there should be enough flexibility to allow for local context, culture, and community needs.

**Implications for further research.** This study also has the potential to establish a foundation for future empirical studies regarding professional development for a broad range of grade levels and content areas. Because the data shows positive results for K-12 teachers, across content areas, a fertile area for further research involves the professional development features of duration and active learning. For example, future studies might target the core feature of duration in order to determine the “tipping point” in regards to contact hours, frequency, and span of time. Other studies might consider variations of active learning, such as adding classroom observations or videotaping lessons. It might also be informative for a study to identify active learning strategies as mastery experiences, vicarious experiences, verbal persuasion, or physiological and emotional experiences and to determine the effect size of such activities on student achievement scores, teacher self-efficacy scores, or other outcome measures. Finally, this study might be expanded to explore program scalability and fidelity. The Core Teacher program employed a tight-loose approach, where certain program aspects were consistently targeted in all six regions of the state by all program facilitators and other program aspects were left to the discretion of the program facilitator based upon local context and culture. Determining whether teachers of all regions experienced
similar increases in teacher self-efficacy regardless of program facilitator would provide a starting point for designing a study around program fidelity and exploring the relationships among program facilitator, the teachers as learners, and the professional development program. This suggestion corresponds with Borko’s (2004) Phase 2 of a coherent program of research targeting professional development and teacher learning. The goal of such a study would be to determine the extent to which a professional development program can be implemented with integrity at various sites with various program facilitators (Borko, 2004).

**Implications for the measurement / evaluation of Core-aligned teaching self-efficacy.** Implications from this study include the potential to inform both the design and measurement of professional development programs in the area of Common Core State Standards for Literacy. Not only does this study provide comprehensive measures of Core-aligned teaching literacy efficacy, a topic of current interest within the educational community, but it provides evidence that a singular professional development program can have nearly similar effects on participants, regardless of the content area or the grade level of the teacher. Measuring such an effect with the CAT-SES reveals the importance of a carefully created measurement that is specific enough to the topic (i.e. Core-aligned literacy) yet general enough to provide for teachers of all grade levels and content areas. Thus, other programs may benefit from using the CAT-SES to measure participant self-efficacy in Core-aligned teaching and CCSS for ELA/Literacy. Specifically, this study has implications for both researchers and those involved in designing professional development programs and measuring the Core-aligned teaching self-efficacy of their teachers, such as curriculum directors, state
Department of Education professional learning directors, and any other administrator. They may find that the results of this study can serve to inform measurements of their programs, especially if their program targets curriculum development around the CCSS for ELA/Literacy, the Key Shifts, Core-aligned instructional practices, and varied assessments. Additionally, this study may be of interest to Achieve staff and consultants, as well as any of the 26 states that have participated in EQuIP training and quality review process of instructional materials as facilitated by Achieve. The implications for measuring teacher self-efficacy and evaluating the impact of EQuIP-focused professional development are significant.

Conclusion

This study has added to the existing research in the field of teacher self-efficacy beliefs and the effects of a professional development program on those beliefs. The findings from this study have furthered the understanding of whether the self-efficacy of all teachers, regardless of content area or grade span, can be increased by a common professional development experience. It has provided substantive evidence that a statewide professional development program that integrates the core features of effective professional development -- (a) content focus, (b) active learning, (c) collective participation, (d) coherence, and (e) sufficient duration -- and is facilitated by various program facilitators across six regions of a geographically-isolated state has a significantly large effect on teacher self-efficacy. A deeper understanding of the contextual interactions that led to a lack of relationship between teacher self-efficacy and grade span or content areas is fundamentally important to the design of future common professional development experiences. In an educational world of limited
resources and funding, designing effective professional development that increases the self-efficacy for all participating teachers is not only possible but essential. This evidence from this research will inform others who design, implement, and research high-quality, effective professional development.
Appendix A

Core-Aligned Teaching Self-Efficacy Scale

Thank you for participating in the Core-Aligned Teaching Self-Efficacy Scale.

The following survey items are being asked in order to develop a simple and effective method for measuring personal self-efficacy beliefs regarding ability to provide Core-aligned instruction. The results of this scale will be used to adapt the professional development of the Core Teacher Program to best meet your needs.

As you complete this survey, please rate the statements as accurately and honestly as possible. All responses will be held in strict confidence. Your name and the name of your school will never be associated with any survey data or used in any reports, presentations, or publications.

Please answer the following demographic items openly and honestly to ensure that the most accurate information is gathered. Each of the items below is being collected to assist in the development of the Core-Aligned Teaching Self-Efficacy Scale and will be held in strict confidence. You have the option of leaving any of the items below blank, but please only do so if you must.

1. Name (open response)
2. Gender (open response)
3. Ethnicity (open response)
4. Region (Region 1 – Region 6)
5. Highest Degree Received (BA, BS, MA, MEd, EdS, PhD)
6. What is your education certificate emphasis? (Elementary, Secondary, Other)
7. What grade level do you currently teach? Select as many as apply. (K-12, other)
8. If you specialize in a content area, please indicate the subject area(s): (open response)
9. Including this year, how many years have you been teaching? (open response)

These items make up the Core-Aligned Teaching Self-Efficacy Scale (CAT-SES). Please respond using the provided scale choices by indicating your agreement level to each of the statements below. For example, in marking a response of Strongly Agree, you are indicating that you strongly agree with your ability to successfully integrate the skill into your own lesson or unit planning or teach the specific skill to your students.

Answer each question according to the following Likert Scale: a) Strongly Agree b) Agree c) Slightly Agree d) Slightly Disagree e) Disagree f) Strongly Disagree
Common Core State Standards for Literacy
1. I am confident in my ability to create a lesson or unit that aligns to the depth and with the letter and spirit of the Common Core.
2. I am confident in my ability to create and teach a lesson or unit that targets a set of grade-level CCSS ELA/Literacy standards.
3. I am confident in my ability to provide students with a clear and explicit purpose for instruction.
4. I am confident in my ability to select texts that measure within the grade-level text complexity band AND are of sufficient quality and scope for the lesson’s purpose.
5. I am confident in my ability to integrate reading, writing, speaking, and listening opportunities into my unit-planning.
6. I am confident in my ability to select texts in such a way that builds students’ content knowledge.

Key Shifts of the Common Core
7. I am confident in my ability to create a lesson or unit that addresses the key shifts of the Common Core.
8. I am confident in my ability to teach my students to successfully read text closely, examine textual evidence, and discern deep meaning.
9. I am confident in my ability to create a sequence of specific, thought-provoking, and text-dependent questions.
10. I am confident in my ability to facilitate rich and rigorous evidence-based discussions around a common text.
11. I am confident in my ability to facilitate rich and rigorous evidence-based writing around a common text.
12. I am confident in my ability to teach my students to successfully draw evidence from text to produce clear and coherent informative/explanatory writing.
13. I am confident in my ability to teach my students to successfully draw evidence from text to produce clear and coherent argument writing.
14. I am confident in my ability to teach my students successfully write in various written forms (e.g. notes, summaries, short responses, or formal essays).
15. I am confident in my ability to teach my students academic vocabulary in context throughout instruction.
16. I am confident in my ability to provide text-centered learning that is sequenced, scaffolded, and supported in order to advance my students toward independent reading of complex texts.
17. I am confident in my ability to coherently select and strategically sequence appropriately complex texts for my students.
18. I am confident in my ability to teach my students how to successfully analyze a coherent selection of strategically sequenced, discipline-specific texts.
19. I am confident in my ability to select a balance of informational and literary texts according to the CCSS guidelines (p. 5) across the semester or year.
20. I am confident in my ability to teach my students how to successfully produce on-demand writing.
21. I am confident in my ability to teach my students how to successfully engage in process writing (e.g. multiple drafts and revisions over time).
22. I am confident in my ability to teach my students how to successfully participate in short, focused research projects.
23. I am confident in my ability to teach my students how to successfully incorporate digital texts, digital writing, and multi-modal media where appropriate.

Core-Aligned Teaching Practices
24. I am confident in my ability to create a unit that is responsive to varied student learning needs.
25. I am confident in my ability to craft my lesson or unit in such a way to cultivate student interest and maintain student engagement in reading, writing, and speaking about texts.
26. I am confident in my ability to provide all students with multiple opportunities to engage with appropriately complex text.
27. I am confident in my ability to include appropriate scaffolding so that all students directly experience the complexity of the text.
28. I am confident in my ability to teach my students to focus on the most challenging sections of the text through discussion questions and other supports.
29. I am confident in my ability to engage my students in productive struggle with text.
30. I am confident in my ability to move my students toward independent reading of texts that fall within the grade-level text complexity band.
31. I am confident in my ability to integrate appropriate supports in reading, writing, speaking, and listening for students who are ELL.
32. I am confident in my ability to integrate appropriate supports in reading, writing, speaking, and listening for students who have disabilities.
33. I am confident in my ability to integrate appropriate supports in reading, writing, speaking, and listening for students who read well below the grade level text band.
34. I am confident in my ability to create a unit that includes a progression of learning where concepts and skills advance and deepen over time.
35. I am confident in my ability to gradually remove supports and provide students with opportunities to demonstrate independence.
36. I am confident in my ability to provide my students with authentic learning opportunities.
37. I am confident in my ability to provide my students with opportunities to apply their literacy skills.
38. I am confident in my ability to create units that embody student-directed inquiry.
39. I am confident in my ability to create units that provide students with the opportunity to participate in analysis, evaluation, and/or reflection.
40. I am confident in my ability to integrate targeted instruction in grammar and conventions.
41. I am confident in my ability to integrate targeted instruction in writing strategies.
42. I am confident in my ability to integrate targeted instruction in discussion rules.
43. I am confident in my ability to integrate targeted instruction in all aspects of foundational reading (grades 3-5).
44. I am confident in my ability to include opportunities for independent reading based upon student choice.
45. I am confident in my ability to hold students accountable for their independent, free-choice reading.
46. I am confident in my ability to teach my students how to build stamina in independent reading.
47. I am confident in my ability to teach my students confidence and motivation in independent reading.

Standards-Based Assessments
48. I am confident in my ability to create a unit that regularly assesses whether students are mastering standards-based content and skills.
49. I am confident in my ability to elicit direct, observable evidence of the degree to which my students can independently demonstrate the major targeted CCSS with appropriately complex texts.
50. I am confident in my ability to assess student proficiency using unbiased methods.
51. I am confident in my ability to assess student proficiency in ways that are accessible to all students.
52. I am confident in my ability to include aligned rubrics or assessment guidelines that provide sufficient guidance for interpreting student performance.
53. I am confident in my ability to use pre- and post-assessments to accurately assess student proficiency.
54. I am confident in my ability to use formative assessments to provide student feedback.
55. I am confident in my ability to use formative assessments to guide lesson revision.
56. I am confident in my ability to use summative assessments to accurately assess student proficiency and/or interpret student performance.
57. I am confident in my ability to teach students to successfully use self-assessment measures.
58. I am confident in my ability to effectively give and use peer assessments.
Appendix B

Institutional Review Board Exemption

FIGURE 1

Institutional Review Board Exemption

MICHIGAN STATE UNIVERSITY
April 22, 2014

To: Douglas Hartman
352A Erickson Hall
College of Education
East Lansing, MI 48824

Re: IRB# 14-181e Category: Exempt 4
Approval Date: April 22, 2014

Title: Teacher Professional Development and Self-Efficacy

The Institutional Review Board has completed their review of your project. I am pleased to advise you that your project has been deemed as exempt in accordance with federal regulations.

The IRB has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. Under our exempt policy the Principal Investigator assumes the responsibility for the protection of human subjects in this project as outlined in the assurance letter and exempt educational material. The IRB office has received your signed assurance for exempt research. A copy of this signed agreement is appended for your information and records.

Removal: Exempt protocols do not need to be removed. If the project is completed, please submit an Application for Permanent Closure.

Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a new initial application will be required.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problems that may increase the risk to the human subjects and change the category of review, notify the IRB office promptly. Any complaints from participants regarding the risk and benefits of the project must be reported to the IRB.

Follow-up: If your exempt project is not completed and closed after three years, the IRB office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with the IRB office.

Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at IRB@msu.edu. Thank you for your cooperation.

Sincerely,

Harry McGee, MPH
SIRB Chair
FIGURE 2

K-2 and 3-5 / 6-12 ELA EQuIP Rubrics
Appendix D

Initial Instrument Development of the CAT-SES

Teacher self-efficacy has repeatedly been associated with both desirable teaching behaviors and positive student outcomes (Woolfolk & Hoy, 1990; Tschannen-Moran et al., 1998; Henson, 2001). Providing teachers with engaging, meaningful, and high quality professional development is one way to increase teacher self-efficacy (Cantrell & Hughes, 2008; Henson, 2001; Powell-Moman & Brown-Schild, 2011). Measuring and taking steps to increase teacher self-efficacy, then, is an important goal. However, efficacy surveys must be tailored to the particular domain of interest (Bandura, 2006).

Current teacher efficacy scales exist. The limitations of these scales reflect the narrowed scope of previous studies, such as the Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001) and Graham, et al.’s (2001) adapted version of the Gibson and Dembo (1984) measure which is based on personal and general teacher efficacy. New scales are being developed to measure teaching self-efficacy for specific contexts, such as the Teaching Engineering Self-Efficacy Scale (TESS), created by Yoon, Evans, & Strobel (2014). While there is now a rich heritage of creating specialized self-efficacy instruments to measure distinct constructs within teacher efficacy and an abundance of such teacher efficacy surveys available in the literature, there are none that target teacher efficacy in the area of Core-aligned literacy instruction. More specifically, there are none that measure the four dimensions that the Core Teacher Program targets. In an attempt to bridge this gap, I designed the CAT-SES to measure the teacher self-efficacy of participating Core Teachers. The
instrument was designed with four subscales to measure teachers’ self-efficacy in the four dimensions previously mentioned. In slightly more detail, they are as follows: designing lessons and units that align to the letter and spirit of the CCSS, integrating the key shifts of the CCSS into lessons and units, providing instructional supports that are responsive to varied student learning needs, and assessing whether students are mastering standards-based content and skills.

Gall, Gall, and Borg (2006) identify specific steps for developing a test or measurement. Their suggested were followed in order to create the CAT-SES. They are as follows: I consulted the literature regarding the creation of self-efficacy measures, I identified and consulted exemplars from among the educational teacher-efficacy genre, and I tailored the CAT-SES to capture the domain-specific skills and tasks targeted in the Core Teacher Program. Additionally, Exploratory Factor Analysis was run to determine internal consistency.

First, both the literature on self-efficacy in general and teacher efficacy in specific were carefully considered. Specifically integral was Bandura’s “Guide for Constructing Self-Efficacy Scales” (2006). Because teacher self-efficacy can be task- and skill-specific (Bandura, 1997) and because the Core Teacher Program targets very specific tasks and skills, the need for a locally developed test was apparent. The theoretical basis of the scale focuses on determining the self-efficacy of teachers in regards to specific skills and tasks. For example, one test item asks teachers to rate their confidence in their ability to create a sequence of specific, thought-provoking, and text-dependent questions. This is a specific skill that we teach in the Core Teacher Program and subsequently expect teachers to include in the units that they develop. Studies and
measures that address teacher self-efficacy as a component of teaching the literacy
standards of the Common Core do not currently exist. To address this gap, the CAT-
SES was developed.

Secondly, extant self-efficacy measures for teachers, teachers of writing, and
pre-service teachers were all examined and excluded based upon their disconnect with
the target population and target skills of the Core Teacher Program. However, these
measures were used as models for the CAT-SES, both in terms of sentence stems and
language, Likert scale, formats, and methods for establishing validity. In addition to
those previously mentioned, the Teaching Writing Self-Efficacy Scale (Hughey, 2010)
and subsequent version, the Writing Self-Efficacy Instrument (Surman & Schumacker,
2012), which measures a teacher’s confidence or self-efficacy in teaching writing-
related skills to his or her students, were used. These extant Likert-scale instruments all
demonstrated high validity and reliability.

Item construction is a central and primary concern in developing a new
instrument (Bandura, 2006; Tschannen-Moran & Woolfolk Hoy, 2001). Specific criteria
were followed in the development of items. While the sentence stems were all the same
(e.g. “I am confident in my ability to...”), the actual language of the items was guided by
the language of the EQuIP rubric (Achieve, 2013), itself. Items were developed so that
the skills and concepts named corresponded directly to the EQuIP rubric (Achieve,
2013), the exact same skills and concepts that were professional development topics
that teachers experienced as participants. Thus, the CAT-SES allows teachers to
accurately describe their confidence in creating lessons and units that teach those
targeted concepts or skills in the classroom.
Thirdly, as previously described, the CAT-SES is tailored to capture the domain-specific skills and tasks targeted in the Core Teacher Program. The scale reflects four targeted areas in the Core Teacher Program: Common Core State Standards, Key Shifts, Instructional Strategies, and Assessments. The 58 item-scale is divided into four subscales: efficacy for the Common Core State Standards for Literacy (6 questions), efficacy for the Key Shifts of the Common Core (17 questions), efficacy for Core-Aligned Teaching Practices (24 questions), and efficacy for Standards-Based Assessments (11 questions). Items were formulated based on topics identified in the EQuIP rubric (Achieve, 2013) which aligned with specific content of the professional development of the Core Teacher Program. Additionally, items were grouped into the four dimensions of the rubric. Tailoring the domains of skill and task demands allows one to identify patterns of strengths, as well as perceived limitations in teacher capability (Bandura, 2006). Such an assessment not only provides clarity in regards to individual teacher self-efficacy but also has implications for the Core Teacher Program as a whole.

The target population for the CAT-SES consists of those K-12 educators specifically interested in learning and applying the Common Core State Standards for Literacy, as well as the integration of Core-aligned literacy strategies for their grade level and/or content area into their lessons and units, or to support their own educational staff in doing so. After this scale was finalized, it was uploaded to the Qualtrics web-based survey service for distribution.

**Validity.** The Standards for Educational and Psychological Testing (1999) define validity as the “degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests” (p. 9). The following evidences demonstrate
the validity of CAT-SES score interpretations: (a) test content, (b) response process, (c) internal structure, (d) relationship to other variables, and (e) consequences of testing.

Content validity refers to the extent that a given measure sufficiently represents the construct under study. During the creation of this measure, literature was analyzed using grounded theory (Gall, Gall, & Borg, 2007), thus ensuring that the theoretical construct and items were based on the expertise of those in the field as discussed in peer-reviewed studies. Content validity was also developed through the direct reference to the EQuIP rubric (Achieve 2013), a lesson and unit evaluation tool that teachers were trained to use to assess other teachers’ units, as well as their own. Additionally, the content of the CAT-SES directly corresponds with the content of the Core Teacher Program. While the CAT-SES seeks to measure teacher self-efficacy in creating lessons and units aligned to the Core, integrating the Key Shifts of the Core, providing appropriate instructional supports, and creating varied modes of student assessments (all aspects measured by the EQuIP rubric), the Core Teacher Program provided modeling, interactive training, and direct instruction in each of these four areas.

Face validity refers to the extent to which a given measure appears valid to both those who take the measure and those who administer it. As previously mentioned, the content of the measure was drawn from the EQuIP rubric which draws heavily on the language of the Common Core State Standards, as well as the language of current educational practices in instructional practices and assessment. Educators participating in the Core Teacher Program are repeatedly exposed and trained in the language of both the Standards and the EQuIP rubric. Regional Professional Development Coaches, recently classroom teachers themselves, have reviewed the measure and are
in agreement that it has face validity. In other words, it “looks like” it will measure what it purports to measure.

The response process refers to the cognitive or evaluative process required by the test and whether those processes are consistent with the constructs under study (Gall, Gall, & Borg, 2006). The CAT-SES asks participants to rate their confidence in their ability to do specific Core-teaching related tasks. These tasks have been discussed at length during EQuIP training, applications of the EQuIP rubric to multiple unit evaluations, professional development activities, and throughout the process of creating their own units. Teachers have had multiple opportunities to reflect in writing and aloud regarding these constructs and their meaning in both formal and informal spaces.

In regards to internal structure, the CAT-SES has multiple items that are arranged in subgroups. As described in the introductory section titled Instrumentation, these subgroups are designed to measure the four different constructs. In order to determine the internal consistency of the scale and the subscales, an exploratory factor analysis was conducted on each.

Both 6-point and 9-point scale possibilities were considered, based upon the commonly used examples in the literature (Graham et al., 2001; Surman & Schumacker, 2012; Tschannen-Moran & Woolfolk Hoy, 2001). A 6-point Likert-type scale was ultimately chosen because it was an even number of choices and it provided sufficient choices to attain a nuanced view of teachers’ perceptions of their self-efficacy. The items on the measure do not lend themselves to a neutral answer. Additionally, gradations of agree and disagree were sought through the labels.
In terms of relationship to other variables, there is evidence in current research that suggests that the scores on teacher self-efficacy scales may be distributed differently for subgroups of the same population (Tschannen-Moran & Johnson, 2011). For example, elementary teachers may show a certain malleability in terms of self-efficacy, while middle school and secondary teachers may be more static in their scores. The same goes for experience: less experienced teachers may experience more growth in self-efficacy whereas more experienced teachers may have more static scores. In collecting this data and analyzing it according to these subgroups, further test-criterion evidence can be collected to support the validity of these findings.

To consider the consequences of testing, it is important to note that the CAT-SES privileges certain Core-aligned teaching skills, attaching certain values to each of the four constructs through the use of specific and value-laden language. These values directly and intentionally reflect the biases inherent in the EQuIP rubric (Achieve, 2013), as well as the content focus of the professional development program, itself. Interpretations of the test scores, then, should be confined to determining the correlation between participation in the Core Teacher Program and teachers’ perceived self-efficacy. However, the CAT-SES may be valuable for other professional development programs targeting the Common Core and other states who have adopted the EQuIP rubric (Achieve, 2013). At last count, 26 states have participated in the EQuIP quality review process as facilitated by Achieve, an organization founded in 1996 by leading governors and business leaders (Achieve, 2015). (It should be noted that many Achieve staff and consultants were instrumental in the writing and support of the Common Core State Standards, the assessments evaluating student achievement in the standards, as
well as the K-12 Next Generation Science Standards.) States, districts, and even vendors have used the EQuIP rubric for various purposes and in multiple ways, from unit development to curriculum revision to evaluation of open education resources (Gerwertz, 2014; Pease, 2015; Piehler, 2015). Because the CAT-SES also serves as a type of program evaluation, collective results can be used to determine areas of program strength or weakness.

Regarding score interpretation, no transformation of the CAT-SES is necessary. Once scores are reversed (1=6, etc), scores are calculated by computing a standard arithmetic average for each item, as well as for the measure as a whole.

**Analysis of reliability.** Because the CAT-SES is a new measure, internal consistency was determined through principal component extraction, exploratory factor analysis, and reliability analysis. Exploratory factor analysis was used to determine the factor structure of the CAT-SES and to identify whether subscales existed within the instrument.

Teachers’ efficacy beliefs for Core-aligned teaching were measured using the CAT-SES. As previously described, this measure consists of 58 items, including four multi-item subscales: self-efficacy for CCSS Unit Planning (6 items), self-efficacy for integrating the Key Shifts (17 items), self-efficacy for incorporating Core-Aligned Instructional Supports (24 items), and self-efficacy for varied modes of Assessment (11 items). In order to determine the internal consistency of the scale, Cronbach’s alpha was computed for the full scale, as well as for the four subscales. Cronbach’s alpha for the full 58 item scale was $\alpha = .976$. The reliability for the 6-item was $\alpha = .844$; for the 17-item $\alpha = .952$; for the 24-item $\alpha = .948$; and for the 11-item assessment subscale $\alpha = \alpha$.
A commonly minimum accepted value for Cronbach’s alpha is .7, while an alpha of .9 or higher is considered an excellent indicator of internal consistency (Nunnally, 1978).

All items appear worthy of retention. The greatest increase in alpha would come from deleting item 3, but removal of this item would increase alpha only by .001. All items correlated with the total scale to a good degree.

In reviewing the factors, there were four expected. Fabrigar, MacCallum, Wegener, & Strahan (1999) describe that the “total number of measured variables included should be at least 3 to 5 times the number of expected common factors, and the selected variables should include multiple variables likely to be influenced by each of the common factors” (p. 273). The expected number of common factors were 4, while the total number of measured variables included were 58. With each common factor over-determined, and the communalities high (an average of .70 or higher) for 33 of the 58 items, it was determined that I could obtain accurate estimates of population parameters with the sample size of 154.

Initial principal component analysis was conducted on the scale using a principal component extraction method with Varimax rotation. The first step I took was to check the pattern of relationships within the correlation matrix. First, in scanning the significance values (bottom half of graph), there was no variable in which the majority of values were greater than 0.05. In reviewing the Pearson correlation coefficient between all pairs of questions, none were greater than 0.9. For these data, the determinant value is 7.92E-027 which is less than the necessary value of 0.00001. Therefore, multicollinearity is a problem for this data set.
The KMO value is .930, indicating that the “patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors” (Field, 2005). This value is well above the 0.5 minimum (Kaiser, 1974) and falls in the superb category (Hutcheson and Sofroniou, 1999) or “marvelous” category, to use Kaiser’s language (1974). This value of .930 indicates that running a factor analysis is appropriate for this data.

The Bartlett’s test is highly significant (p < 0.001), also indicating that a factor analysis of these data is appropriate.

These findings imply that teacher self-efficacy in the area of Core-aligned teaching is, indeed, a multi-faceted construct. It is based on sets of subskills that can be individually attended to or integrated into a whole.
REFERENCES

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