FOSTERING HIGH SCHOOL TEACHER OWNERSHIP OF CHANGE:

K-12 MATHEMATICS COORDINATORS AS CHANGE AGENTS

by

SANDRA KEMP GEISLER

(Under the Direction of Chandra H. Orrill)

ABSTRACT

Within the educational literature on change, one often-cited element of successful reform efforts is the existence of teacher ownership in the change process. However, the construct of ownership is ill-defined and little empirically-based research exists to support the assertions of its importance. This dissertation is a compilation of journal ready manuscripts designed to engage the educational community in a discussion about teacher ownership, what it is and what it looks like in an educational context and begin the discussion of empirically validating its potential contributions to supporting teacher change.

The first article is a literature review of what we know about the construct of ownership and how it is potentially fostered. We offer a definition of teacher ownership based on the empirical and theoretical data presented. We then conclude with a discussion of the need for a more systematic examination of the importance and potential impact of ownership on reform efforts.

The second article is a contextual study discussing the pervasiveness of large-scale reforms designed to make significant pedagogical changes in classroom teaching. The efforts of

the state of Georgia to implement ambitious mathematics standards forcing large-scale mathematics education reform, serve as the setting for this study.

The third article is the main research study examining the experiences of two expert Georgia mathematics coordinators as they act as change agents in the statewide reform effort. We found that these mathematics coordinators seek to foster teacher ownership of the new standards by helping the teachers connect the state mandate to the local context. The participants are uniquely positioned as intermediaries between the demands of the reform effort and the needs of the teachers. It is through this lens that we describe what ownership looks like in an educational context and present findings on how it may be fostered.

Finally, the fourth article in this series synthesizes the work from the first three articles for a wider audience of education administrators, school leaders and others interested in educational reform. This article is designed to help administrators think about how to bring together top-down mandated reform efforts and locally-owned initiatives and priorities.

INDEX WORDS: Ownership, Teacher Change, Large-Scale Reform, Mathematics, K-12 Schools, High School, Educational Change, Change Theory

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DEDICATION

This dissertation is lovingly dedicated to my two children, Eliott and Victoria. Without your love, support, encouragement, and patience, this four-year journey would have been difficult to successfully complete. Eliott, during this time, you have grown into a wonderful young man, joining the Navy and developing an inner strength and becoming someone that I admire and appreciate more than I can put into words. Victoria, you were fated to still be at home while I was going through the writing phase of this dissertation… God Bless You. I so appreciate your humor and understanding of all the hours I had to closet myself away to complete this tome. You have become a wise and wonderful young lady right before my eyes.

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CHAPTER 1

INTRODUCTION

Our world has changed significantly over the last 100 years and continues to change at an ever-increasing pace. Access to information and knowledge introduced by advances in technology is requiring today's youth to graduate with skills and abilities very different from just one generation ago. While teachers change in response to the needs of students on a daily basis (Richardson, 1990), in many fundamental ways the organization and culture of today's schools in America mirror those seen in the late nineteenth century (e.g., Elmore, 1996; Elmore, 2002; Fullan, 2001; Gardner, 2000; Reigeluth, 1994). Lectures, drill and practice, and decontextualized activities continue to prevail in today's classrooms (Gardner, 2000). With all the understandings we have about what makes good teaching and learning (Bransford, Brown & Cocking, 1999), why has it been so difficult for these understandings to be adopted in the classroom?

Recognizing that the shift to an information-based economy requires changes in the educational system (e.g., Fullan, 2001; Reigeluth, 1994), local and national government organizations have initiated a number of reform efforts over the years designed to improve student learning outcomes. These initiatives are derived from a solid research base and reflect sound principles of teaching and learning. As a result, calls for high quality teacher professional development (PD) abound and millions of dollars have been spent to support reform efforts (Ball & Cohen, 1999; Guskey, 2003; Loucks-Horsley & Matsumoto, 1999; NPEAT, 1999), yet only 15% of these reform changes designed to significantly alter classroom practice are ever

implemented (Richardson & Placier, 2001). This disconnect is the foundation upon which my research interests lie.

When first entering the doctoral program, I was struck by the wealth of knowledge and understanding we, as a field, have amassed over the last 75 years about teaching and learning. Yet, in personal and professional experiences, I have seldom witnessed or heard of this knowledge being effectively transferred to the classroom setting on a large scale. As I continued to develop my own personal understandings, especially in the area of professional development, I realized that while there are pockets of excellence in education, most are occurring only in small contexts and sporadically. At this pace, how can education ever effectively keep up with the changes students will face to be functioning members of society?

The success of an innovation is determined by a combination of individual characteristics and organizational factors (Fullan, 2001; Richardson, 1990). My personal area of interest is in individual change, recognizing that large-scale organizational change is too complex to be solely dependent on one or the other. Because teachers operate largely independently in the ways they conduct their classrooms, any significant reform effort must support individual change to accomplish organizational change. Without teacher support and "buy-in," change will stop at the classroom door.

Change is difficult under most circumstances and requires a great deal of ongoing support to accomplish. Since beginning this doctoral program, I have focused much of my reading on gaining a better understanding about what research tells us about good teaching, learning and change. While educational research has provided valuable insights into both individual and organizational change, there is little evidence that this knowledge is used *explicitly* when introducing large-scale mandated reforms. The professional development field has created

standards and criteria for supporting gains in teachers' content knowledge and the research base for designing quality professional development continues to grow. However, while supporting teacher change is mentioned, it is rarely dealt with explicitly within the context of professional development, which I maintain is critical for real change to occur.

Individuals' beliefs about themselves and their abilities strongly influence their willingness to embrace a new initiative (Bandura, 1994). While there are many teachers who do wholeheartedly embrace change in their practice and exemplify the qualities critical to improved student learning, too often widespread implementation of innovations is elusive. With relatively few change initiatives making a lasting impact over the years, the field has much work left to do to understand how to better support change. While we can continue to conduct research about high-quality teaching and learning and we can continue to create tools and strategies to improve student learning outcomes, if we cannot persuade and support classroom teachers to adopt these practices, what have we really accomplished? My position is that while we know a great deal about change, we have to continue to develop our knowledge and begin to explicitly engage and support teachers in change as a process.

This research study examined an element of change that could potentially improve our ability to support teacher change in a large-scale mandated reform environment. In this study, I explored the construct of ownership that is often cited as important to changing teachers' classroom practice, which remains ill-defined and largely unexamined. Specifically, the study considered how elements of "ownership" manifest themselves in individuals, what these elements might look like in school settings and how they might be fostered within the confines of a large-scale reform effort.

As the context for my study, I selected the state of Georgia's introduction of the Georgia Performance Standards (GPS) in mathematics. Based on nationally developed mathematics standards, this ambitious statewide roll-out was launched during the 2004-2005 school year. The GPS represented major revisions to the curriculum and implied changes to teacher performance in the classroom. This reform effort required all teachers to implement new content and process skills, moving their teaching pedagogy closer to an investigative-based or inquiry-based approach in which students learn by exploring open-ended investigations. For mathematics, this approach was consistent with the National Council of Teachers of Mathematics (NCTM) *Principles and Standards for School Mathematics* (2000) document, which called for teachers to provide opportunities for their students to solve complex investigations, apply their mathematics knowledge, use technology as a mathematical tool, make generalizations and test conjectures. The GPS made heavy demands on all teachers, requiring effective professional development opportunities through both internal and external support groups. The GPS provided an excellent opportunity to examine how to better support change in a mandated reform environment

My main study followed two exemplary Georgia mathematics coordinators who acted as intermediaries between the state's large-scale reform effort and the locally-owned (aka grassroots) initiatives and priorities of the local school districts and their teachers. These individuals possessed a very strong knowledge of the intent of the reform as well as strong mathematical knowledge. How these mathematics coordinators navigated this intermediary role and actively sought to foster teacher ownership through their professional learning sessions provided insights that informed my study.

Overall, this research study sought to answer these broad questions: How do Georgia mathematics coordinators manifest ownership of the Georgia Performance Standards? How do Georgia mathematics coordinators foster ownership in their teachers?

Significance of the Study

Within any large-scale reform effort, there are a number of change agents who guide the direction that the implementation will take at the local level. In most diffusion efforts, there are middle-level individuals responsible for getting the reform off the ground in the school districts. We know that fundamental change to teacher pedagogy is difficult, but we do not fully understand the role this midlevel person plays in crafting the large-scale change experience by attempting to foster ownership in their teachers. While this study sought to examine more closely the role of mathematics coordinators during the roll out of the GPS, the findings should reach across disciplinary lines as the issue of individual change impacts all reform efforts. The insights gained could inform educational administrators and the field of professional development as they consider how to explicitly support teacher change as teachers face the difficult challenges of the reform classroom (Wilson & Peterson, 1996).

Subjectivity

As a new researcher, my interests were influenced by my experiences as a parent and my 21 years experience in business and industry. As a parent, working as a volunteer in the local schools, I was exposed to a variety of teachers and teaching styles. When entering the doctoral program at the University of Georgia, I was immediately struck by how much we know through research about good teaching and learning and how little of it I witnessed in classrooms. As a manager in business, where keeping abreast of the latest innovations and ideas to maintain a

competitive edge was critical for survival, I knew that fast-paced change was inevitable. Although adapting to change in the business world is certainly no simple task, the field of education in the United States has been slow to integrate new understandings about teaching and learning and adopt new innovations in the classroom. Over the last three decades, researchers have developed understandings of effective teaching and learning (Bransford, Brown, & Cocking, 1999) demonstrating the need for learner-centered constructivist pedagogy yet most classrooms continue to follow the traditional teacher-centered whole-class didactic instruction (Riel & Becker, 2000). To compete in a global economy, our youth must gain the latest knowledge and skills, which means that our educational system must fundamentally change.

While acknowledging that change is difficult, I know that big changes in our lives are necessary for growth and personal improvement. Individuals have their own personal tolerance for change, making it more difficult for some than others. However, I believe we all have an innate curiosity and desire for self-improvement at some level. I desired to find ways to spark this interest for growth in others. In different opportunities in my life, I have found myself in the role of change agent, so this research had personal significance to me in many ways. Ultimately I find myself biased towards expecting others to share my same curiosity and fearlessness about change. I endeavored to constrain my personal bias so that the participants' own experiences guided my research.

Overview

This dissertation is a compilation of four journal-ready manuscripts written with the intent of furthering the discussion about teacher ownership and its role in educational change. These articles do not address the potential impact of teacher ownership on the success or sustainability of reform efforts, although clearly the merits of ownership need to be studied. It is

my assertion that before the value of the construct can be substantiated, it must first be operationalized so that a common understanding of what ownership is and what it is not is developed.

The first article is a literature review of what we know about the construct of ownership and how it is potentially fostered. I offer a definition of teacher ownership based on the empirical and theoretical data presented. I then conclude with a discussion of the need for a more systematic examination of the importance and potential impact of ownership on educational change efforts.

The second article is a contextual study that discusses the pervasiveness of large-scale reform efforts designed to make significant pedagogical changes in classroom teaching and improve student-learning outcomes. It discusses the tension between these policy-driven large-scale reforms and the locally-owned initiatives substantiating the need for a hybrid approach to educational reform that provides for top-down design and direction with local participation and adaptation. The efforts of the state of Georgia to implement ambitious mathematics standards forcing large-scale mathematics education reform, serve as the context for this study. This study discusses what we know about large-scale reform efforts juxtaposed with this statewide implementation of the GPS for high school mathematics.

The third article is the main research study, which examines the experiences of two expert Georgia mathematics coordinators as they act as change agents in the statewide reform effort. We found that these mathematics coordinators seek to foster teacher ownership of the new standards by helping the teachers connect the state mandate to the local context. The participants are uniquely positioned as intermediaries between the demands of a large-scale reform effort and the needs of the teachers and local school districts. It is through this lens that we seek to describe

what ownership looks like in an educational context and present findings on how it may be fostered.

Finally, the fourth article in this series synthesizes the work from the first three articles for a wider audience of education administrators, school leaders and others interested in educational reform. This article is designed to help administrators think about how to tie top-down mandated reform efforts to locally-owned initiatives and priorities. The findings presented provide evidence and ideas for administrators to consider that can potentially develop and sustain teacher ownership.

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CHAPTER 2

LITERATURE REVIEW

OWNERSHIP: A PREREQUISITE TO CHANGE IN CLASSROOM PRACTICE?

Geisler, S.K. & Orrill, C.H. To be submitted to the *Review of Educational Research*, August 2009

Introduction

Research and experience has provided a wealth of information about effective teaching and learning (Bransford, Brown, & Cocking, 1999), yet much of what goes on in today's classroom still mirrors the models from the early 20th century, where drill and practice, and decontextualized activities prevailed (Gardner, 2000). Outside of the classroom, students live in a world that stands in stark contrast to what they experience in school – a world focused on interactivity, communications, problem solving and information use. If a primary goal of K-12 education is to teach students skills that will benefit them throughout their lives beyond school, why has the educational system fundamentally remained the same?

School reform efforts, designed to change how "teachers understand the nature of knowledge and the student's role in learning, and how these ideas about knowledge and learning are manifested in teaching and classwork" (Elmore, 1996, p. 288), have failed to penetrate more than a small fraction of classrooms and have yet to produce the outcomes their designers envisioned (Waks, 2007). School reform is a complex undertaking involving new initiatives and programs constantly being introduced with the goal of improving student-learning outcomes. A fundamental part of successful school reform efforts is change in classroom practice through high quality professional development (Loucks-Horsley & Matsumoto, 1999). However, while millions of dollars are spent annually on school reform efforts and professional development opportunities (Ball & Cohen, 1999; Guskey, 2003; National Partnership for Excellence and Accountability in Teaching, 2000), only 15% of these reforms are ever implemented (Richardson & Placier, 2001).

Teachers are both the object of change and the agents of that change (e.g., Borko & Putnam, 1995; Cochran-Smith, 2004; Cohen & Ball, 1999), but too often reform efforts do not

build from what is already known about teachers engaged in the change process (Fullan, 2001; Spillane, 1999). For example, many efforts in today's mandated reform environment rely on prescriptive approaches that are not successful in achieving the changes for which they are designed (Kirk & MacDonald, 2001). In contrast, research has shown implementing change "is ultimately a problem of the smallest unit" reinforcing the understanding that "organizations don't innovate or implement change, individuals do" (McLaughlin, 1987, p. 174).

Traditionally, teachers have been perceived as recalcitrant and resistant to change, however, we know that teachers actually do change all the time, by making voluntary changes over the course of their career (Cuban, 1988; Richardson & Placier, 2001). It is the imposition of change, as is typical in large-scale reform efforts, that causes resistance (Burke, 2002). While there are many variables involved in educational change, the fundamental decision to adopt and implement specific teaching strategies resides with the teacher whose beliefs about teaching and learning are the basis for choices of classroom instructional strategies and activities, task definition and selection, as well as interpretation of course content, ultimately impacting student learning outcomes (Pajares, 1992). To make successful changes to the educational system as a whole, fostering and supporting individual teachers in changing their practices and beliefs is imperative.

Reform efforts intended to make fundamental changes that are incompatible with teachers' current beliefs and practice are unlikely to be implemented in ways intended by the reform designers (Borko, Mayfield, Marion, Flexer, & Cumbo, 1997). This is because a teacher's beliefs about knowledge and learning act as filters through which a teacher interprets and reacts to proposed changes (Grant, Hiebert, & Wearne, 1998). These implicit and explicit beliefs about teaching and learning affect teachers' reasoning, their choices of strategies in the classroom and

even what they attend to in their own learning (Bruning, Schraw, Norby, & Ronning, 2004; Cuban, 2001; Kagan, 1992). Beliefs are stable and resistant to change, and in most cases, the teachers themselves are not consciously aware of their own specific beliefs or the impact their beliefs have on their teaching (Kagan, 1992). Beliefs are particularly problematic because they shape the teacher's day-to-day choices in their classroom that can make or break an innovation or reform effort, yet little is known about how to impact beliefs to get teachers to buy-in to the change process. As Kagan (1992) observed, the more teacher beliefs are studied, the more one suspects this "form of personal knowledge lies at the very heart of teaching" (p. 85). Reform efforts designed to make fundamental changes in classroom practice must take into consideration the very personal nature of teacher beliefs and capitalize on what we know about motivating and supporting change to those beliefs.

One clear lesson from successful reform efforts is that changing teacher beliefs and practices requires buy-in to the proposed change (Darling-Hammond, 1997). Without such buy-in, no professional development or local support will make change happen. Buy-in is a multi-faceted construct as described in the change literature (e.g., Klingner, 2004), but one of the commonly discussed elements of teacher buy-in is the development or existence of teacher *ownership* (e.g., Campbell, Lindsay, & Phillips, 2002; Fullan, 2004; Guskey, 2003; Richardson & Anders, 1994.). Ownership is described as essential for generating the effort needed for successful reform efforts (McLaughlin, 1990) and without ownership, new classroom practices are unlikely to take hold (Klingner, 2004). On the surface, ownership appears to be a reasonable aspect of supporting teacher change. As it turns out, not much is known about ownership; it is ill-defined and rarely examined in the educational change literature. If ownership is an important part of making fundamental change in the classroom, a better understanding of this construct

might enable professional developers and administrators to foster a higher success rate as they support change in the field of education.

In this article, we attempt to develop a definition of teacher ownership by presenting empirical data and theoretical discussions on what is known about ownership and how it is potentially fostered. We then conclude with a discussion of the need for a more systematic examination of the importance and potential impact of ownership on educational change efforts.

Defining Ownership

In an effort to better understand and define ownership, we searched a number of educational databases including ERIC, LexisNexis Academic, Dissertation Abstracts, Education Full Text, and a collection of professional development, psychological and sociological journals. A variety of search terms were used alone and in combination with ownership including: volition, commitment, buy-in, teacher change, will, individual agency, emotional engagement, and investment. An EBSCOhost search, which searches multiple educational databases at once, using the term ownership alone located over 23,000 titles. It was necessary to further refine the search, so combinations of the search terms were used. For example searching the terms ownership and teacher through EBSCOhost resulted in the location of 1,338 titles. Articles were then discounted from this review for the following reasons: 1) the use of ownership referred to property rights or the possession of property; 2) ownership was not used in relation to a change process; 3) ownership was not listed as a descriptor or key search term in the article overview. As a result, we ultimately included 38 articles in this review.

Through this literature review, it became evident that ownership, as a derivative of the word “own,” is used in several different ways that are context-dependent. From a business and industry perspective, ownership infers legal possession of property. Informally, ownership is

used as an admission or acknowledgement that something is the case (McKean, 2005). However, as noted above, for the purposes of this article, ownership in the educational change and professional development literature takes on yet another meaning which remains ill-defined. There are a number of terms used in ways that are similar to the uses of ownership. Some of the more frequently used terms included commitment, buy-in, investment, will, empowerment, volition, individual agency, and choice. In our analysis, we have determined that while each of these is similar to ownership, each is also used in ways that are inconsistent with ownership. However, like ownership, most of these descriptors also lacked consistent definitions leading to potential problems of interpretation and thereby limiting their usefulness.

To develop our definition of ownership, we began by examining the differences and similarities between these terms and how ownership was referenced in the educational change literature. For example, *commitment*, which was most often used and more fully researched than ownership in the educational change literature, was described as being synonymous with "organizational commitment, teacher commitment, professional commitment, job satisfaction, teacher motivation, engagement, organizational loyalty, organizational identification, career commitment – these are just some of the larger set of terms used in the extensive literature about commitment" (Leithwood, Menzies, & Jantzi, 1994, p. 40). Commitment has often been viewed pragmatically where commitment decisions are made through a type of cost-benefit analysis or "side bets" (Becker, 1960). Commitment has also been identified as a psychological state where an individual desires to be involved with a person or idea (Leithwood et al., 1994). The assumption made is that once an individual makes a commitment, their behavior will be consistent with that commitment which suggests that commitment is "an engagement or obligation that restricts freedom of action" (McKean, 2005). Interestingly, definitions and uses of

commitment do not always require the individual to understand or agree with the object of their commitment, nor do these perspectives require a personal stake be present (for example, widespread commitment to getting students to pass tests). Where we assert that commitment and the other synonyms differ from ownership deals with the individual choice, a measure of personal control and a deep understanding of the innovation or reform.

Another commonly used term is *buy-in*, defined as "an informal agreement to support a decision" (McKean, 2005), that we have come to interpret as an umbrella term under which ownership falls. Teacher buy-in is comprised of many elements including: 1) Vision: Do teachers understand what we are asking them to do? (e.g., Borko & Putnam, 1995; Fullan, 1995; Stevenson, 1995.) 2) Attitude: Do teachers believe this is how the content should be taught? (e.g., Kagan, 1992; Philipp, 2007.) 3) Culture: Does the culture support or hinder the development of new practices? (e.g., Elmore, 2002; Lave & Wenger, 1990.) We found a fourth element, ownership, is also cited as an element of teacher buy-in (Klingner, 2004).

The other similar terms we found appeared less frequently in the literature. Like buy-in and commitment, the other terms each have elements of their conventional use that overlap with ownership. For example, *empowerment* includes elements of not only owning an innovation but feeling that you have some autonomy and the ability to make decisions about its implementation or roll-out (Richardson, 1990), whereas *choice* includes no element of commitment, which we see as a part of ownership because it simply describes whether a person desired one option or the other without regard to the underlying understandings or values at work in that decision. However, choice does include a measure of autonomy and making a decision to act, which are both elements of ownership.

Importance of Ownership

When the term ownership has appeared, it has been used without a definition, as if there is general consensus about its meaning. From these uses, we know that ownership is considered important to large-scale reform as well as individual teacher change. For example, Squire and Reigeluth (2000) suggest that, "in successful districtwide changes, leaders allow others to take ownership of the change effort, so that the vision and energy for change diffuse throughout the system and transcend any one individual" (p. 147). In Klingner (2004), professional development is said to be most successful when teachers take ownership of the new practices they are being taught and without this ownership, "it is unlikely the practices will take hold and spread" (p. 252). Elsewhere, taking ownership is credited with helping teachers change "both their perceptions of themselves as professionals and of their ability to contribute (to) educational reform" (Dutro, Fisk, Koch, Roop, & Wixson, 2002, p. 798). Clearly, in any school change effort, ownership is considered important both for implementing the desired change and for helping support the spread of that change through the community of teachers.

In Hamilton and Richardson's (1995) study of staff development and teacher beliefs, the third and final stage in successful staff development processes was "*empowerment*" where "teachers claimed ownership of the staff development itself and dominated the conversation in the group sessions" (p. 375). The results of this study suggest that the traditional change model where teachers are told about the methods mandated for use in their classroom during professional development is not useful when making fundamental changes to teaching practice. The change model implemented in this study relied on empowerment to shift control of the teachers' learning from the staff development to the teachers themselves. This resulted in greater teacher interest and participation in making changes to classroom practices.

Research on literacy education provided insights into ownership as it relates to students' learning in the classroom, which was useful in formulating our overall understanding of ownership. Student ownership of their own learning is highly valued and equated with "independence, autonomy, and choice" (Dudley-Marling, 1995a, p. v). However, ownership is not seen as teachers abdicating their role in the classroom and withholding their support from their students, it is described as providing students a measure of control over their work. Ownership requires a "careful balance between student control and teacher support and direction. Too much teacher support risks taking control of the learning away from students. Too little teacher direction denies student access to the voices that support their intellectual growth and development and their ability to take responsibility for their learning" (Dudley-Marling, 1995b, p. 14). Ownership is not seen as something that can be given, but must have conditions present for its development by providing some level of personal control over their own learning. In this frame of reference, ownership is considered a right for students to express their own identities and is conceptualized as a "moral imperative" (p. 14).

However, perhaps because it is not well-defined, ownership is also inconsistently used in the literature — sometimes even within the same article. For example, although Gelzheiser and Meyers' (1996) made conjectures about the importance of it, they failed to explicitly define ownership and in fact, used the term in different ways. Their research studied the role of the researcher as a change agent and identified possible change strategies within that role. When discussing teacher ownership, the researchers referred to commitment and buy-in, illustrating the potential impact of ownership on the successful implementation of an innovation. However, when discussing the role of the researcher as change agent, the meaning of ownership changed. The researchers explained that as a consequence of allowing teachers to take ownership of an

innovation “the researcher must give up ownership of the innovation” (p. 128). In this instance, the initial definition of ownership, that of commitment or buy-in to an innovation, is abandoned and ownership is defined in terms of control of an innovation. According to this study, the researchers’ role changed to that of an observer, giving up their ability to intervene when the process was not going as intended and unable to “tell teachers what to do” (p. 128). These two different perspectives of ownership are at odds, reiterating the need for a common understanding of this construct.

In an essay considering the need for mandating pedagogical change, Reynolds (2000) offers thoughts on the potential problems that ownership can create. Reynolds described the “ownership paradigm” (p. 194) that predominated in the 1990’s as the belief that teachers would be more effective professionals if they were involved in creating the changes that they would then enact in their schools. Under this characterization, ownership encouraged ‘self invention’ which could widen the gap between effective teachers and less effective teachers and ‘inventing the wheel’ requiring teachers to ‘discover’ what worked which was very time consuming (p. 194). This view of ownership and its role in teacher change differs from our review as it implies teachers working in isolation to develop their own materials, which would lead to redundant effort and inconsistent results. Our review of the literature does agree with the need for teacher involvement in changes that impact their classroom, however, as presented shortly, it infers teachers needing to make adjustments to meet the needs of their classroom without altering the intent of the reform rather than trial and error to discover what works.

Ownership Studies

We located three studies that included ownership as a focus of their research. The first, an evaluation study of a professional development initiative for primary school headteachers in the

United Kingdom, looked specifically at whether the headteachers would develop a strong sense of ownership between individuals during a mandated reform effort (Campbell et al., 2002). Questionnaires and semi-structured interviews were used to collect the headteachers' perceptions about ownership. While the researchers did not explicitly define ownership, they did explain that a strong sense of ownership "meant that they had, or more accurately *perceived* themselves to have had, the opportunity to define for themselves and/or for their schools, what their priorities for professional development should be" (p. 362). The study's findings relied on headteachers self-reports about the projected impact and duration of the professional development they developed. The researcher acknowledged the data, while triangulated with observations and other data, are based on perceptions of specific individuals and were collected early in the reform cycle.

One element of Perla's (2007) dissertation research, which looked at "teacher ownership toward the education of students with disabilities" (p. 2), was to understand how various stakeholders characterized teacher ownership within the context of the inclusive classroom. After noting the lack of formal definition, Perla developed a working definition of ownership from the implied use of the term in the special education or inclusion literature and in conjunction with her own personal experience. Teachers were identified as demonstrating ownership for their students if they perceived themselves to be: "active participants in the decision-making process regarding the student's education; directly engaged with the student; invested in their relationship with the student; experiencing positive feelings toward the student and their relationship; responsible and accountable for the student's learning experience; and collaborating with others (including the student) regarding the student's education" (p. 4). This definition describes what actions a teacher would be involved with that demonstrate ownership. Perla

created a survey instrument, containing a series of ownership indicators, to measure the participants' perception of their level of personal ownership. The teachers rated themselves on a scale from one to five, where one was "definitely does not apply" and five was "definitely applies" (p. 245). The findings of this research provided insights into how teachers viewed ownership through self-reports (surveys) and provided interesting observations about what was missing from the teachers' views of ownership. The most significant of these gaps, for our purposes, was that none of the teachers mentioned, "an emotional or affective dimension of ownership" (p. 175). While this study is a first step towards operationalizing the construct of ownership, it described teacher ownership in terms of teacher perceptions of their actions and it defined ownership in terms of how it could be developed rather than what it is or is not.

In the third study involving ownership, Rainer and Matthews (2002) conducted a self-study of their collaborative masters' degree program. The goals of their study were to describe ownership, determine how faculty could encourage ownership and develop an understanding of the perceptions of ownership of the classroom teachers who were participating in the program. In their literature review, they identified "four common elements of ownership: autonomy, power, voice and responsibility" (p. 23). Data collected included teachers' responses to an open-ended questionnaire and a 35-item Likert-scale survey which dealt with the teachers' "beliefs, opportunities, and actions related to ownership and empowerment, specifically, voice, support, relevance and trust" (p. 24). The open-ended questions asked the teachers about their definition of ownership, examples and changes they perceived in themselves and their students as a result of ownership.

These research studies provided valuable insights into the construct of ownership, identified elements of ownership and proposed strategies for encouraging ownership. However,

the authors relied on teacher perceptions and self-reports and did not propose a common definition of ownership as a construct. While self-reports provide valuable information, they also present validity problems because they "require some metacognition or self-awareness on the part of the individuals responding to them" (Pintrich & Schunk, 1996). To fully operationalize this construct a clearer understanding of what ownership is and what it is not is needed. Additionally, to gain a better understanding of the value of ownership, a common definition of ownership needs to be identified and refined. Based on a synthesis of our review of the literature, our proposed definition of ownership would be:

> A deeply personal, highly individualized, connection with and understanding of an innovation or idea reflecting a personal stake in its success. For teachers, this is in part, demonstrated by a willingness to put forth the effort required to adopt an innovation into their own classroom practice.

Theoretical and Empirical Evidence About Ownership

In an effort to better develop our definition of this potentially important construct, we relied on theoretical writings and empirical studies in which the authors related their findings to ownership. Our goal in this section is to present theoretical and empirical evidence to support our proposed definition of ownership.

Claims Made in Research Findings and Conclusions

Studies in our sample mentioned ownership or one of the synonyms discussed previously in their findings or conclusion sections although ownership was not a focus of the study and the data collected were not necessarily tied to ownership. In one such study, dealing with a large-scale curriculum reform process, the authors developed an organizing strategy to create a sense

of ownership and reduce resistance to the introduction of a new medical curriculum (Elizondo-Montemayor, Hernandez-Escobar, Ayala-Aguirre, & Aguilar, 2008). The authors concluded that by consciously attempting to include faculty and students in all phases of the innovation process, they fostered a sense of ownership that reduced resistance and created a better climate for change. While the strategies chosen made common sense (e.g., soliciting teacher participation in various stages of the process to give them a voice in, if not control over, the curriculum), there was no empirical evidence upon which the strategies were based.

Other studies claiming the importance of commitment and fostering a sense of ownership in classroom practice change admitted that importance or impact on teacher change in practice was not measured in their study. For example, Geijsel, Sleegers, Leithwood and Jantzi, (2002) acknowledged in their theoretical framework that "although not measured in these studies, it is assumed that teachers' extra commitment and effort results in changes in their interactions with students which, in turn, influences students' outcomes" (p. 229).

In their study on the education reform process in Uganda, Higgins and Rwanyange (2005) sought to understand how varying degrees of ownership affected the translation of policy into practice within a community context. The authors examined how local stakeholders within the education sector perceived local ownership. When describing ownership, the researchers stated that it is "widely accepted that ownership of reforms requires strong engagement by those involved in implementation" (p. 10), but offered no empirical evidence to support this particular claim. The researchers related ownership to "issues of participation and voice, communication, trust and accountability" (p.15), rather than specifically defining it. The study's findings concluded that the inclusion of teachers in the early planning stages was essential for successful

reform and their exclusion was an impediment. Self-reliance, accountability and involvement were all necessary elements within the education sector for ownership to develop.

Claims Made in Theoretical Papers or Professional Development Literature

In addition to the references to ownership in research articles, general statements were found about the value of ownership to the success of professional development efforts in professional development standards and other non-empirical literature. For example, in a chapter on computer-mediated professional development, Fontaine (2002) stated, "as with all good development activities, promoting ownership contributes to success and sustainability" (p. 153). Similarly, in a discussion of supporting teacher change through staff development Richardson (1998) noted, "a measure of success is the degree to which the teachers take responsibility for their actions, assume ownership of their practices, and are able to articulate these actions and their justifications to another person" (p. 6). Elsewhere, ownership was linked with creating teacher leadership in efforts to sustain communities of practice beyond the allotted time of a research grant (Grossman, Wineburg, & Woolworth, 2001). Finally, Collinson and Ono (2001), when presenting an overview of professional development in the U.S. and Japan, noted that the lack of ownership made it difficult to find teacher volunteers to conduct demonstration lessons within professional development programs.

The importance of ownership also appears within frameworks for staff development workshops reflecting the experiences and understandings of their authors. For example, in Borko et al. (1997), the researchers' belief that teachers learn best by actively constructing new practices based on their existing beliefs is accompanied by the belief that ownership of the workshop content and processes is equally important to teacher learning. Further, Adey's (2006) comprehensive model showing the inter-relationship of professional development features lists

ownership as an essential element, yet this essential element was not defined and only superficially mentioned elsewhere in the article.

Fullan (2004) speculated that ownership, commitment, energy and ideas are needed from all who are involved in the implementation of an innovation. He acknowledged that fostering ownership is difficult "because the urgency of problems does not allow for long term 'ownership development'" (Fullan, 2004, p. 4). To Fullan, ownership develops through a change process and is not present at the outset of a change effort. When discussing the complexity of change in the culture of teaching, Fullan acknowledged in an earlier interview that "when we think about change we have to get ownership, participation, and a sense of meaning on the part of a vast majority of teachers" (Sparks, 2003, p.58). As with the previously mentioned articles, no definition of ownership is offered nor is empirical research cited to support these claims.

Ownership as Related to Control

In the educational literature referencing ownership, teachers' control of classroom practice is a recurring key element. Control is an inherent characteristic of classroom teaching, where uncertainty, ambiguity and the need to control the environment are the norm, leaving teachers to create highly specialized pedagogy for their classroom (Kagan, 1992). Teachers, as adults need some measure of control over and input into their lives and learning (Merriam & Caffarella, 1991; Olson, Butler, & Olson, 1991). For teachers, control over their own lives would include opportunities "to influence *instructionally relevant* school decisions," which also leads to greater teacher efficacy (Goddard, Hoy, & Hoy, 2004, p.10). Richardson (1990) expanded ownership to include empowerment without which "teachers may become victims of their personal biographies, systemic political demands, and ecological conditions, rather than making use of them in developing and sustaining worthwhile and significant change" (p. 16). In many

cases, providing teachers the opportunity to participate in the design of a reform effort or have a voice in the decisions being made that affect them, gives some measure of control. However, if that control is missing, teachers like all adults, can shut down or actively resist. In a mandated reform environment, providing opportunities for teachers to participate in the design of the reform may be difficult to achieve.

Control Means Adaptation

Another recurring element within the literature relates to individual control. Giving teachers control in a reform environment means providing the opportunity for teachers to make adjustments to the changes expected of them to meet the needs of their own classrooms. Teaching is very personal and the teacher is in the best position to understand the unique needs of her students and constantly makes little adjustments to improve learning on a daily basis. Illustrating this point, Klingner's (2004) analysis of successful professional development efforts suggested that teachers develop ownership by "adapting a new strategy to fit their needs" (p. 249) and making it more relevant to their classrooms, thereby promoting its sustained use in their classrooms. Teachers need "opportunities (time and space) to adjust and fine-tune the instructional practices to work in their setting with their students" (p. 254). Referencing her own prior research, Klingner examined the sustainability of practices taught through a professional development program three years earlier. In that study, teachers were interviewed and observed to determine the extent to which they sustained practice modifications, how they had modified them and what factors influenced the sustained use of the new practices. The teachers reported the factors that enhanced their sustained modification included what the researchers termed as "flexibility of the practice." Noting, "when teachers perceived that they could modify the

practice to suit their instructional style or their students' needs, they developed more ownership of the practice" (p. 251).

This idea of control through adaptation was identified as a paradoxical element in the Campbell et al. (2002) study of headteachers discussed previously. The study examined headteachers' development of ownership during a mandated government reform initiative and found that when the headteachers were allowed to develop their own professional development projects, those projects were not incompatible with the objectives published by the central government. The researchers interpreted their findings as demonstrating that given a free hand to develop their own learning, most of the headteachers developed professional development activities that supported the government's agenda rather than developing other alternatives. This finding contradicted concerns typically voiced over allowing teachers more control over how reforms are disseminated within their own schools and classrooms. One of the researchers' theories for this paradox was that the headteachers accepted the agenda of the central government and devised their own professional development to achieve that agenda, thereby owning "the means, if not the ends" (p. 367).

Controlling through adaptation was also noted in the RAND Change Agent Study, conducted from 1973 to 1978, which reviewed the federal government's first major attempt to affect change in local educational practices (McLaughlin, 1990). The results of this study indicated that mutual adaptation, rather than uniform implementation, distinguished an effective project, "and that local factors (rather than federal program guidelines or project methods) dominated project outcomes" (p. 11). At the time of the study, the prevailing thought was that federal policy mandates directly led to local change, ignoring local practices and beliefs. McLaughlin (1990) re-examined these findings over a decade later with a more refined lens that

allowed a much more robust understanding of change. McLaughlin found that local capacity and will, often used as synonyms for ownership, matter most to policy outcomes. Specifically, she suggested, “the presence of the will or motivation to embrace policy objectives or strategies is essential in the generation of the effort and energy necessary for a successful project” (p. 13).

Control Means Participation

As a result of their work conducted between 1993 and 1998 on two large-scale reform efforts, Kirk and MacDonald (2001) suggested that for teachers to have ownership in the reform process, it may be important that they be involved in the instructional discourse surrounding the development of the reform, as well as participate in the delivery of the results of that discourse. Without defining it, the researchers linked ownership directly with teachers’ participation and control in a reform effort.

As part of Ely’s (1990) conditions for facilitating educational change, ownership is inferred in the sixth condition, which expects and encourages participation of teachers. Participants need to feel they or their surrogate have had the opportunity to comment on the change. In addition to other conditions such as dissatisfaction with the status quo, availability of resources, time and incentives, etc., participation provides individuals the opportunity to comment on innovations that directly affect them. This participation creates a connection with the innovation making it difficult for an individual to reject or resist the change (Ellsworth, 2000).

It appears to be a broad-based assumption in the educational change literature that ownership plays an important role in teacher change and the eventual success or failure of a reform effort. If ownership is important to making lasting change in the classroom, developing a better understanding of ownership as a construct and examining how we can encourage it might

enable reformers to foster a higher success rate as they introduce change in the field of education.

Conclusion and Recommendations

The significance of ownership and the frequency with which it is referenced in the educational change literature raises important questions for teacher change and educational reform. How can we continue to assume that ownership is important if we have no consistent definition? How can we continue to assume that ownership is important if we have little rigorous research to support that claim? Without a viable definition and empirically-based studies, can we really claim that teacher ownership matters to lasting change in the classroom? We propose that rigorous research is indeed needed.

Refining the Definition

First, more fully defining ownership as a construct within the context of educational change would be a step toward understanding its value and how it could be fostered, measured and sustained in an educational reform environment. A common definition would allow a shared interpretation, clearer dialogue about its importance in educational change initiatives, and ultimately more effective research and professional development efforts. Ideally, this inquiry would enable educational researchers, professional development experts, and teachers to collaborate in a line of research designed to yield more effective educational change initiatives. As presented above, our initial definition for guiding and conducting research is:

> Ownership: a deeply personal, highly individualized, connection with and understanding of an innovation or idea reflecting a personal stake in its success.

> For teachers, this indicates a willingness to put forth the effort required to adopt the innovation into their own classroom practice.

Operationalizing the Construct of Ownership

Within a definition of ownership, observable or measurable characteristics need to be identified and refined to operationalize the construct for research. Refining a definition would include developing descriptions of what ownership is and what it is not, what ownership looks like within an educational setting and what behaviors and language are exhibited when ownership is present. Initial research questions of interest would include: What does ownership look like in the context of educational change and classroom change? What actions, choices and language do teachers use that indicate they have taken ownership of an initiative? How do we foster ownership? Given that ownership exists in a continuum, how much ownership is enough ownership in a given situation?

Teacher change is a highly individualized process and we could assume that teachers would display varying levels of ownership in a reform effort. As with any measurement, assessing where individual teachers are on an ownership continuum would be informative for developing strategies and setting goals. A continuum would also reflect a path along which teachers would progress. Perla (2007) suggested that ownership could be viewed in stages or of varying degrees, which would acknowledge that ownership is "dynamic, subject to change, and specific to a moment in time" (p. 207). A measurement instrument would also necessarily differentiate ownership as distinctly different from the other constructs that are often present and confounding such as self-efficacy, self-regulation, and motivation. As with other measures of

motivation, a measure of ownership could consider an individual's actions, choices, language and persistence.

As shown in the discussion presented here, it seems clear in the literature that ownership is something valued in teacher change efforts, yet it remains ill-defined. Further, there has been little research either exploring ownership or determining how to foster it and there is no reliable instrument for measuring it. If, as touted, ownership is an important element of fundamental and lasting change in classroom practice, more rigorous research of this construct might enable those interested in enacting educational change to foster ownership, and thus, realize a higher success rate. Also, if we accept that teaching is personal and that to make lasting change in classroom practices requires attention to beliefs and epistemology of individual teachers (e.g., Richardson, 1990), the concept of ownership becomes more interesting to study and understand.

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CHAPTER 3

UNDERSTANDING CHANGE: A CLOSER LOOK AT THE GEORGIA PERFORMANCE STANDARDS FOR MATHEMATICS

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Introduction

Change is difficult under the best of circumstances. Because educational systems are notoriously complex, significant change has been especially difficult to affect and almost impossible to sustain on any large-scale basis (e.g., Cuban, 2008; Elmore, 1996; Fullan, 2001). While teachers and schools do change in small ways in response to daily obligations and requirements, sustained large-scale fundamental change is a major challenge (Richardson, 1990; Cuban, 2008). Yet, change is constant in the world and demands for a competitive workforce continue from parents, business leaders, and policymakers (National Research Council, 2001). The media continues to highlight "reports of inadequate teaching, poorly designed curricula, and low test scores" (NRC, 2001, p. xiii), fueling fears that our educational system is not properly preparing students to take their place in society. This feeling of frustration with the educational system has led policymakers to increase efforts to legislate change because they perceive that, too often, school districts do not hold themselves accountable.

One policymaking entity that has long been an active voice in reform efforts is the U.S. government. In many ways, the government began the latest wave of sweeping reforms with the release of *A Nation at Risk* (National Commission on Excellence in Education, 1983), which attempted to spur educators to better meet the needs of the country through changes in their practice and to spur educational groups to begin creating standards to support those changes. More recently, the government has moved beyond the role of requesting reports about education, and has begun to legislate change. In 2001, the "No Child Left Behind" Act (NCLB) introduced federally-mandated accountability measures tied to state use of Title I funds (NCLB, 2001). This legislation required that all students meet or exceed state standards in mathematics and reading within 12 years, creating an avalanche of actions by policymakers and administrators in state

departments of education nationally as they worked to ready their schools to meet these requirements. Through NCLB, policymakers have moved from suggesting reform to creating a threat of school accountability for student performance driving school districts to engage in reform (Leithwood, Jantzi, & Mascall, 2002).

In the area of mathematics, the standards-based reform movement was a national phenomenon before NCLB. In 1980, the National Council of Teachers of Mathematics (NCTM) released *An Agenda for Action* (NCTM, 1980) which called for new directions in mathematics education including a focus on problem solving and new ways of teaching (Klein, 2003). This report led to the development of NCTM's first set of standards (NCTM, 1989), which outlined a set of learning goals for all K-12 mathematics students. Subsequent documents released detailed standards for teaching mathematics (NCTM, 1991). Work since these original sets of standards has led to the development of the further refined learning standards as well as an updated set of teaching standards in *Mathematics Teaching Today* (NCTM, 2007). These documents have not only provided a vision for mathematics learning but have also aimed to stimulate discussions about learning and teaching mathematics for all students. The NCTM standards have proven to be important for two reform-related reasons: (1), they were the first standards of their kind and led to standards being developed in all of the content areas, and (2), they have influenced most of the state mathematics standards created since 1989. However, even with these core national goals, "current state standards and curriculum frameworks vary considerably in their specificity, difficulty, and character" (NRC, 2001, p. 34) resulting in wide variation in student learning outcomes.

Policymakers and the general public conventionally view education as part of a solution to social and economic problems. With the fast-paced growth and complexities of the global

society, these groups seem to be growing impatient with the slow pace of educational reform efforts (Cuban & Usdan, 2003; Elmore, 1996; Leithwood et al., 2002). Simultaneously, the media, policymakers, and the general public demonstrate little understanding of the enormity of the change educators are being asked to make both personally and organizationally (Leithwood et al., 2002). Clearly, while there are tensions between the constituents of the educational systems and the public at large, the imperative for change is a fixture in our current policy climate and large-scale mandated reforms will likely continue to be an active part of the educational environment. This raises the imperative for learning from past efforts and building on them to support change in the future.

Large-Scale Reform

Large-scale educational reform efforts during the last 30 years have attempted to change classroom teaching in very fundamental ways (e.g., Cuban, 2008; Elmore, 1996; McDonald, Hatch, Kirby, Ames, Haynes, & Joyner, 1999; Waks, 2007). In the 1980s reformers sought to implement student-centered, inquiry-oriented instruction where students were allowed to "puzzle and delve deeply, to experience and explore alternatives…" (Darling-Hammond, 1990, p. 343). In the 90's, Nelson and Hammerman (1996) described the nation's reform agenda as a vision of practice requiring most teachers to rethink their own practice, to develop new roles in their classrooms and to teach in ways they have never taught before – and have probably never experienced as students. Now, in the first decade of the new millennium, goals relating to change in classroom practice of current reforms continue to echo the reforms of the past, "in fact reforms *du jour* typically repackage old solutions in hopes that 'this time things will be different'" (Keller & Reigeluth, 2004, p. 17).

This apparent repetitiveness in large-scale reforms and lack of fundamental change in classroom practice reinforces the concerns voiced about the overall educational system's inability to make fundamental and sustainable change on a large-scale basis. "Reforms do return again, again, and again. Not exactly as before or under the same conditions, but they persist" (Cuban, 2008, p. 105).

Top-Down Reform versus Locally-Owned Initiatives

Historically, policymakers have relied on legislation, centralized authority and assessment criteria to control policy implementation (Elmore, 1983). Unfortunately, this top-down control of reform efforts creates complexities, which can derail implementation efforts rather than support them. Elmore calls this the "power of the bottom over the top," elaborating that teachers' work is highly individualized and occurs almost completely in their classrooms. Mandating strategies and activities uniformly for all classrooms "is not only extraordinarily difficult, but also very risky" (p. 356). The success of reform efforts hinges on individual teachers' abilities to learn the skills and perspectives assumed by these new visions of practice and unlearn past practices and beliefs about their students (Darling-Hammond & McLaughlin, 1996; Spillane & Thompson, 1997).

This trend of policy as a driver of reform was highlighted in the RAND Corporation's study of federally funded programs designed to introduce and support innovations in public schools (Elmore & McLaughlin, 1988; McLaughlin, 1990). The report's finding which were reaffirmed by later analysis indicated the critical interdependence between policy, administration and practice. The RAND study suggested strengthening the connection between policymakers and local practitioners by charging practitioners to develop solutions rather than mandating changes on them; allowing for variability in implementation at the local level; and creating

organizations that support change in practice. These opportunities occur in the very early years of a reform effort, impacting local interpretations and actions as well as overall implementation effectiveness (Sipple, Killeen, & Monk, 2004).

Admittedly there have been some successes in large-scale reform efforts and in locally-owned initiatives, so we should learn from these earlier efforts and "do what has yielded success in the past and to continue to do it with increasing sophistication" (Elmore, 1996, p. 14). Learning from successful reform initiatives over the past 20 years, we know that changes in classroom practice depend on how well local challenges are met, how motivated the local groups are to implement the change, whether the local personnel have the capacity to make the change and how well the organizational structure supports their efforts (Leithwood et al., 2002). We know that educational change is highly complex requiring attention to the interconnectedness of policies and practice, system-wide needs and local differences (Darling-Hammond, Hightower, Husbands, LaFors, Young, & Christopher, 2005). We also know that individuals and organizations respond to change that is imposed on them by resisting (Burke, 2002). It is not necessarily the actual change itself that is being resisted, but the imposition of change. This is problematic because while large-scale efforts do not necessarily preclude input from those involved as policies are being formed, the overall efforts are, by nature, not locally-owned and are mandated from outside the educational setting (Richardson, 1990). So it becomes that "the degree of ease and success with which an organization change is introduced is therefore directly proportional to the amount of choice that people feel they have in determining and implementing the change" (Burke, 2002, p. 93). The failure of many top-down reform efforts has been attributed to a failure to "consider how the new ideas will lodge in the local policy context –

which includes a variety of community ideas and resources as well as the preexisting policy constraints" (Darling-Hammond, 1990, p. 344).

While we know that educators and schools voluntarily make changes all the time in classroom practices and school structures that they initiate themselves (e.g., Cuban, 1988; Elmore, 1996; Richardson, 1990) (aka locally-owned initiatives), there is little evidence that these locally-owned initiatives by themselves have led to changes in educational practices on any large-scale (Hall & Hord, 2006; Morgan, 1994; Wagner, Kegan, Lahey, Lemons, Garnier, Helsing et al., 2006). Experience and research has demonstrated that a hybrid of top-down reform and locally-owned initiatives is needed to increase the possibility of successful reform (e.g., Elmore & McLaughlin, 1988; Hall & Hord, 2006; McLaughlin, 1990). The connection between these two reform strategies is well-cited in the literature, but is rarely well-executed. The state of Georgia's current reform effort provides a unique opportunity to examine this connection in a real world context. From the perspective of the original reform framers, we examine Georgia's current effort to design and put into practice the Georgia Performance Standards for high school mathematics. Specifically, how does the state of Georgia's reform effort in high school mathematics embody what we have learned from other large-scale reform efforts? How does this effort illustrate the connection between top-down reform and locally-owned initiatives?

Case Study: Georgia's Mathematics Reform

Georgia was chosen as the exemplar for this analysis as it is in the midst of a large-scale, top-down reform across the four major content areas: language arts, mathematics, science and social studies. Most notably, the mathematics curriculum has undergone a significant overhaul in which the content taught at many grades has changed dramatically and, the traditional high

school courses (e.g., algebra, geometry) have been replaced by an integrated high school curriculum (e.g., Math 1 and Math 2). Integrated mathematics is a holistic curriculum approach blending a variety of mathematics content areas to enable students to make connections between the content areas and linking their learning to practical contexts (Burkhardt, 2001).

In this article, we examine how the Georgia mathematics reform, particularly at the high school level, embodies lessons learned from other large-scale reform efforts. Specifically, we consider how this effort illustrates the connection between top-down reform and locally-owned initiatives. Clearly a single article cannot present an exhaustive account of Georgia's current efforts, however there are significant elements about large-scale change and how they are being enacted in Georgia worth considering for future reform efforts.

The Initiative

In response to continually declining student achievement scores, the State Board of Education contracted the Phi Delta Kappa International (PDK) organization to conduct an extensive curriculum management audit of the statewide K-12 curriculum. In 2001, the audit, conducted by a 13-member team comprised of educators and education professionals, found that Georgia's "Quality Core Curriculum Standards (QCC) were unclear, failed to clearly articulate across grade levels, did not align with national standards consistently, and lacked rigor compared to other states" (PDK, 2004). The QCC's had been updated several times since their introduction in 1985, however, they lacked the rigor required to challenge students to analyze, synthesize or evaluate (Jacobson, 2002).

The original PDK audit was completed in 2002, which was a time of political upheaval in the Georgia State Superintendent of School's office. At that time, the State Superintendent was involved in an unsuccessful campaign for the Republican nomination for governor and classified

the PDK audit as a political maneuver. However, her replacement, the newly-elected State Superintendent, brought a new attitude toward the audit results and quickly set the enormous task of overhauling Georgia's K-12 curriculum in motion for all four content areas. Rather than continue to make superficial adjustments to the QCC's that had been in place since 1985, she made the unilateral decision to replace them in all four content areas at once across all grades Kindergarten through 12.

In May 2004, the Georgia Department of Education introduced the Georgia Performance Standards (GPS) for mathematics, which represented a major revision to the curriculum and implied expectations of teacher change in classroom practice. Additionally, the year-end assessment of student learning, the Criterion Referenced Competency Test (CRCT) was changed to align with the new standards. These changes required teachers to not only teach new content, but also to implement a set of process skills that align closely with those in the *PSSM* (NCTM, 2001). Under the GPS, teachers are encouraged to provide opportunities for their students to solve complex investigations, apply their mathematics knowledge, use technology as mathematical tool, communicate about mathematics, make generalizations, and test conjectures in mathematics classrooms. While no teaching approaches were mandated in the mathematics GPS, these standards implied pedagogical changes consistent with an investigative-based or inquiry-based approach in which students learn by exploring open-ended investigations. To be successful under the GPS, mathematics teachers must teach in ways with which they may not be familiar.

At the request of the Georgia Partnership for Excellence in Education (GPEE), a business-led non-partisan advocacy group, PDK returned in 2004 to audit the new Georgia standards as they were being developed. The 2004 results were dramatically different from the

earlier ones (PDK, 2004). The second audit acknowledged that the new standards were “rigorous and in line with national standards” (Jacobson, 2004, p. 1). The audit also found that the working relationships and the governance spirit within the Georgia DOE were remarkably different from the prior audit. The relationships were “harmonious,” “positive,” and “a relatively strong commitment to cooperative effort in behalf of improving the quality of Georgia public education” (PDK, 2004, p. 20) was noted. However, the report asserted that the timeline for the development and implementation process was “excessively compressed and highly ambitious” (PDK, 2004, p. 21). Further, the timeline for training teachers was too ambitious to allow classroom behavior to change and did not meet the standards set by the National Staff Development organization (Jacobson, 2004). The audit also noted that the success of the new standards would be dependent on the “commitment of the State [school] Board and the citizenry to provide the support, resources, time and assistance needed to complete this highly ambitious, enormous, and important work” (PDK, 2004, p.166).

This study is designed to examine the process the state of Georgia undertook in the framing of the GPS as it relates to what we know about change in a large-scale reform environment.

Research Design

In this retrospective study, we are not seeking to generalize findings, but rather to focus on examining and interpreting how Georgia chose to enact this reform through the lens of what is known or believed about large-scale educational change efforts. In this way, our findings can potentially add to the collective understanding of large-scale reform and can be drawn upon by policy makers and others in future reform efforts.

Participants

Four participants were purposefully selected for this study, they are referenced in this article using pseudonyms. One participant represented the Expert Advisory Panel (EAP) that was in charge of guidance and oversight of the writing of the mathematics GPS. Dr. Eliott was a senior faculty member from higher education and an international authority on mathematics teaching and learning. Two participants, Jo Anne and Dana, were members of the Secondary Writing Team that wrote the drafts of the high school mathematics GPS. The fourth, Cindy, was an outside consultant brought in to facilitate the GPS for high school mathematics process. These three were all exemplary mathematics specialists, each with more than 20 years experience, who had held a variety of teaching and leadership roles in education. The specific participants were selected as they had firsthand knowledge of the intent behind and the development of the GPS, and could provide the greatest detail into the reform process. Each of these participants, referred to framers collectively, has continued to play an important role in the rollout of the GPS.

Because our goal was to describe the efforts of the development and early plans for implementation of the GPS, we did not attempt to balance the perspectives of our participants. All four of the participants selected were proponents of the GPS reform effort and demonstrated an obvious passion for the success of the effort. Opponents were not contacted, though there was some discussion of the issues about the opponents in the interviews with the four participants and in the documents analyzed.

One semi-structured interview, lasting approximately one hour, was conducted with each participant by the first author. A second follow-up interview was conducted with one participant to clarify timelines and actions taken. These interviews included questions concerning the participant's perception of the intent behind the GPS, views on the significance of the GPS, and

perception of the receptiveness of key stakeholders. Sample interview questions are included in Table 3.1.

Table 3.1

Sample of Georgia Performance Standards Framer Interview Protocol

In your mind, what was the overall intent behind the change to the GPS?
When the GPS was being developed, what sense did the framers have about how significant this change was?
How complicated did you envision the change to the GPS was going to be for Georgia teachers?
How were classroom teachers involved in the design process or how was their input sought?
What types of issues arose when trying to get teachers involved in the design process?

Secondary Data Sources

Primary and secondary source documents for this study were retrieved through Internet searches using the search terms: GPS, Georgia Performance Standards, Georgia mathematics reform, etc. Because the focus of this study involved the original design of the GPS, documents dated between January 1, 2004 and August 31, 2006 comprised the primary search. The documents found were all publicly available from either the daily media archives or the Georgia Department of Education (DOE) website. Retrieved documents included press release documents from the DOE, news media articles, training documents, audit reports, etc. The documents were organized chronologically and analyzed using a form of content analysis to systematically review and extract details of the GPS process (Merriam, 1998). These documents were used to triangulate the interview data collected from the framers and solidify the timeline behind the development of the GPS. The news media documents available were limited in scope and detail about the GPS and provided little additional insight into the process. The primary documents used in this study were obtained through the DOE website.

The data were analyzed using standard qualitative methods, which included multiple

readings and sorting, organizing and categorizing, and clustering data by themes or patterns (Creswell, 1994). These multiple sources were then triangulated to ensure the trustworthiness of the data and to help weave together the descriptions of events (Bentz & Shapiro, 1998; Merriam, 1998). Connections between responses were highlighted and emergent themes were used as a basis for chunking the data (Merriam, 1998). Our goal was to develop a thick, rich description of the details and events surrounding the development of the GPS (Creswell, 1994), which could be juxtaposed against what we know about supporting large-scale reform efforts.

Limitations

This study focused on events that occurred primarily in 2004 and 2005 as the GPS were being developed. The participants were asked to remember events and situations, so the primary data source was retrospective interviews as direct observations were not possible. This limitation exists in any recounting of experiences regardless of the time differential, however, to account for this, the data collected from the four participants was triangulated across people and documents where possible to ensure trustworthiness (Bentz & Shapiro, 1998; Merriam, 1998).

Another limitation was in our sample. While two of the participants were K-12 classroom mathematics teachers during the timeframe of interest, there were no school administrators or individuals from outside the educational system chosen to participate in this study. Further, as stated previously, no opponents were included in the sample. This is both a strength and limitation of this study as our participants were very knowledgeable about the process while also being very biased about it.

Findings

We considered the development and planning for implementation of the mathematics GPS as an opportunity to consider how school reform can look in practice. We knew from years of research literature that large-scale reform is, at best, very difficult to implement and wondered whether the vision set forth by the reform literature was practical in real life. To tell the story of the GPS development, as seen through a reform lens, we examined some of the critical school reform factors by juxtaposing literature descriptions of change against the GPS experience. The significant themes that emerged from the data were: expect teacher resistance, obtain stakeholder buy-in, allow time for beliefs to change, and allow for local control.

How Significant is this Reform?

The GPS reform effort was seen by all of the framers as a radical departure from the previous standards, both in content and in teaching. As described by Cindy, the original PDK audit found the previous Georgia curriculum to be "superficial, fragmented, disjointed, trivial and that it promoted superficial, fragmented, trivial teaching." As Jo Anne explained, "there were no clear expectations for students and no clear expectations or guidance for teachers." Thus, according to Jo Anne, the GPS required:

> A complete about face…it's demanding, it's integrated, it's not low level, it's not trivial, it's all about making connection. It's all about not just being able to do 20 problems, but being able to do those 20 problems five different ways…. it's a huge shake up for what people believed it meant to know and understand mathematics.

These strong sentiments were equally shared by all of the framers who routinely described the change to the GPS as "huge," "radical," or "bold." In fact, Dana described the moment she personally realized what the EAP was empowering them to do: "…. And that was an oooooh moment, because it just had never occurred to me until that moment that they were that serious to

that extent of redoing the curriculum."

The significance of the curriculum change brought about by the GPS for mathematics implied the expectation that the GPS would also change classroom practice. These changes, consistent with an investigative-based or inquiry-based approach, required teachers to teach in ways with which they may not be familiar. Jo Anne emphasized, "I don't think you can overstate how significant this change is. A lot of times we said [to teachers] we're not telling you to change how you teach, but we really were." In light of the significant changes expected of Georgia teachers, the DOE and the framers created an implementation plan that intentionally and intuitively included aspects of what we know can make reforms successful.

Expect Teacher Resistance

What the literature tells us. Change leads to resistance because it inherently represents a loss of the known and the imposition of the unknown (Burke, 2002). Many times, resistance is a reaction as individuals directly impacted by a change work through this loss (Hall & Hord, 2006). Typically, large-scale reforms that are intended to make fundamental changes in teaching and learning in the classroom will engender very strong resistance. Historically, this strong resistance led to a view that teachers were recalcitrant and highly reluctant to change, such as the attitude that dominated the 1990's. However, upon closer examination, this proves to be an exaggeration because we know that teachers change all the time (Cuban, 1988; Richardson, 1990). They change in response to the experiences from and the needs of their classrooms. Resistance comes more from the imposition of change that is forced upon teachers; it is actually a small minority who are simply intolerant of change (Burke, 2002).

Involving the individuals directly affected by a change contributes greatly to relieving resistance (Burke, 2002). Involving teachers or teacher representatives early in the process

allows teachers' concerns to be heard during the change process. Early and ongoing participation by teachers in the design, discussion and implementation of a reform will make its sustainability more likely over time (Rogers, 2003). As a corollary, the more isolated the decision-making and design of a reform effort, the more likely failure will occur if the authorities behind the decision-making leave.

Georgia. The framers understood the significance of the change expected of Georgia teachers and knew to expect strong resistance. The GPS changed the high school mathematics curriculum from the traditional content specific model to an integrated model that weaves together four strands: number and operations, algebra, geometry, and data analysis and statistics (DOE, N.D.) Courses are designed to develop natural connections between the strands and with other disciplines allowing students to use mathematics for complex problem solving. In an effort to allow teachers the opportunity, individually, to voice their opinions and concerns, Jo Anne explained, "my thing about this is you can't address people's issues and concerns unless you give them an opportunity to vent them and then to share them."

In Georgia, teachers were brought into the process at a number of critical stages and lines of communication were set up for a wide array of teachers to participate. The DOE was determined to include classroom teachers from the beginning, developing an extensive interview process to identify expert mathematics teachers. As Cindy, who developed the teacher selection process put it, "we didn't want people who were shut down and had their minds closed. We wanted people who believed that students could learn at high levels and that schools and the curriculum could make a difference." Initially, the teacher participation was to encompass just one week in the summer of 2003 and every Saturday for two months in the fall for which they were paid $100 per day. As the process stretched to over two years and funding ran out, the high

school writing team continued without pay. This representation of highly regarded, dedicated teachers from around the state was intended to give the process more authenticity with other Georgia teachers.

Although there were profound curriculum changes at all grade levels, as Dr. Eliott from higher education explained:

> We always expected that the big resistance would come at nine through 12 because this effort to unify the curriculum and get rid of the year of Algebra, the year of Geometry, that's been going on for over a century and you know teachers have a vested interest in the ways things are now.

In spite of the state's effort to include teachers in the development of the GPS, Dr. Eliott recognized that even this effort was insufficient to address teacher buy-in. Based on other mathematics reform efforts, "you know I could have predicted this because, and it seemed to me there was never enough teacher [professional] development built into this system, because you know high school teachers' identities are tied up in their subject." However, he did acknowledge, "if we don't take the step, we'll never take it." In the end, "the key is the teacher, you have to have the teacher willing, committed, understanding what the change is about, agreeing with it and committed to doing it, and those aren't easy things to accomplish." Because educational change efforts notoriously come and go, Dr. Eliott noted that many teachers assume that "if I just keep my head down and don't change, this will blow over. It always has, why wouldn't it this time?"

Obtain Stakeholder Buy-in

What the literature tells us. Educational systems are highly complex and large-scale

change cannot occur without the support and cooperation of the many stakeholders, both within and outside of schools (Wagner et al., 2007). These partnerships between educators at all levels and community stakeholders are an essential element of real and lasting change (Keller & Reigeluth, 2004). If we view education as a system of variables, we know that the more variables, including stakeholders that support a change effort, the more successful and sustainable that effort will be (Fullan, 2001). Further, we know that the educational system is a social system that requires all its members work together in "joint problem solving to accomplish a common goal" (Rogers, 2003, p. 23). This synergy of stakeholders can develop a common vision and shared understanding of the goals and direction of the reform effort, essential elements of making real change happen (Senge, 1990).

Georgia. From the beginning, the framers understood the importance and the long-term significance of obtaining solid backing and buy-in from specific external stakeholder groups. To this end, as Jo Anne described, "we just tried to build as broad a base as possible." One of the key ways in which the stakeholder base was built was through the various teams that had responsibility and/or oversight of the standards development process: the EAP, which was in charge of guidance and oversight of the writing of the mathematics GPS and included district leaders and representatives from higher education and business, the Teacher Writing Teams, and a Business and Community Advisory Board. In addition to providing oversight and development of the standards, these representative stakeholders were tasked, according to Cindy, to "establish a common vision of teaching and learning in mathematics throughout the state."

In the very early stages of the integrated high school curriculum design, the DOE also contacted the Board of Regents of the University System of Georgia to obtain a written letter of support for the GPS. This created, as Jo Anne described, a unique collaboration between the

DOE and the higher education community in Georgia:

> We knew that we were going to get a lot of resistance from all of our stakeholders, just because they didn't really understand the change. So the higher ed component helped us build, not only did it help us with the quality of what we were doing – it was huge – but it also helped us build a really broad base.

As teachers resisted and questioned the merits of the GPS, the framers were able to say, "well, we did read a lot of research but we also got the people who wrote the research to be on our committee, to actually write the standards and help us implement this." This unique collaboration was also helpful when a district superintendent had received incorrect information and was talking, in very public ways, to others around the state about the pending failure of the GPS. Two of the other higher education framers became personally involved and met with the district superintendent and resolved all of his concerns.

Leveraging the higher education community to break down barriers, bring in a broader perspective, and work directly with DOE in the development of the standards was a unique opportunity. As pointed out by Dr. Eliott, "I think [the DOE] felt that the higher ed people would support [the GPS], which I think most of them did, and would help them out to the extent that we could." This inclusion of higher education stakeholders in a statewide reform effort is extremely rare. As Jo Anne put it: "I can't imagine - I'm sure that higher ed has never been involved to this extent" in a K-12 public education reform effort in Georgia. When she presented their work at the National Association of State Supervisors of Mathematics (ASSM), Jo Anne was approached by her counterparts who were "blown away by what we were trying to accomplish at the DOE." This coalition with higher education not only enhanced the credibility of the reform effort, it had an added benefit of bringing the higher education community into the process early so that they

too could begin to align their pre-service teacher education curriculum more specifically to the GPS.

The framers also understood the influence that the media and the general public, in specific parents of K-12 students, would have on the success of the reform effort. As a way to educate the public about the GPS and to solicit input, comments and feedback from all interested parties, drafts of the GPS were publicized and posted on the Internet. Over 6000 responses from the public were processed (PDK, 2004) indicating a wide range of reactions. The DOE released media communications throughout the design process, developed parent letters for each curriculum unit and talked to concerned teachers and parents individually. Several of the framers also traveled around the state directly involved in the teacher training but also conducted teacher/parent forums. Jo Anne recounted a particularly volatile forum she held with 472 parents where she was accompanied by an armed guard at the request of the district. Willing to meet the issues head-on, she told parents "when we generate this much interest in mathematics and curriculum and what our children are learning, that is really a good thing." Similar negative reactions continued to be voiced in the media and on the Internet, which fueled a lot of misunderstanding. However, as Jo Anne explained, "what really makes the difference is when parents start seeing what their students are doing and how the teachers are working with the students." To enable this, the DOE posted work and written commentaries about the mathematics on the Internet for all to view.

To further broaden the stakeholder base, the DOE was able to build a coalition between the DOE and the Regional Educational Service Agencies (RESA) located around the state by leveraging funds from the NSF-funded Georgia Partnership for Reform in Science and Mathematics (PRISM) grant focused on supporting the improvement of mathematics and science

instruction across the state of Georgia. This became a vital part of the GPS effort as it allowed the DOE to extend its reach beyond what was feasible with its funding and personnel levels. As Dana explained, while teacher support for the mathematics GPS received "by far the lion's share of the curriculum and training budget," the needs of the over 20,000 mathematics teachers in the state of Georgia were too many for the DOE to address without such a partnership.

Allow Time for Beliefs to Change

What the literature tells us. Fundamental change in beliefs about teaching and learning is a slow and complex process (Horsley & Loucks-Horsley, 1998). While teachers are the key to any successful implementation of change in the classroom (Fullan, 2001; Spillane, 1999), the roles and responsibilities of teachers in large-scale reforms are often not appreciated by the system imposing them (Kirk & Macdonald, 2001; Leithwood et al., 2002). Teacher beliefs about teaching and learning are the basis for their choices of classroom instructional strategies and activities, task definition and selection, as well as interpretation of course content, ultimately impacting student-learning outcomes (Pajares, 1992). These beliefs are stable and resistant to change and in most cases, the teachers themselves are not consciously aware of these specific beliefs and the impact they have on their teaching (Kagan, 1992). Interestingly, policy makers who introduce large-scale reforms "often treat teachers in exactly the same way as they criticize teachers for treating their students" (Stevenson, 1995, p. 129). Too often in reform efforts, teachers are not seen as learners themselves who require sensitivity to the beliefs they hold and experiences they been exposed to over their lifetimes.

Ultimately, we know that change takes time. This is especially true when the change challenges teachers' fundamental beliefs about teaching and learning. In order for these changes to occur, time is needed for teachers to work through their personal decision-making processes

"with some people requiring many years to adopt an innovation, while other people move rapidly" (Rogers, 2003, p. 22). Complex change, defined as having more variables involved, requires a slower rate of adoption (Ellsworth, 2000). Large-scale fundamental change requiring teachers to develop new skills and understandings presents a large degree of complexity and will directly impact the rate of adoption.

Georgia. Despite implicitly understanding the time needed for teachers' to adapt to the changes expected of them, the Georgia DOE and GPS framers recognized the need to push the implementation out on a short timetable. Georgia had the 9th largest K-12 public school enrollment in the U.S., with over 1.6 million students (NCES, 2008). With 182 districts of varying sizes and demographics, Georgia had a 63.3% high school graduation rate in 2002-2003 (PDK, 2004). Georgia's average 2008 SAT achievement score fell to 1466 or 47th in the U.S., 45 points lower than the national average (Diamond, 2008). For mathematics, Georgia students scored an average 490 out of 800 compared to the nationwide average of 515, a decline that has persisted for the past 25 years. Given Georgia's troubled performance on all commonly used indicators of educational quality in mathematics, Jo Anne described the reality of the reform saying, "quite frankly our scores were so abysmal and our kids were getting further and further behind, faster and faster, we knew we didn't have 13 years to do this." When the GPS were approved, they were approved with a seven-year roll-out across K-12, with the final four years focusing on the high school mathematics implementation.

Even within the DOE, there were major concerns voiced about the speed at which the implementation was planned. Cindy recalled that the State Mathematics Coordinator at the time "just wrung her hands and wrung her hands and wrung her hands and kept saying to the EAP: 'But you don't understand, the teachers can't do this. They don't know the math, they can't do

this. You don't know what you are asking.'" A tension existed throughout the design process between the time needed to make a fundamental change in teaching and learning and the political reality that test scores were continuing to decline.

In an effort to provide the necessary time for teachers to begin aligning their beliefs with the requirements of the GPS, the state DOE decided to provide a "preview" year prior to the rollout year for each grade. To further support the needs of teachers in changing their beliefs and practices, the state created and implemented a plan for middle and elementary school teachers using a train-the-trainer model. Dana explained, "each district was allowed to send up to three people to the DOE sponsored training and then those people were supposed to go back to their district and redeliver the training to the teachers in their district." This proved to be ineffective, though, as many times there was either no redelivery or it was shortened to a "go back and report out situation." As Dana explained "what we were finding out was that we didn't have equal partners from a lot of the local districts to allow these people to redeliver training in the same way we were delivering it." The quality varied and the intent of the GPS was becoming lost in translation. This was particularly problematic because of the underlying beliefs of the GPS and their fundamental misalignment with many of the teachers' beliefs. When the high school roll out began, the professional development model changed to face-to-face for a larger subset of the state's teachers. The DOE brought in approximately 30 teachers and coaches from around the state who understood standards-based instruction. This training was delivered in 17 sites statewide and several more in the metro Atlanta area. Dana described it as a "blitzkrieg," running all of the sessions in June and taking up to four Math 1 teachers per school which "even with the large school, that would give them enough to start ninth grade." Three of the framers had never

seen this done and realized, and Jo Anne explained, it was “a huge concession to give everybody a year of grace” along with DOE led training.

It was not only the teachers who had to change their beliefs about teaching and learning. The extent of the high school curriculum change and the time needed for Georgia teachers to adopt the change was seriously debated in the EAP and on the curriculum writing team. In the EAP, while the higher education representatives understood the ultimate goal needed to be an integrated curriculum, Dr Eliott noted:

> Some of the people were a little more resistant of going as far as an integrated curriculum in grades 9 to 12. I think everybody was on board for the things that were done K-8, I think that was an easy sell, both to the school people and the state DOE people and the Board, but it was always the high school that was the big bottle neck because it was such a radical change.

All of the framers on the writing team had to work through their own beliefs about teaching and learning mathematics, spending two years during the creation of the GPS arguing, debating, voicing their concerns and growing their own understanding of what these new standards could look like. Dr. Eliott explained, “they're all experienced high school teachers and they were committed to it from the beginning…. the other teachers who aren't as well equipped and motivated as these people are probably going to take longer than two years.” Even the framers had to gain a common understanding of what they were trying to accomplish. In fact, the first product that the high school writing team presented to the EAP was forcefully shot down. As Dana recalled, they were told, “you don’t get it, you don’t seem to understand what we want and I suggest you go back and start over.”

The question of the depth of change and the time needed for Georgia teachers to adopt the change continued to be debated throughout the process, attempting to balance the political need for expediency and the reality that change takes time. From Dr. Eliott's perspective, the implementation has been "pretty abrupt." He suggested:

> I would have preferred a little more lead time so that people could get used to it…. I think [the DOE] should allow districts to go at a rate that is comfortable for them. They can't get beyond the teachers, you know, it's really dependent on the capabilities and the attitudes of their teachers…. Phasing it in year-by-year makes a lot of sense.

The big issue, for Dr Eliott, was that the support materials were not ready at the time the decision was made to begin implementation. However, he also had a realistic vision of how policy gets set at the state level. When asked about how long a reform needs to be in place before it can continue on its own, the Dr. Eliott admitted:

> I can't know because it is a political thing. I know that [State Superintendent of Education] has stuck her neck out on this and has pushed hard and the question will be whether the state will continue along this path or will there be such a reaction to set in from the districts, especially the secondary high schools, that they'll say we'll forget about it. I don't know.

Change in teacher beliefs of this magnitude takes time raising the question about the balance between the time needed to change teacher beliefs and the political will needed to see the reform through to a successful conclusion.

Maintain Commitment at the Top

What the literature tells us. While those who advocate locally-controlled initiatives see teachers as the key driver of change in their classroom practice, we know that leadership, vision

and committed support from the top is required for the long-term success of any change effort (Hall & Hord, 2006). In the very early stages of a reform effort, a key to the ultimate success is leadership at the top of the organization with a clear vision and direction, an understanding of the external environment, a belief in the need for change, and a long-term commitment (Burke, 2002).

Georgia. From the beginning of this study, the framers' perceived the Georgia State Superintendent of Schools to be the primary driver behind the move to the GPS. All of the framers acknowledged her vision, leadership and focus were present from the beginning of the process. Cindy stated, "I think the support from the State Superintendent has been absolutely extraordinary", "[Moving to the GPS] was a very very bold move that I sincerely applaud …She said that's enough already, we're not revising these things [the prior state curriculum] any more." According to Cindy, the State Superintendent described the effort as:

> … dumping [the prior state curriculum] overboard and we're starting over. Her message was we're on any given day 48th, 49th, 50th in the nation, other people are doing it better than we are. We don't have time to invent it, you know. Go out and find it, find the best of what's out there.

According to all four framers, the State Superintendent remained visible and supportive throughout the process. As Dana recalled:

> If she wasn't in there in that closed room with that State School Board arguing, fighting, explaining, staying firm, it would never have happened. And I guess that the piece, I guess that's really the bottom line why we're still hanging in there -- is because she means it. And she's going to stand up and say this is right and we're going to do it.

When asked if the State Superintendent really knew what she was asking of Georgia teachers, Cindy responded, "her son has been in the guinea pig year every single year. He was in sixth grade, he's now in ninth grade."

However, political leadership of a statewide reform effort has to be allowed to lead which raised concerns voiced by three of the framers. When asked whether a similar reform could take place in other states, Jo Anne said:

> No, the resources to do this kind of thing are not provided in other states. And I'll tell you what else is non-existent in other states is the political will to do this. And I think that is really the most important factor because if you don't have that first, then none of the rest of this is going to happen.

Educational reforms initiated by policymakers are subject to political winds and elections. With the time involved in making a change of this nature, is it realistic to expect the presence of the political will strong enough for long enough to allow large-scale reform to happen?

Allow for Local Control

What the literature tells us. The decision to engage in large-scale reform is typically out of the hands of teachers and local administrators. However, teachers, like most adults, want and need some measure of control over their lives, especially opportunities to make decisions that relate to their classroom instruction (Goddard, Hoy, & Hoy, 2004). Control is also an inherent characteristic of classroom teaching where teachers create highly personalized and individualized pedagogy for their classroom in response to their students needs (Kagan, 1992). Not only is teacher participation, or the participation by their peer representatives, important (e.g., Ellsworth, 2000; Ely, 1990; Kirk & MacDonald, 2001), but local control also means the ability to adapt reform efforts to local needs without losing the intent of the reform. Teachers are in the best

position to understand the needs of their students and can develop ownership of a change if they are able to make adaptations so the changes are more relevant to their classrooms (Klingner, 2004). Even within mandated reform efforts, it is possible to provide teachers with control over the means to reach the end objective (Campbell, Lindsay, & Phillips, 2002). Allowing teacher flexibility in determining how a reform is enacted in their classroom rather than requiring uniform implementation has been attributed to successful reform efforts (McLaughlin, 1990). Policymakers and state administrators trying to enact a large-scale reform can be hesitant to allow a measure of individual teacher control through adaptation. However, in what Elmore (1983) calls the "power of the bottom over the top," because teachers' work is highly individualized and occurs almost completely in their classrooms, mandating strategies and activities uniformly for all classrooms "is not only extraordinarily difficult, but also very risky" (p. 356).

Georgia. A measure of "local control" was built into the educational system of Georgia. At the school district level, the state allowed the local school systems to make independent decisions on textbooks and curriculum. As Dana explained: "the DOE is charged with supplying a curriculum and assessing the success of that curriculum and really that's it." A local system could choose to use their own curriculum as long as their students can pass the state assessment and achieve their Adequate Yearly Progress (AYP) as mandated by NCLB. The primary oversight by the DOE was through the year-end assessment, which was redesigned to reflect the GPS. This relationship between the state DOE and the local school districts allowed for independent decisions and flexibility to take place.

At the teacher level, teacher control of how a reform is enacted in the classroom was subject to the individual school district administration and varies by teacher. Prior to the

introduction of the GPS, an intermediary position (the mathematics coordinator) existed in most of Georgia's larger school districts. The people in these positions were typically charged with ensuring the district was taking appropriate steps toward meeting AYP goals. In the case of Georgia, that meant the mathematics coordinators made sure teachers were using the standards and preparing for the end of year tests. The mathematics coordinators also typically worked directly with teachers in a professional development role. Their primary responsibilities under the GPS included providing professional learning and curriculum organization for K-12 mathematics teachers – in essence they were working to help the teachers understand the intent of the GPS. This mathematics coordinator position was key as they functioned as change agents and were the primary intermediary through whom change was communicated to the teachers and who could exert substantial influence on the successful implementation of a reform effort (Hall & Hord, 2006). Several of these coordinators were part of the high school writing teams gaining first hand knowledge of the GPS.

Conclusions and Recommendations

What is apparent from a study of the literature is that top-down change can conflict with locally-owned initiatives and that change can be more effective when teachers and districts are allowed to take ownership over key aspects of the change that affect them directly. Based on this, it follows that the ideal change situation may be one that is a hybrid – both top down and locally-controlled – to have the best chance of succeeding (e.g., Elmore & McLaughlin, 1988; Hall & Hord, 2006; Leithwood et al., 2002; McLaughlin, 1990).

This study examined how the state of Georgia's reform effort in high school mathematics embodied what we have learned from other large-scale reform efforts and how this effort illustrated the connection between top-down reform and locally-owned initiatives. Although the

long-term outcome of Georgia's current reform effort was yet unknown at the time this article was written, many of the important elements identified in the change literature for a successful large-scale reform effort were present. Georgia's DOE intentionally and intuitively created a hybrid within their reform effort. The DOE and the framers involved multiple groups of key stakeholders, most significantly the teachers, from the very beginning of the process. Within a political environment, Georgia made great efforts to provide teachers critical information about the reform very early in the process and established a preview year and multiple training opportunities. However, the Georgia case reminds us that what we know from literature may not easily transfer to a real world setting, especially one as complex as educational change.

First and foremost, *expect* resistance. Resistance can be fierce, but it is healthy and a natural occurrence in any change effort (e.g. Burke, 2002; Hall & Hord, 2006). As seen in some of the examples provided in this study, when met head-on, resistance can open lines of dialog between stakeholders to allow development of shared understandings. Next, including internal and external stakeholders in a reform effort from the beginning can build coalitions and develop support groups to help move the effort forward (Fullan, 2001; Wagner et al., 2007). Georgia's DOE built a unique coalition of business leaders, members of higher education, local school district administrators, teachers and parents. Another example of the value of these relationships is the higher-education framers working with superintendents to clarify confusion and bolster support. Third, the length of time required for a successful implementation varies greatly but cannot be underestimated (Ellsworth, 2000; Rogers, 2003). Political realities within educational reform may influence time limits so the political stamina and will needed to initiate and sustain a reform effort has to be present. Georgia's State Superintendent demonstrated the political will to provide time for the GPS to potentially become entrenched in the educational system. This

commitment at all levels is critical for the sustainability of any reform. This commitment most certainly must also come from the local level, where any real change in classroom practice will occur. Also, mediating between top-down reform and locally-owned initiatives is a juncture that bears more scrutiny. For Georgia, the mathematics coordinator position has promise, but more research into understanding the potential role this position as an intermediary can play in the long-term success of a reform is needed.

If public policy is to continue to be a major driver of educational reform, we should learn from past reform efforts (Elmore, 1996). For policymakers or others interested in large-scale educational reform, there are a number of aspects from Georgia's experience that could prove helpful to future reform efforts. Specifically, we suggest that reformers should intentionally plan for the complexities of change: (1) include representatives from all internal and external stakeholder groups in the various stages of the reform design, rollout and implementation, (2) incorporate the public news media in the early stages to provide extensive information to the public sector, (3) plan educational reform funding in terms of years, significant educational change takes time measured in years, (4) focus internal and external professional learning support efforts on teacher beliefs and understanding about teaching and learning.

The long term results of Georgia's reform effort are as yet unknown. A longitudinal study to determine the effectiveness of specific change strategies employed would provide insights to help guide future reform efforts. Further study into the impact of the various stakeholder groups as they relate to the effectiveness of an educational reform implementation is also needed. Finally, as mentioned previously, further research into the intermediary position between the top-down reform and the locally-owned initiatives could provide valuable understandings about integrating these two change strategies effectively.

The rollout of the GPS has continued despite the economic downturn in the state budget. It remains to be seen whether or not Georgia's efforts will result in true and lasting change to the educational system in the state. However, as one reformer summed it up, "So you know when you have all those people united, it's just the perfect storm." Time will tell.

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CHAPTER 4

FOSTERING HIGH SCHOOL TEACHER OWNERSHIP OF CHANGE:

K-12 MATHEMATICS COORDINATORS AS CHANGE AGENTS

Geisler, S.K. & Orrill, C.H. To be submitted to *The Journal of Educational Change*, August 2009.

Introduction

Our world has changed significantly over the last 100 years and continues to change at an ever-increasing pace. Access to information and knowledge introduced by advances in technology alone is requiring today's youth to graduate with skills and abilities very different from just one generation before (Fullan, 2001). "Our current educational system was never designed to deliver the kind of results we now need to equip students for today's world – and tomorrow's" (Wagner et al., 2006). Because of this, viewing education as part of the solution to social and economic problems, the public and policymakers at all levels have shown little patience for the slow pace of educational reform efforts and little understanding for the enormity of the change educators are being asked to make both personally and organizationally (Leithwood, Jantzi, & Mascall, 2002). The last two decades has seen a flurry of state and federally initiated reform efforts designed to change teaching and learning to reflect the significant shifts required of an information age economy. These reforms attempt to mandate fundamental changes in school structures and individual classroom teaching practice.

Unfortunately, we know that top down reform strategies typically disappear, often because they fail to fully appreciate the role and responsibility the local school districts and teachers ultimately have (Kirk & Macdonald, 2001; Leithwood et al., 2002; Senge, 1990). We know too that locally-owned initiatives (aka grassroots efforts) fail to create large-scale sustainable change and are typically misaligned with the urgency and impatience expressed by policymakers and the public (Corcoran, Fuhrman, & Belcher, 2001; Leithwood et al., 2002). Thus experience and research has shown that top down reform *alone* or locally-owned initiatives *alone* have a high risk of failure; it is a hybrid of these two reform strategies that increases the

possibility of sustainable success (e.g., Elmore & McLaughlin, 1988; Hall & Hord, 2006; Leithwood et al., 2002; McLaughlin, 1990).

A hybrid strategy's success draws from the most important aspects of top-down reform and locally-owned initiatives, representing the "connection between the big ideas and the fine grains of practice in the core of schooling" (Elmore, 1996, p.301). Policymakers set the direction, provide funding and develop accountability measures, which set the expectations; however, it is at the local level that change in classroom practice actually occurs. A hybrid strategy seeks to address local needs and allow for the development of teacher ownership, which has been cited as important for change to be successful and sustainable (e.g.: Campbell, Lindsay, & Phillips, 2002; Fullan, 2004; Guskey, 2003; Klingner, 2004). For these two strategies to co-exist and teacher ownership to be fostered, we suggest that an intermediary position is needed to ensure the requirements of the reforms as well as the needs of the local districts and teachers are met.

The Glue that Binds?

Integrating large top-down reform efforts into local needs can be problematic. Reform priorities, typically dictated by policymakers and administrators, are often communicated and viewed as taking precedence over the local needs of school districts and teachers (Campbell, Lindsay, & Phillips, 2002). Thus mandated change can cause resistance if teachers perceive they have no choice over how reforms are enacted in their classrooms (Burke, 2002). While teachers are not naturally resistant to change, in fact we know they change all the time (Cuban, 1988; Elmore, 1996; Richardson, 1990), it is rather the imposition of change that causes resistance (Burke, 2002).

At the local level, school districts and teachers make decisions and formulate priorities based on the needs of their specific student population and the day-to-day needs of their schools and communities. This local perspective can produce decisions that sometimes appear to be at odds with mandated reform efforts. The day-to-day details can also cause local school district decision makers to lose sight of the reform's intent and fail to appreciate how their daily decisions can impact the larger reform effort (Senge, 1990). These sometimes conflicting priorities can cause tensions impacting the long term success of the reform. Bringing together these two competing priorities and structures is difficult and does not occur naturally; failure to resolve them can cause some of the most well-designed reform efforts to fail (Hall & Hord, 2006; Rogers, 2003, Senge, 1990).

The "glue" that binds these large-scale reform efforts and locally-owned initiatives, are *linking agents* who provide a personal connection between the state or federally-mandated change and those working at the district level to make reforms happen and be sustainable (Hall & Hord, 2006). The role and skill of this position is to translate and apply the intent of the reform effort while mediating between reform priorities and local priorities (Rogers, 2003). This requires the intermediary to have an intimate understanding of the reform effort, from the framers' perspective, as well as an intimate understanding of local issues. For the purposes of educational reform, we suggest this individual must also be considered an expert in the content area affected by the reform, must function as a change agent within the local school district and must personally manifest personal ownership of the reform effort. This study seeks to better understand this role and its potential for fostering ownership in teachers during a large-scale mandated reform effort. To examine the role of an intermediary position, this article looks in

depth at two mathematics coordinators and how they manifest and then attempt to foster teacher ownership in their support of a state-mandated reform.

Theoretical Framework

We build from three key perspectives in our work. First, we assert that expertise is critical for the intermediary to possess to simultaneously understand the needs of the teachers involved in the reform and to understand, deeply, the requirements of the reform. Second, we assert that the intermediary must be seen by the local participants in the change effort as 'one of us' – that is, the intermediary much be an internal player in the change effort and not perceived as an interloper. Finally, we assert that the intermediary needs to work to develop ownership among the effected teachers as a way of gaining the buy-in necessary for the reform to become a part of everyday practice.

Experts

Studying experts provides us with insights into exemplary performances from which we can learn and guide the development of others (Berliner, 1986). Within the field of mathematics, "there is a powerful relationship between what a teacher knows, how she knows it, and what she can do in the context of instruction" (Hill et al., 2008). However, expertise is not just exceptional knowledge related to a specific content area, but it also includes high-level interpersonal skills to interact effectively with teachers (Hall & Hord, 2006). Experts possess an ability to organize information more efficiently than novices, are faster at processing meaningful information and are better problem solvers (Bruning, Schraw, Norby, & Ronning, 2004). Because experts exhibit a knowing-in-action, which is partly automated, their choices and language many times are not noticeable to themselves (Berliner, 1986). Helping them articulate their knowledge through

interviews and observations of their actions and language choices with teachers, can provide insights helpful to our study's focus on developing teacher ownership in a reform environment.

Internal Change Agents

Internal change agents, individuals who are members of the local school districts, are primary intermediaries through whom change is communicated to the teachers and who can exert substantial influence on the successful implementation of an innovation (Hall & Hord, 2006). These individuals often are in the key position to help translate the intent of a reform within the local context and can encourage teachers' decisions to adopt the innovation even it if requires slowing the process (Rogers, 2003). Internal change agents are most effective when they hold similar beliefs, education and experiences to their teachers enabling them, through interpersonal channels, to persuade others to adopt an innovation (Rogers, 2003). Every change effort includes one or more change agents who work, formally or informally, to promote a positive attitude toward the change among the stakeholders affected by the change. Carefully selected, these individuals are uniquely positioned to build coalitions with other change agents, both within and across groups (Ellsworth, 2003) influencing the adoption of a reform and positively impacting its long-term sustainability. In our work, we specifically focus on the internal change agent as being a particularly necessary role in a large-scale reform effort. Their vantage point can provide insights on how to effectively mediate between potentially conflicting strategies, meeting the needs of both.

Ownership

When a change is mandated, individuals who perceive they have little or no choice will resist, which is typically what happens in educational reform efforts (Burke, 2002; Elmore, 1983). However, as cited in numerous research studies and theoretical papers regarding teacher

change and professional development, teacher ownership of, commitment to, or participation in the change process are important factors in the successful implementation of any innovation (e.g. Campbell et al., 2002; Fullan, 2004; Guskey, 2003; Hawley & Valli, 1999; Hill, 2004; NPEAT, 2000; Richardson & Anders, 1994). It has been suggested that ownership is "essential in the generation of the effort and energy necessary for a successful project" (McLaughlin, 1990, p. 13) and reforms are said to be most successful when teachers take ownership of the new practices they are being taught and without it, "it is unlikely the practices will take hold and spread" (Klingner, 2004, p. 252). Once ownership of the innovation is taken on a personal level, it is difficult for an individual to reject or resist the change (Ellsworth, 2000).

Typically, ownership is not present at the beginning of a change effort; it is actually developed and evolves through a change process (Fullan, 2004) unlike beliefs, self-efficacy or other personal attributes that are preexisting and may or may not change throughout the process. If one thinks of change in terms of stages, the "persuasion stage" (Rogers, 2003) provides the natural entrée to develop ownership. It is in this stage that a teacher becomes more psychologically connected to the reform by actively seeking information, deciding what information is credible and choosing how to interpret the information received (Rogers, 2003). It is also the stage in which the teacher forms either a favorable or unfavorable opinion of the suggested change and the development of a personal connection to the change begins to develop. In the persuasion stage, teachers want to know "'what are the innovation's advantages and disadvantages in my situation?'" (Rogers, 2003, p. 175). From the Concerns-Based Adoption Model (CBAM) individual's concerns about an innovation progress through a seven-stage process (Hall & Hord, 2006). It is at the "impact" level (which is comprised of the top three stages of the CBAM model: consequence, collaboration and refocusing) when ownership

potentially has the best opportunity to be fostered. It is at this level that teachers are most concerned about what is happening with their students and what they can do to become more effective in their classroom. We assert that it is at this point that the intermediary needs to actively engage with the teachers to develop not only a positive attitude, but gain buy-in and help the teachers see how they can embrace the change as their own. This strategy could reduce teacher resistance to change and improve the transfer of reform efforts into classroom practice. This understanding can guide reformers and teacher educators' conception of ownership impacting the design of professional learning opportunities (Borko & Livingston, 1989).

Interestingly, while the literature provides a clear vision for the importance of ownership in a change effort, little is known about what developing ownership looks like in practice. Clearly, if teacher ownership is important, better understanding what ownership looks like in an educational setting and how it can be fostered is worthy of study. Yet, while there are numerous references to ownership and its importance in teacher change, a review of the literature yielded little rigorous research that presented a common definition or sought to illuminate how it could be fostered in a mandated reform environment (Geisler & Orrill, in progress). For the purposes of this research, we are defining ownership as: "a deeply personal, high individualized, connection with an innovation reflecting a personal stake in the success of the innovation. For teachers, this indicates a willingness to put forth the effort required to adopt the innovation in to their own classroom practice" (Geisler & Orrill, in progress).

This Study

In this article we built from the ideas that teacher ownership is important to successful educational change and that better understanding ownership and what it looked like in an educational context could further efforts to real educational change. We considered that an

internal change agent who is also an expert in the area of the reform was one promising person who is well placed to engender the ownership that is necessary if the reform is to become institutionalized locally. Specifically, we looked at how intermediaries in two districts sought to develop ownership among their teachers as part of the rollout of a state-mandated mathematics curriculum change. This case was interesting because it provided a glimpse of a model for supporting reform that simultaneously acknowledged that the change is mandated – teachers must adhere to the curriculum if their students are going to pass the end of year assessments that No Child Left Behind (NCLB, 2001) requires – and embraced the notion that gaining teacher ownership could lead to not only an implementation of the new standards, but a transformation of teaching and learning in the school district.

As the context for our study, we chose to focus on the implementation of the Georgia Performance Standards for mathematics (GPS). The GPS were introduced in 2004 and implemented on a seven-year rollout schedule. The GPS represented major revisions to the state curriculum and implied changes to teacher performance in the classroom. The GPS outlined a set of concepts and processes for students to master each year and implied a model of teaching that is an investigation-based or inquiry-based approach in which students learn by exploring open-ended investigations (Darling-Hammond, 1990; NCTM, 2001).

The rollout of the GPS provided an interesting environment in which to study and understand the role of the intermediary in developing teacher ownership. After all, the GPS were rolled out in a double-layer of mandated change. First, NCLB was mandating constant improvement in performance on the yearly statewide assessment. Second, the state was mandating, through the GPS, a considerable “raising of the bar” in terms of the depth of learning and the complexity of the content to be learned at most grade levels. The research questions

guiding this study were: How do Georgia mathematics coordinators manifest ownership of the Georgia Performance Standards for mathematics? How do Georgia mathematics coordinators foster ownership in their teachers?

Methodology

To gain a better picture of ownership issues and the intermediary role, we chose to develop a descriptive qualitative study design (Creswell, 1994; Merriam, 1998). We relied on two semi-structured interviews of each participant and observations of their interactions with teachers in meetings and in professional learning sessions. The data were collected over a three-month time frame as the two participants conducted their regularly-planned professional development activities. Our goal was to gain a better understanding of what ownership might look like in a real-world setting. The study's purpose was not to examine ownership in terms of cause and effect, but rather to seek to initiate a common discussion of what ownership is, how it was fostered and its potential value as a topic for future study.

Participant Selection

Our participant pool focused on Georgia's mathematics coordinators who work in the central office of the local school districts, but who also work directly with the state to roll out the GPS for mathematics. Many of the larger school districts in the state have mathematics coordinators whose primary responsibilities include providing professional learning and curriculum organization for K-12 mathematics teachers. These mathematics coordinators are ideally positioned to serve as intermediaries in the ways described above.

We used a purposeful process to select our participants. To explore the role of the intermediary, we needed to select from a pool of mathematics coordinators who were likely to allow us to understand the role of the intermediary from the perspective of our theoretical

framework. We determined that to maximize our chances of observing both personal ownership of the GPS by the intermediary and fostering of it in the teachers we would need to identify mathematics coordinators who were early adopters, had significant expertise in mathematics teaching, and who had deep understanding of the GPS.

Substantial variability of selection criteria exists across studies when researchers attempt to identify experts (Palmer, Stough, Burdenski, & Gonzales, 2005). Berliners' (1986) work has been extensively cited in the literature, however, the interpretation and enactment of selection criteria is inconsistent (Palmer et al., 2005). For our purposes, we took a two-pronged approach. First, we contacted three of the GPS framers who had worked closely with schools district personnel through the training and implementation phase to obtain independent recommendations from which to identify participants. One of the framers described her reasoning for selection as:

> Those are people that I know get it…. I know they understand engaging students in the mathematics. And I know that they are people who are personally involved in making it happen. They're personally and actively involved and that means providing support, going to extremes" (C. Pierce, personal communication, October 17, 2008).

Five names were initially offered, two who matched our criteria noted above. Of the remaining three, two served in administrative roles with no significant teacher contact and the third individual was new to the position of mathematics coordinator and was, therefore, not as well-grounded in the processes of developing ownership in which we were interested.

Next, our participant selection process was also consistent with the literature on identifying expert teachers using external criteria. Palmer et al. (2005) suggested a multigated procedure for selecting expert teachers: First Gate - teachers with three to five years teaching

experience in a specific content area and relevant certification and degrees in that specific field; Second Gate - teachers recognized as exemplary by multiple constituencies "based on recent and relevant indicators of teaching effectiveness" and having documented impact of student performance (p. 23). The two participants selected had directly participated on the high school teacher writing teams during the GPS development and had intimate knowledge of its intent. They each possessed over ten years experience as mathematics teachers and had both been in their current roles as mathematics coordinators for at least four years. Both participants had primary responsibility and autonomy for the GPS in mathematics implementation for their district.

Data Collection

Participants were interviewed two times each for approximately one hour each time. In these interviews, they were asked to discuss their perspectives on the GPS, their teachers, and their own beliefs about teaching and learning mathematics. Sample interview questions are included in Table 4.1.

Table 4.1

Sample of Mathematics Coordinators Interview Protocol

From your perspective, how dramatic is the shift from the QCC's (the state's previous curriculum standards) to the GPS?
How do you explain or justify the change from the QCC's to the GPS to your teachers?"
How would you describe your teachers' current comfort level with their personal knowledge of the GPS for mathematics?
What types of adjustments have you made to the GPS to meet the needs of your teachers?
What plans do you have or think you need to continue your teachers' evolution towards the GPS?

To keep from tainting the participants' view of ownership, we purposefully did not use the term "ownership" in the interview until the participants did. When initially asked to

participate in the study, the participants were advised that the purpose of the study was "to broaden our understanding of the process of teacher change in the area of large-scale mandated reform." Once the participants raised the concept, we proceeded to probe into their meaning, how they would describe it, how they attempted to foster it, and how they would know a teacher had it.

Each participant was subsequently observed in action with classroom teachers and teacher leaders either in professional learning settings or in meetings, twice each for approximately two hours on each occasion. Our observations were guided by the research questions of this study intending to find evidence of ownership and how they fostered ownership through their actions, choices and language. The observations led to subsequent interview questions to further clarify and illuminate issues relating to ownership and its development.

Data Analysis

This research sought to understand the actual experiences of the mathematics coordinators as they mediated between the GPS and their local district's issues through open-ended, broad-based questions that explored these experiences with no initial expectations (Creswell, 1994).The data were analyzed using recognized qualitative methods, which included numerous readings, sorting, categorizing, and discerning patterns (Merriam, 1998). Our goal was to describe, through two participants' experiences, what ownership looked like in a real-world setting.

To address our first research question (How do Georgia mathematics coordinators manifest ownership of the Georgia Performance Standards for mathematics?), we developed descriptive studies on each participant examining their choices, actions and language relating to the GPS. To address our second research question (How do Georgia mathematics coordinators

foster ownership in their teachers?), we conducted a cross-case analysis to look at the similarities and differences between participants. This method enabled us to illuminate strategies used to foster ownership of the GPS in teachers that can potentially enhance generalizability and applicability of our findings to other similar reform settings (Miles & Huberman, 1994). Cross-case analysis also provided deeper understandings and descriptions of what ownership is and what it is not, information important to future research efforts.

To increase the trustworthiness of the findings, the data sources were triangulated (Bentz & Shapiro, 1998; Merriam, 1998). Data from interview transcripts were triangulated with observations during meetings and professional learning sessions. Patterns of similarities and differences between and across cases were found and emergent themes were used as a basis for grouping the data (Miles & Huberman, 1994). Our goal was to observe interactions and choices of language in an effort to better understand how the mathematics coordinators manifested personal ownership of the GPS and how this translated into their actions to foster ownership in their teachers.

Limitations

This study focused on two mathematics coordinators considered to be experts and who demonstrated personal ownership of the GPS by the framers of the reform effort. The participant selection was purposeful and was not intended to represent a cross-section of mathematics coordinators. These participants were both positively biased about the reform effort in Georgia. While there were certainly many who contest the necessity of this reform, our goal was to look at experts who best exemplified ownership and foster it with their teachers. Because the purpose of the study was to describe ownership in an educational setting and begin to operationalize it as a concept to study further, purposeful selection of participants was required.

This study does not attempt to make claims about the effect ownership has on the success or sustainability of a reform; it seeks purely to describe what ownership looks like and how it might be fostered in a real world context. Also, we do not maintain that our findings are generalizable as traditionally defined (Merriam, 1998); however, this study is intended to add to the collective discussion about the importance of ownership in the change literature potentially providing more experience and knowledge that policymakers, professional developers and others interested in educational change efforts can access when designing plans for change (Donmoyer, 1990).

Findings

We first present individual descriptions of our two participants, using the pseudonyms Lauren and Victoria. These descriptions provide personal characteristics as well as details of the participants' actions, choices and language demonstrating how they personally manifested ownership of the GPS. Next, we present the findings from our cross-case analysis where we explored how our participants fostered ownership in their teachers.

Lauren

Lauren's career spanned more than 20 years. She taught mathematics in middle school for eight years before moving to the central office as the mathematics coordinator in a large urban school district. At the time of this study, the total population of the county was approximately 198,000 (43.8% white and 52.3% black) with a median household income of $36,944 (U. S. Census Bureau, 2009). The school district had 35 elementary schools, nine middle schools and eight high schools with a total enrollment of 31,822 students of which 69% were considered economically disadvantaged (defined by the percentage of students receiving free/reduced lunch) (Georgia Department of Education (GA DOE, 2008).

As the mathematics coordinator, Lauren was tasked with professional learning for the K-12 mathematics teachers for the entire district. Her responsibilities included curriculum organization, benchmark assessments, teacher and classroom observations, and assessment and curriculum monitoring. In addition, her responsibilities included several other non-mathematics related programs such as remedial education, early intervention, math and science partnerships, grants, etc. However, Lauren admitted spending about 90% of her time on mathematics "because that's the part that I really want to do, I just decide that's what I am doing and the other pieces fall into place." Maintaining a balance in priorities between "all these big needs in math" and the GPS versus the day-to-day demands of the central office was a major challenge. With the conflicting priorities, Lauren saw her main constraint as time. "I'm not in charge of my schedule… there is a lot of time sucking and most of it is meetings. Most of it is meetings."

Lauren was an example of a motivated life-long learner. At the time of this study, she was a Ph.D. student in Mathematics Education. Her anticipated dissertation topic involved "looking at changes that have occurred in teachers' practice over time and if it is sustained." She was a self-described voracious reader of everything in mathematics with a specific interest in teacher change. Additionally, to prepare herself for the GPS rollout she read "all the time, I study all the time because when I'm here [in the schools or office] that's not something I get to do. There's no down time." With the constant interruptions and shifting priorities of the school district, "my thoughtfulness and studying that I do is away from here and at night." Lauren explained that her "biggest interest is the professional learning piece trying to figure out how teachers learn and what are the things you have to set up in order for them to feel enough disequilibrium or confusion or concern that it actually becomes something that they take ownership in."

Lauren's intellectual curiosity and love of mathematics is obvious to anyone she meets in the educational arena. When asked about why she is so upfront about her feelings, she explained:

> It was important to me as a teacher because so many students didn't like math…and the biggest thing that I interact with on a regular basis even now is this negativity about math, so I decide to just put it out there in front of everybody that that's how I feel. Then you can say what you need to say, we can have a conversation but I'm telling you right up front, this is how I feel.

Even in professional learning sessions, when encouraging teachers to use manipulatives, she told them:

> You know, you're not going to change the way I think about it cause I've been studying the research on why it's important for us to have concrete opportunities and concrete materials like manipulatives for us to understand and truly understand. So you're not going to change how I think, but if you want to keep talking about it, we might change how *you* think about it.

Lauren laughingly admitted she used to just try to make everyone happy, but now she realized that if she built relationships, "they can hear what I am trying to say."

Lauren's personal style with teachers was direct, confident, honest and laced with humor. She worked in the district where she grew up and taught, giving her keen insights into the local school culture and personalities. Based on the relationships she has built over the years, she had an intuitive ability to connect with her teachers. This was evident in her meetings and professional learning sessions in which her approach was lively and was a constant model of the style of teaching she expected from her teachers. Lauren was very animated in her delivery and used facial expressions and body language to emphasize points, to encourage participation and to

show teachers she was one of them. Through knowledge of her teachers she is able to anticipate their concerns: “it is my responsibility to know where they are so I can know what kind of questions to ask them.” She gauged their mood as they entered the room and adjusted her strategy accordingly to allow for open and honest communications. She admitted she knows her teachers well enough to know when she was “pushing” them enough and when she needed to back off and change directions. Her purpose was to cause enough confusion and disequilibrium to prompt her teachers to be open to new ideas and new ways of thinking about mathematics on a personal level. Lauren then intentionally asked thought provoking questions waiting patiently for a response from the group.

It was clear from the interview and observations that Lauren was very enthusiastic about mathematics and working with teachers. Her positive attitude permeated every conversation and interaction we observed before, during and after the professional learning sessions and meetings. She had a lot of positive energy about her job, was a self-starter and considered herself a life-long learner. Lauren admitted she had a personal stake in the success or failure of the GPS in her district and struggled when conflicting priorities arose taking her away from what she felt was her most important role as mathematics coordinator.

Victoria

Our second participant began her teaching career in middle school mathematics over 20 years ago. She taught a variety of mathematics classes, moving from middle school to high school and then into an administrative position in charge of instruction at the high school. At the time of data collection, she was working in the central office of her school district, which is located in a rural county. At the time of this study, the total population in the county was approximately 45,000 (75% white and 23% black) with a median household income of $33,024

(U.S. Census Bureau, 2009). The school district had ten elementary schools, two middle schools and one high school with a total enrollment of 8,366 students of which 65% were considered economically disadvantaged (GA DOE, 2008).

As Director of Middle and Secondary Curriculum for the district, Victoria was tasked with coordinating the curriculum for all content areas for the middle and high schools as well as K-12 mathematics. Her responsibilities included designing and delivering professional learning for the teachers, conducting focus walks (classroom observations and teachers' assessment of a standards-based classroom), mentoring individual teachers, organizing group meetings, and administering a variety of other programs.

While Victoria felt she had autonomy in her job, prioritizing and juggling projects on a daily basis was constant. According to Victoria, "it's just nutty." Trying to balance her workload, she looked to delegate where appropriate and encouraged others to become involved in various aspects of the GPS, especially teachers and coaches. Victoria felt it was her energy and belief that math was fun that enlisted other people into her network of resources. Several of the literacy coaches had developed an interest in supporting mathematics teachers and learning strategies "as they've kind of branched out from their literacy roles…I think they see the fun that we're having and so, they say 'hey, I want to learn to do that!'" Even the individual school administrators had been enlisted by Victoria to help with the GPS rollout. An assistant principal at the high school had signed on to deliver the high school training while other administrators accompanied Victoria on focus walks to help monitor and support teachers moving to a student-focused classroom.

Victoria also enlarged her network by including outside stakeholders, the parents. She believed including stakeholder groups was an important facet to a successful reform effort.

Having gained two years of public relations work with parents during her time at the central office, she saw parental involvement as an important part of the successful roll out of the GPS. Realizing "it was a mismatch between what parents were trying to help kids at home with and what teachers were trying to help kids with at school with making sense of the math instead of just doing a procedure," Victoria knew they had to get the parents on board. They began offering parent workshops during the day and in the evenings where even the parents were working with mathematics manipulatives. An unanticipated outcome from these sessions was what Victoria called "teacher empowerment." She explained, "now teachers are starting to feel comfortable with the strategies and more of them are feeling comfortable teaching the parents how to do things." Although parent participation wavered, "I don't care if two or three show up, it's two or three more that know what's going on and have a better understanding of what we're trying to do and they talk to their friends and well, you know…"

Victoria had an obvious enthusiasm about mathematics and what the GPS could bring to classroom teaching. She described her personal comfort with the GPS as "extremely high, I have done so much reading and studying on my own." She contacted teachers at an elementary school in a neighboring state who were an America's Choice Model School in her effort to seek "out places where it was happening." It was during this visit that Victoria admitted her eyes were opened about student-centered, standards-based teaching and learning, "seeing it in action with kids first hand." Although as a mathematics teacher she felt she "was always trying to look for what was out there that was different, you know, looking for application oriented stuff rather than teaching out of a regular old algebra book." As a teacher she also described herself as "very much – here's the rule and here's what you do." She began to read in her spare time to the point

where she admitted her friends began calling her “a math nerd.” She found her reading “intriguing” and used her third grade daughter as her “little guinea pig.”

> When Victoria started seeing her daughter “thinking, it fueled my fire and I was like ‘I am going to become the expert in this and I’m going to learn it’, so I have just learned a ton. I mean, I’m still learning and I don’t know everything but I have taught myself by reading all the best stuff I could get a hold of, it has really been fun.”

For Victoria:

> The GPS is more… everybody can do math, we’ve got to figure out…how you can think about it, how you can have access to it, what your entry point is with it and you know, even with our most profound severe kids…there are a lot of things they really could understand if given a way to think about it and some strategies.

When working with her teachers, Victoria was enthusiastic and personable. She gauged the mood of her group as they entered the room and asked thought provoking questions early in her professional learning sessions. She involved the whole group and encouraged the teachers to make choices and develop ideas from the reform for their own classrooms. Victoria built relationships over her years in the school district and effectively used those relationships to develop trust, create an open environment for discussion and encourage teacher self-reliance.

As with Lauren, Victoria had a clear enthusiasm about working with her teachers and the implementation of the GPS. She had a high energy level, spoke quickly and was very animated when describing how her teachers had become involved in the GPS. Victoria was a self-starter and continually looked for ways to improve her mathematical knowledge and her ability to support her teachers. She, too, had a personal stake in the success of the GPS in her district, which was illustrated as she expressed a personal failure during the first year of implementation

when a third grade class test scores "came back really bad." She felt it was "something I kind of dropped the ball on…Even though it is not my direct responsibility, you know, it's still something that I think I should have picked the ball up on."

Cross-Case Analysis

As we reviewed the similarities and differences between the two mathematics coordinators, several key aspects emerged related to fostering ownership: the role of the intermediary, expertise, modeling new behaviors, reflection, and building relationships. We present the details for each aspect relayed through the voices of our participants.

View of Ownership

The participants had a similar perspective of ownership. For Lauren, "I think it's thinking about what I've [the teacher] seen and then making the adjustments, making the changes to whatever…. I guess taking ownership is that I don't have to do it exactly like she did, what else could I do?" She elaborated, saying, "ownership to me is seeing what we are doing and having a good and strong understanding of where that relates back to the standards. You know, making that connection as firm as possible." For Lauren, understanding the content was important to ownership:

> I guess that is why I worry about the content issue, because if you don't understand what we are working on and you are only at the surface level of it and you haven't moved further than that, it's going to be really hard for you to feel confident to do this with your kids.

Expanding on this view of ownership, from Victoria's perspective, because the GPS emphasized student-centered learning, both students *and* teachers needed to take ownership. For students, this translated to "making sense of problems and it's not just mimic the teacher's

procedure." By providing multiple representations and strategies for learning, students could find one that works for them, thereby taking ownership of their own learning. For teachers, ownership meant teachers directly participating in the creation of their own plans and materials to be used in their classrooms.

> I didn't want them to see their curriculum at that point as something I was writing to hand to them...ownership to me meant that they felt attached to that, it wasn't something that I was going to give them and it might go on the shelf, because I have had curriculum documents handed to me…but I didn't use it, I didn't have any connection to it, I didn't feel like it was something that might be useful to me, that it pertained to me.

For both participants, it was important for teachers to connect what they were learning to their own situations. Throughout the observation sessions, both continuously asked teachers their thoughts and what this would look like in their classrooms. Rather than provide examples or directly answer questions, Lauren and Victoria would return the question to the group for input from the other teachers.

Both participants viewed ownership as a very individualized connection between the reform and a teachers' own practice which appeared to support our proposed definition of ownership as: "a deeply personal, high individualized, connection with an innovation reflecting a personal stake in the success of the innovation" (Geisler & Orrill, in process).

The Role of the Intermediary

Over the years, starting as teachers within their own school district, the participants had developed a sense about needs and priorities of their teachers and the district. Even though Lauren worked in a very large school district, she developed a solid relationship over the years with her mathematics teachers around the school district. She was very conscious of her

intermediary role between the state DOE, the district office and her teachers. Lauren took her role as intermediary very seriously. While she had a level of autonomy in her job, she explained, "I am really low on the hierarchy level," making her job "very confusing and conflicting" at times. Balancing the needs of the state DOE during a major reform effort with the needs of the local school district and then with those of teachers was challenging. However, she saw herself as a filter between the large-scale GPS reform and local initiatives, remaining focused on what she felt were her priorities in the local environment.

For Lauren, her job was:

> To synthesize all of this stuff that comes through. If I don't synthesize it and just put it right back out it's hard enough for me to understand it all and I really have a perspective that is a little bit more of a bird's eye. If I'm one person in a school building and I'm getting all of that thrown at me, there's…that's going to be really complicated to figure out. It's not that I'm trying to protect people, I just want to make sure that they don't feel that overwhelming feeling that I feel every day.

Lauren realized that teachers' jobs could be overwhelming, she saw her role as helping them focus on what was important in a reform and understanding how it relates to their classrooms and their students.

For Victoria, the GPS represented a "huge mindset change" for her teachers, which meant significant hurdles for them to overcome since they were coming from a very rote and prescriptive curriculum. She realized her teachers would need a personal understanding of what the standards-based classroom would look like and sought "pockets where it really is happening and you, you just try to exploit that." She developed a partnership with another school system in a neighboring state, which was already involved in making similar changes in classroom

practice, and began taking her teachers to observe the different pedagogy in action. Victoria explained that her teachers "couldn't see how that [the materials published by the state DOE] was going to translate day-to-day." Victoria also had begun videotaping some of her own teachers demonstrating local best practices. Knowing her teachers, she explained, "I think it adds credibility when I see my teacher next door who's really doing a good job."

Expertise

Both participants were invited to participate on the high school mathematics writing team for the GPS giving them firsthand knowledge of the intent behind the reform. They were highly regarded for their expertise in mathematics and mathematics teaching. However, as discussed previously, they also shared the belief that they were always learning and were not afraid to exhibit that with their teachers. As Victoria put it:

> I think I am very much that way. I just…I don't know everything, I don't profess to know everything and I am always wanting to learn and I really like for people to tell me if there is a better way to do something, or "Victoria, you were wrong on that, let's reconsider."

They both wanted their teachers to understand that mathematics was complex and even though a teacher may have taught mathematics for years. As Victoria explained:

> They are not necessarily the expert in everything…it's okay for them to say, "can you show me that again, can you come out and work with me on that, can you go through this I don't know how to get the answer to that."

Modeling New Behaviors

Both participants felt it important to model the behaviors they expected from their teachers. During her professional learning experiences, as Lauren modeled, she also tried to explain what was going on in her head and then made adjustments on the fly during a class, "I

am trying to go back and forth between my teacher role and how I think as a teacher." This was important because:

> What happened over here is not happening with their children and I'm making the same kinds of decisions that they have to make with their children. But if I am not explicit about it, they have no idea that that's what's going on in my head.

For Lauren, having teachers experience what their students should be experiencing in their own classrooms was invaluable. First and foremost, to move to a more student-focused classroom, teachers needed to deeply understand the content they are teaching, "I think you are more likely to be able to do that if you understand the standards a little better, you understand the content, …it's like, alright, what does that really mean?" To do this, Lauren explained, "that is why we were trying to start making it explicit, but that was kind of uncomfortable [for the teachers], so I went 'well, we'll come back to it.'"

Pushing teachers to learn more about mathematics was a goal of Lauren's. While she had a deep intellectual curiosity and excitement about mathematics, she realized many teachers do not yet share this. To help her mathematics coaches "get caught up really quick on math," she planned opportunities to expose them to research to help them gain deeper understandings, knowing it would take time. Lauren felt the depth of knowledge teachers needed took time to process. She intently watched for signs the teachers and coaches were beginning to make connections, she noted one teacher who had been in a professional learning session the day before was "not done thinking about it." "You can't be finished today. If you are done today, you don't really have a good understanding."

Victoria's perspective was that modeling was important to teachers making meaning of a student-centered classroom; however, as previously discussed, she primarily sought to provide teachers with opportunities to see the standards in action. In her interviews, she advised:

> It's going to be a lot of me talking today, but it's because we have a lot of new people at the grade levels and it's okay, there's a good set of people out there that wrote this [the grade-level pacing guide] and they know the mindset with where we were going with the lessons, but there's also a good set of people that are going to pick this up and go, "what is this?"

Victoria also admitted that she still struggled with talking too much and telling rather than questioning her teachers and wanted to improve her facilitation and modeling skills. While it may seem counter-intuitive that a facilitator could build ownership when she was struggling to relinquish control over the conversation, we found evidence in our observations and discussions that this mathematics coordinator found ways to encourage teachers to take ownership by giving teachers choices and ideas of different ways the reform strategies could be used in the classroom. Throughout her sessions, she found ways to couch her delivery of information by offering suggestions using, "you might..." or "you could…," balancing her focus on developing teacher ownership while making sure the intent of the reform was preserved.

Reflection

Lauren and Victoria used reflection in professional learning sessions to support teacher adaptation of their learning to their own individual classrooms. Lauren believed in using reflection as a tool with her teachers, "sometimes I do it explicitly like 'let's write this down.'" Feeling it was important for teachers to put their thoughts together after a professional learning session, she had her teachers break into small groups and highlight "things they had that were the

same so they could see in their own words. To me, that's how ownership happens. I've got to get it into my own words somehow." In other ways, Lauren admitted pushing her teachers to reflect as a group by asking thought provoking questions and "just kind of putting some situations out there for them to kind of grapple with." She explained, "What I'm trying to do is think about where do I want to go in the end. Now what are all the things that have to happen in order for the teachers to be reflective about that?" Lauren felt that by including pertinent research literature into professional learning sessions, teachers were also better able to reflect and adapt what they are learning to their own classrooms. "I think it is important to take and put all your thoughts together…what teachers are doing, what are students doing, how would the classroom look?"

For Victoria, the emphasis for teachers was to "read, study, and reflect" on the changes they were asked to make in their practice, primarily aimed at collective reflection. Regarding how she uses individual reflection in her sessions with teachers, she admits:

> Probably not as big of an extent as we need to personally, but we do a lot with collective, like…when we were revising and editing our pacing guides, we did a lot of reflection on the lesson flow, the organization of the lessons…

However, in group meetings, she said, "we try to reflect on what's happened and move ahead…causing teachers to reflect a little bit on what they did last year and how they are going to do things different this year." Victoria's reflection strategies were geared more toward specific lesson plans rather than using reflection to develop teacher pedagogy and deeper understanding of their classroom.

Building Relationships

Both participants felt that building relationships with their teachers was key to gaining trust, respect and credibility. As Lauren put it:

> There's a distrust with just central office generally and there's a distrust with people that aren't teaching… I've… really been here too long now, … so if I haven't built some type of relationship with you or you don't see some cost benefit in what I am doing, you don't see me every day and you don't need to have me do anything.

Lauren felt that relationships allowed the mathematics coordinators to "push" the teachers to grow and change in ways to which the teachers will respond. As Lauren explained, "the relationship I've built with the teachers allows me to press on them and push on them a little more than maybe just a random stranger." For Lauren obtaining the trust of her teachers is important in the relationship, "They have to know that if I say were going to get this thing right here that we get it because the minute we don't…. I don't get second chance."

For Victoria, it was important for the teachers to understand an element that she called "transparency:"

> They've [the teachers] taught for 30 years, they are not necessarily the expert in everything. You know, and it's okay for them to say, "can you show me that again, can you come out and work with me on that, can you go through this?"

Taking risks and talking openly about their lack of understanding, Victoria explained, "I just think that that's the way you learn. You have to be open to learn."

Conclusion

This study does not intend to make claims about the specific value ownership has in changing classroom practice in a reform environment. However, we think that ownership likely

does make a difference in teachers' willingness to put forth the effort required to adopt the reform into their classroom practice (Geisler & Orrill, in progress). Our participants provided us with insights into how ownership is manifested in their actions, choices and language. Both participants had a love of math and a passion for learning that they model in all their interactions with teachers. They valued building open and honest relationships with their teachers and saw themselves in a position to make a positive difference. The success of the GPS was highly valued; each feeling the changes brought on by the reform was what is needed for Georgia's students.

Although fostering ownership has not traditionally been a specific focus of educational reform efforts, we suggest that ownership can and should be fostered to help a top-down reform effort take on the character of a locally-owned effort (Campbell et al., 2002; Kirk & MacDonald, 2001). From our two participants, we learned specific strategies for how ownership might be fostered. Specifically, our participants worked to engage teachers in a dialogue about the reform, supported a culture of thoughtful adaptation, and built a vision of implementation in the local context. Through their personal strategies of effectively leveraging their role of intermediary, using their recognized expertise, modeling new behaviors, intentionally creating opportunities for teacher reflection, and building relationships, they have realized growth in their teachers' interest and participation in reform activities. While this study was conducted at a midpoint in the implementation plan, this evidence suggests that developing teacher ownership could positively impact the reform effort.

Although this study's focus was ownership and how it might be fostered in a large-scale reform environment, we found interesting insights into the intermediary position that are worth noting. We suggest that for an intermediary to be effective, the three characteristics outlined in

our theoretical framework need to be present. First, based on our study, we found the intermediary should be known as an expert (Berliner, 1986; Palmer et al., 2005), not only in a particular content area, but also in less obvious areas of having the ability to anticipate situations, build relationships, and model effective behaviors. Next, our participants demonstrated the need for people holding these intermediary positions to see themselves as change agents (Fullan, 2001; Hall & Hord, 2006; Roger, 2003) effectively using their intimate knowledge of both the large-scale reform effort and the locally-owned initiatives to mediate conflicting priorities. Last, like our participants, intermediaries must themselves demonstrate personal ownership of the reform effort having a personal stake in its success. We suggest this personal ownership is essential to their effectiveness as an intermediary as they exhibit the willingness to put forth the effort needed to support their teachers during the reform (Geisler & Orrill, in progress). In our study, each of our participants effectively exhibited these characteristics and was considered highly successful mathematics coordinators by their peers, their local district administration and the GPS framers.

The characteristics and skills needed to effectively foster teacher ownership are not exclusive to our two participants. In fact, the strategies employed are such take we suggest anyone involved in educational reform efforts can work to foster teacher ownership. We recognized that fostering ownership may be difficult for external consultants who are hired to lead professional learning efforts, however, it is within the reach of district-based personnel, especially individuals in this intermediary role. These individuals know their teachers and their district needs and are in a good position to begin to foster teacher ownership.

This study is only a beginning to better understanding what ownership is and how it can be fostered. To continue to operationalize this construct, more observable and measurable

characteristics need to be identified and refined. Our study focused on two participants who we found exemplified personal ownership and actively sought to foster ownership in their teachers. Broadening this study to include a random sample of mathematics coordinators would provide a wider array of characteristics of what ownership is and what it is not. Once these characteristics are refined, tools to measure ownership and gauge teacher progress would be a next step. These tools could then help evaluate success and guide practice. Last, and arguably most important, would be the need to conduct a longitudinal study to determine empirically how ownership impacts change in classroom practice and contributes to the success of a reform effort.

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CHAPTER 5

SUPPORTING TEACHERS IN A REFORM ENVIRONMENT:

FOSTERING TEACHER OWNERSHIP

Geisler, S.K. & Orrill, C.H. To be submitted to the *Phi Delta Kappan*, August 2009

Introduction

Educational reforms, designed to make fundamental change in classroom practice, have been with us for years and will probably be with us for years to come. The general public and policymakers have conventionally viewed education as a key element of solving social and economic problems and have shown little patience for the slow pace of educational reform efforts (Cuban, 2003; Elmore, 1996; Leithwood et al., 2002). This pressure has increased the demand for more effective professional learning opportunities, which have been identified as central to teacher preparation, learning and change (Borko, 2004; Loucks-Horsley, 1999).

In any change effort, teachers are the key to meaningful classroom change as they make the day-to-day decisions that impact their students, thus making teachers both the object of change and the agents of that change (e.g., Borko & Putnam, 1995; Cochran-Smith, 2004; Cohen & Ball, 1990). Yet, often reform efforts necessarily aim to make fundamental changes in teachers' pedagogies. This, in turn, creates a challenge for school leaders who must find effective ways to support teachers' in changing their classroom practices. While various organizations and researchers have offered standards outlining the characteristics of effective professional development to guide successful reform efforts (e.g., National Partnership for Excellence and Accountability in Teaching, 2000) few specifically address elements we know support teacher change. Clearly we know that teacher professional learning must provide teachers with opportunities to study content and pedagogy (Loucks-Horsley & Matsumoto, 1999). However, a criticism voiced of professional learning design is that it continues to be aimed primarily at the why and what to be changed, rather than helping teachers actually adopt and sustain changes in their practice (Cole, 2004).

One often-cited element of successful reform efforts is the development or existence of teacher ownership in the change process. Teacher ownership is seen as essential for generating the effort needed for successful reform efforts (McLaughlin, 1990) and without teacher ownership; new classroom practices are unlikely to be sustained (Klingner, 2004). While this makes intuitive sense, when we examine ownership more closely, we find that little is known about it within educational literature. In this article, we examine what ownership is and how mathematics coordinators have been working to foster ownership in one statewide reform effort. Our conclusions focus on the benefits of having people who can facilitate the effort to make a top-down reform meaningful to the local personnel charged with its implementation.

Background

We recently conducted a study focused on what ownership looks like in an educational context and how it can be fostered. The state of Georgia's current large-scale reform efforts in mathematics served as our case study and we selected mathematics coordinators as our study participant pool. While these positions were neither identical nor ubiquitous across the state, the core elements of the mathematics coordinators' job included professional learning and curriculum organization for all K-12 mathematics teachers in the school district as well as benchmark assessments and teacher observations. Mathematics coordinators typically reported to the central district office in the larger school districts in Georgia and were also involved in a myriad of non-mathematics responsibilities. Unlike traditional professional developers who are external to the school district and who come and go on demand, these coordinators were involved in a variety of activities as well as the politics and culture of their districts. There is much to be learned about supporting change by considering the activities of these internal professional learning facilitators.

Because professional developers are often expected to act as change agents, we wanted to better understand what could be done to better support change in a reform environment. To this end, we worked with two exemplary mathematics coordinators who acted as intermediaries between the state's large-scale reform effort and the locally-owned (aka grassroots) initiatives and priorities of the local school districts and their teachers. These individuals understood the intent of the reform deeply and had strong mathematical knowledge. How these mathematics coordinators navigated this intermediary role and actively sought to foster teacher ownership through their professional learning sessions provided insights that can inform our professional learning efforts.

What is Ownership?

Our work with the mathematics coordinators guided our understanding of teacher ownership, which we define as:

> … a deeply personal, highly individualized, connection with and understanding of an innovation or idea reflecting a personal stake in its success. For teachers, this indicates a willingness to put forth the energy and effort required to adopt the required changes into their own classroom practice (Geisler & Orrill, in progress).

It also requires that teachers have knowledge and understanding of the changes mandated by the reform, for how can anyone take ownership of something they do not understand? According to one of our participants who summed up her view of teacher ownership as "thinking about what I've seen [in professional learning] and then making the adjustments [for my own classroom]… I guess taking ownership is that I don't have to do it exactly like she did it, what else could I do?" Given that ownership is important to supporting teacher change in classroom practice

(e.g., Campbell, Lindsay, & Phillips, 2002; Fullan, 2004; Guskey, 2003; Richardson & Anders, 1994), how do we foster it within the realm of professional development?

Fostering Ownership

Large-scale reform efforts, which are typically mandated by policymakers or state education administrators, are met with resistance. Sometimes this resistance can be fierce, giving teachers the reputation for being highly resistant to change. Nonetheless, we know that teachers actually do change all the time, changes they initiate themselves (aka locally-owned initiatives) on a daily basis to address the needs of their students and schools (e.g., Cuban, 1988; Elmore, 1996; Richardson, 1990). Teachers, as adults, however resist change that is forced on them, where they have no choice in changes that impact their lives directly. Having some level of control over their lives includes opportunities to influence school decisions that are relevant to their classroom instruction (Goddard, Hoy, & Hoy, 2004). Resistance is a natural reaction to mandated reforms and the strength and duration of that resistance is directly proportional to the degree and complexity of the change (Burke, 2002). So how can teachers regain a sense of control within a large-scale reform effort? We suggest that teacher control within a mandated reform and ownership are closely linked.

Our review of the literature suggested that two important factors are involved in giving teachers control and thereby fostering teacher ownership. First, teachers need to feel that they have the opportunity to participate in the design of a reform effort or have a voice in the decisions being made that affect them. This allows teachers to have some measure of control. In a mandated reform environment, providing opportunities for teachers to participate in the design of the reform may be difficult to achieve. However, teachers need to feel that either they or their surrogates have had input or an opportunity to comment on any changes to be implemented.

Teacher participation and voice need to play an active role in designing reforms, providing credibility to the reform and enabling teachers to feel as though at least some of their concerns were considered prior to implementation. In Georgia, the state helped lay the groundwork for teacher participation by including teachers in both the development and review of the new standards they are now responsible for teaching. Further, the state attempted to use a model for support that relied on empowering local district personnel to redeliver the salient aspects of the statewide professional learning efforts in their own districts. However, this was still perceived as top-down in terms of ownership, so people like our mathematics coordinators and other regional and district support personnel become key players in fostering more widespread ownership. They work directly with the actual classroom teachers who are implementing the reform effort and can foster ownership among these teachers through carefully designed professional learning experiences.

The second factor in fostering ownership suggests that giving teachers control provides opportunities for them to make adjustments or adaptations to the pedagogies they are expected to implement in their classrooms. Teaching is very personal and the teacher is in the best position to understand the unique needs of his/her students, as little adjustments to improve learning on a daily basis are constantly needed. Typically school reform proponents look to implement change on a uniform basis, but one size does not fit all. Teachers need to feel they can adapt innovations to meeting their own needs – in short that they have "flexibility of the practice" (Klingner, 2004, p. 251), making reform strategies more relevant to their classroom. Teachers are best able to understand local factors of the classroom and modify reform strategies to meet their needs. We know that ignoring these local factors can ensure failure of a reform initiative (McLaughlin, 1990). The mathematics coordinators' role in the Georgia reform effort was to mediate between

the requirements of the reform and the needs and priorities of the local school districts and teachers. With their intimate knowledge of the GPS, they were able to alleviate some of the areas of possible divergence from the original intent of the framers while encouraging and enabling their teachers to make adaptations to the GPS for their own classrooms. At the midpoint of the Georgia reform rollout when this study was conducted, these mathematics coordinators were seeing their teachers beginning to take ownership of the GPS strategies and activities.

What Does This Mean for Professional Learning?

While fostering the ownership necessary to support a reform effort may be difficult for external consultants who are hired to lead professional learning efforts, it is within reach for the district-based personnel. After all, these personnel know their teachers, their population, and the district politics. From our two mathematics coordinators, we learned a lot about how ownership might be fostered to help a top-down reform effort take on the character of a locally-owned effort. Specifically, we saw these coordinators work to engage teachers in a dialogue, support a culture of thoughtful adaptation, and build a vision of implementation in the local context. We also considered their facilitation style in their efforts to build the top-down to locally-owned bridge.

One important aspect of the work of our two mathematics coordinators was their ability to open up a dialogue with their teachers allowing the teachers to discuss the reform and voice their opinions. This allowed the coordinators to understand where the teachers were in relation to the changes being mandated by the state. By understanding where the teachers were uncomfortable or confused, the mathematics coordinators were able to address teachers' issues and concerns from the perspective of the local district. To help start the discussion, our mathematics coordinators, who themselves had actively participated in the creation of the state's

new standards, purposefully engaged the teachers in looking deeply at the standards to help them understand the foundations and the research upon which the reforms were built. By engaging in this in-depth study of the standards, the mathematics coordinators ensured the teachers were familiar with the standards and were able to promote a dialogue about what the standards meant in practice.

Another significant opportunity to develop teacher ownership is by providing teachers direct opportunities to think about how they can adapt reform strategies to their own classrooms. Our study's participants intentionally encouraged their teachers to think about local adaptation. Their actions reflected the belief that ownership could be fostered by giving teachers control over the means to reach the end objective (Campbell, Lindsay, & Phillips, 2002). Each participant approached issues openly and did not situate themselves as the expert during professional development or meetings with teachers. To encourage discussion and teacher participation, they used techniques like "I'm not sure, let's figure it out" or "how do you think the best way to teach that might be?" Rather than telling teachers what they need to know, one participant prefers to involve her teachers in brainstorming sessions, saying, "let's figure it out together, what are some things we can do?"

Through professional learning, our participants encouraged their teachers to consider what the reform strategies might look like in their classrooms and how the teacher might alter the reform design. The mathematics coordinators guided their teachers through the development of their own strategies without changing the intent of the reform designers. During brainstorming sessions, one coordinator would add ideas to guide the discussion, ensuring that the reform's intent was preserved, but recorded ideas in the teachers words, not her own. Asking reflective questions was another strategy that both coordinators used. Specifically, they crafted questions to

guide their teachers to think about what they were learning from research and reflect on and share how it might be used in their own classrooms.

The complexities of large-scale reform efforts often make adaptations difficult because of the amount of information and content knowledge with which teachers have to work. However, one of our participants felt that part of her job was to "synthesize all of this stuff that comes through. If I don't synthesize it and I just put it right back out it's hard enough for me to understand it all and I really have a perspective that is a little bit more of a bird's eye." To reduce perceptions about the enormity of the reform, the participants kept pointing to areas of compatibility between what the teachers were already doing and what the requirements of the reform by asking, "how can we put [these new requirements] into things we're already doing?" Teachers' jobs can be overwhelming, helping them focus on what is important in a reform and understanding how it relates to their classrooms and their students is where ownership seems to begin.

In consideration of the approaches each of these mathematics coordinators took, we found that exemplary facilitation skills were not necessary. In fact, one of our participants commented that she still struggled with talking too much and telling rather than questioning her teachers. While it may seem counter-intuitive that a facilitator could build ownership when she is struggling to relinquish control over the conversation, we found evidence in our observations and discussions that this mathematics coordinator found ways to encourage teachers to take ownership by giving teachers choices and ideas of different ways the reform strategies could be used in the classroom. In contrast, our other participant was an exemplary facilitator. From her we saw a different approach. Her focus was on challenging her teachers to think outside the box about these reform strategies in terms of how they might look in their classrooms, but understand

how this box came to be. In short, facilitation skills seemed to be particular to the individual participants and varied within their comfort levels, however, each was able to engage teachers in meaningful ownership-building activities.

Our participants have seen successes in their efforts to build ownership. One participant acknowledged that three years into the reform, she was beginning to see her teachers take ownership by volunteering to take over the writing of pacing guides, common assessments and curriculum maps, deciding what materials to use and updating materials based on their experiences with their students. Both participants saw their role as setting the tone and vision for their teachers, thus ensuring the original intent of the reforms' framers was kept intact.

Conclusion

Our study illustrates the benefit of having people who can mediate between a top-down reform effort and the priorities and demands on local personnel charged with its implementation. This intermediary role represents the "glue" needed to ensure the fidelity of the reform framers' intent while developing teacher ownership of the changes in classroom practice that reforms typically imply.

When facing a large-scale reform effort, the identification and selection of exemplary personnel to fill this intermediary role is critical. These individuals must have a solid grasp of the framer's intent and demonstrate a personal stake in the reform's success. Further, how these individuals interact with teachers, develop relationships, support teacher participation and encourage appropriate adaptation of reform strategies for individual classrooms can potentially make a difference in how successful and sustainable changes in classroom practice will be.

Teachers' work is highly individualized and occurs almost completely in their classrooms, we cannot forget they possess the "power of the bottom over the top" (Elmore, 1983). Teachers and therefore teacher support is pivotal to the success of reform efforts designed to make changes in classroom practice.

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CHAPTER 6

CONCLUSION

Summary

The research studies and articles included in this dissertation offer a beginning to a conversation about teacher ownership and the role it might play in the long term success of educational reform. My purpose was to establish a common understanding of ownership by proposing a definition based on the literature and detailing what we think we know about the importance of this construct regarding change in classroom practice (Article 1). Ultimately, I sought to gain an understanding of what ownership looks like in an educational setting and how it might be fostered in teachers (Article 3).

To accomplish my objectives, I began with a review of the literature base from educational change and professional development (Article 1). As detailed in the literature, ownership is touted as critical to the success and sustainability of reform efforts (e.g.: Fullan, 2004; Klingner, 2004; McLaughlin, 1990). This review provided strong arguments about the need to better understand and begin to operationalize this construct of ownership. Then, to understand if ownership is even possible to achieve in an environment of large-scale mandated reform, I examined an ongoing large-scale reform effort in the state of Georgia. I conducted a contextual study (Article 2), by exploring the experiences of four of the framers of the Georgia Performance Standards (GPS) for mathematics. The purpose of this study was to investigate what we know about teacher change in large-scale reform efforts. This study then informed my main dissertation study by outlining the need for a hybrid approach to large-scale change and

raised the question of the importance of an intermediary to mediate between top-down reform and locally-owned initiatives (Campbell, Lindsay, & Phillips, 2002; Kirk, & MacDonald, 2001).

My main dissertation study (Article 3) participants, two exemplary Georgia mathematics coordinators who function as intermediaries, provided insights into what ownership looks like in an educational setting and how it could potentially be fostered in teachers. Their personal experiences and strategies to mediate between the requirements of the GPS and their own knowledge of their teachers and the school district's locally-owned initiatives, supported my contention that teachers' participation and adaptation of reform strategies were key to fostering teacher ownership (Campbell et al., 2002; Klingner, 2004; McLaughlin, 1990).

The final article (Article 4) was written to bring my new understandings and insights gained from the first three articles to a wider population of educational administrators, school leaders and others interested in educational reform. This article summarizes my findings specifically reiterating the importance of teacher participation in the design and discussion of changes that affect them and the importance of intentionally providing opportunities for teachers to actively adapt reform strategies to their own classrooms. These elements seem to foster teacher ownership, and can thus potentially support teachers making changes to their classroom practice.

An aspect of this research study that cannot be adequately described in my articles is the amount of energy and enthusiasm that is present when talking to the framers and the two participants. Whether this is a byproduct of taking ownership of a large initiative or just specific to the individuals who volunteered early in the process to participate in the design and development of the GPS, I am not sure. However, it is clear that when one comes into sustained contact and discussions with any of these individuals about the potential of this reform effort for

Georgia students, it is difficult not to catch some of their enthusiasm.

Discussion

As raised in my first article, one of the areas for further research was to refine our suggested definition of ownership: "…a deeply personal, highly individualized, connection with and understanding of an innovation or idea reflecting a personal stake in its success. For teachers, this indicates a willingness to put forth the effort required to adopt the innovation into their own practice (Geisler & Orrill, in progress)." Based on my study of two mathematics coordinators, I found that this definition seems a reasonable starting point. Each of the coordinators was personally connected to the innovation as evidenced by the enthusiasm they shared for mathematics and their teachers. Each coordinator also had a personally meaningful and deep knowledge of the mathematics of the reform that allowed them to better understand the intent of the new standards. They both were highly self-motivated spending a large amount of their own personal time to improve their skills. Both coordinators' goals to support their teachers change in classroom practice and ultimately improve student learning transcended their professional life, becoming an active part of their personal life.

Because of my belief that teacher ownership is important to the long-term success of a large-scale reform effort, I questioned if ownership was even possible given the complexities involved in a reform environment. Therefore, the next overarching question I sought to answer was: How can we foster teacher ownership? I began by returning to the literature for a theoretical understanding of how ownership might be fostered, but again the most valuable insights came from my two mathematics coordinators. Through analysis of my interviews and observations, it appeared that teacher ownership could, in fact, be fostered in this environment as evidenced by

the coordinators' own experiences and observations. Victoria provided concrete examples of how some of her teachers were beginning to proactively take on projects and use the GPS strategies in their classrooms. And, while she felt the process was too slow, Lauren referred to some "pockets of wonderfulness" in her district. While I still cannot contend that ownership will directly impact the success of a reform effort, it appears that the intentional efforts and enthusiasm of the coordinators are making a positive impact.

Based on my research around these two questions, I assert that any professional learning opportunity, whether conducted in a group or one-on-one, should purposefully include specific strategies that support teacher adoption of change. Specifically, professional learning should engage teachers in a dialogue about the reform, support a culture of thoughtful adaptation, and build a vision of implementation in the local context. Those individuals in the intermediary role should leverage their position by using their recognized expertise, modeling new behaviors, intentionally creating opportunities for teacher reflection, and building relationships. These strategies should be carried out in conjunction with content knowledge and pedagogy development, as they are not mutually exclusive. Specifically, from my research study, developing ownership could help to improve teachers' effort to change classroom practice. Encouraging and supporting teacher ownership through participation, intellectual discussions and local classroom adaptations will take time, but the results of these efforts could make a difference in the long term success and sustainability of a reform effort.

Implications

For policymakers, the implications of my research suggest there are plans and actions that can be put into place which can support reform efforts and foster teacher ownership. First, involving all internal and external stakeholders very early in the reform process is important to

garner the support and consistency of vision needed. Georgia's DOE put together a unique combination of stakeholders, a "perfect storm," which potentially could allow their effort to succeed where others have failed. Next, change takes time and requires sustained funding and commitment from all levels involved in reforming the educational system. Leadership with vision and the political will to persist through a very complex change initiative is crucial. Last, attending to public perception of the reform effort through effective partnering with the mass media can work to build buy-in from parents and create a support network for teachers and policymakers to accomplish the reform's goals.

For practitioners, the implications of my research suggest that the intermediary role can play a significant role in the success of large-scale reform efforts at the local level. While specific characteristics and strategies of an intermediary were identified, those characteristics and strategies can be developed and employed by anyone in the educational community. Fostering teacher ownership, through the intermediary role as well as a variety of professional learning opportunities can help teacher embrace change in their classroom practice.

Future Research

My participants are "best practice" examples of the energy, passion and drive to succeed that ownership can bring to a reform effort However, to obtain a more complete understanding of what ownership is and what is it not, further research is needed. We expect that individuals will vary in the degrees of ownership they exhibit. Therefore, a larger and more random sample of mathematics coordinators needs to be studied to determine other observable or measurable characteristics that might play into a formal definition and help operationalize this construct.

While my research took a first step toward operationalizing ownership by proposing a definition and describing how it might be fostered, another step would be to develop tools to

measure ownership. A way to begin would be to draw from the other research projects mentioned in the first article, refining their tools based on further observations of teachers' choices, actions and language relating to a large-scale reform effort. If, as with many affective constructs, ownership exists in varying degrees within individuals, this could lead to developing an objective ownership measurement tool that could be used to gauge teacher progress. This line of thought would then lead to answering the question of how much ownership is enough ownership in a given situation to create real and lasting change?

In the end, to make the claim that teacher ownership is important to the success of reform efforts, we are obligated to support that claim through further empirical research. Also, it is precisely because large-scale educational change is so difficult to achieve, with its history of more failures than successes, that the potential ownership brings to these efforts deserves further study and refinement. In the meantime, I felt very strongly that my fourth article summarizing my findings needed to be addressed to education administrators, school leaders and others interested in educational reform, to begin to bring the issue of teacher ownership into the conversation at the practice level.

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APPENDICES

APPENDIX A

GEORGIA PERFORMANCE STANDARDS FRAMER INTERVIEW PROTOCOL

1. What role did you have in the development of the GPS?	• What role have you had in the implementation of the GPS?
2. In your mind, what was overall intent behind the change to the GPS? What initiated the move from the QCC's to the GPS?	• How would you categorize the significance that the change from the QCC's to the GPS represents to teachers in GA? • When the GPS were being developed, what sense did the framers have about how significant this change was? • How complicated did you envision the change to the GPS was going to be for Georgia teachers? • Have the results to date been more or less than you expected? Please explain.
3. How were classroom teachers involved in the design process or how was their input sought?	• How were the teacher-participants chosen? • What types of issues arose when trying to get teachers involved in the design process? • Can you describe the teacher participation? • How significant was their participation?
4. Please describe the GPS rollout process. How would you describe its effectiveness ?	• With the benefit of hindsight, if you could start over again, how would you plan the roll-out now? • What changes does this new plan reflect? • Why would you make these changes?
5. How significant was the financial commitment by the DOE for this rollout?	• How does this financial commitment compare to other similar programs? • Do you feel the financial commitment was sufficient? • How did the teachers view the state's commitment?

6. At the beginning of the rollout, how receptive were the 6th grade math teachers to the GPS?	• What was your sense about how significant the teachers felt this change was? • How did the teachers' understanding and receptiveness to the GPS reflect that of the framers? • How have this changed with each new group of teachers?
7. Looking at the first year's results (GA Report Card) for math, the students' achievement scores dropped substantially. To what do you attribute that drop?	

APPENDIX B

MATHEMATICS COORDINATORS INTERVIEW PROTOCOL – ROUND ONE

About the participant's own personal perspective:	
1. From your perspective, how dramatic is the shift from the QCC's to the GPS?	• Can you give examples?
2. How do you explain or justify the change from the QCC's to the GPS to your teachers?	
3. How would you describe your current comfort level with your personal knowledge of the GPS for mathematics.	
4. How confident are you *personally* in teaching the GPS for mathematics to **students**?	• If confident, to what do you attribute that confidence?
5. How confident are you *personally* in teaching the GPS for mathematics to **teachers**?	• If confident, to what do you attribute that confidence?
6. What additional resources have your obtained/sought to help grow your own knowledge of the GPS beyond the initial training provided by the state?	• What plans do you have for your self in the future to expand your knowledge?
About the teachers the participants work with:	
7. From your perspective, how different are the GPS from how most of your teachers teach today?	• Can you describe where your teachers are along the evolution of change to the GPS in their teaching? • How can you tell, please give examples.
8. How would you describe your teachers' current comfort level with their personal knowledge of the GPS for mathematics?	• Are there some teachers with more confidence? If so, to what do you attribute the difference?
9. What specific plans do you have for your district that go beyond plans provided by the state to support your teachers' in gaining knowledge and understanding about teaching with the GPS.	

10. What additional resources have your obtained/sought to help grow your **teachers'** knowledge of the GPS beyond the initial training provided by the state?	
11. Please describe any unique materials you have created for your district's teachers to support their growth in the GPS?	• If possible, could I obtain copies of these materials that you created?
12. What types of adjustments have you made to the GPS to meet the needs of your teachers?	• Can you give specific examples? • If no adjustments, have you consider them? Please explain.
13. What plans do you have or think you need to continue your teachers' evolution towards the GPS?	• What kind of additional support do you need to make your plans happen?
14. In your work with teachers, do you generally use reflection as a strategy?	• If so, please describe how you put it into practice?
15. Since you are responsible for multiple schools, what kinds of strategies do you have to support your teachers when you are not available?	• How effective have these strategies been? Please explain.
About the participant's vision:	
16. If you had the perfect job in the perfect school district, what would you be doing?	
17. Within the constraints of your specific school district, what are you doing?	
18. If there is a difference between the answers to questions 16 and 17, to what do you attribute the difference?	

APPENDIX C

PARTICIPANT ONE (LAUREN) – INTERVIEW PROTOCOL – ROUND TWO

I would like to get a sense of your work environment. Can you describe your perception of your autonomy?	• Flexibility • Decision making • Prioritization of your schedule • Choices • Funding • Chain of command
Can you describe some other major district/system wide changes you have witnessed and how this change differs?	• Good or bad in how the change effort was handled/supported?
You mentioned previously that your district issue was more "content deficit", not so much the standards. Can you talk about that?	
Beyond the CRCT results, the AYP scores, the school keys, etc. how else are you monitoring this GPS rollout?	• What kinds of measures, etc. (Last interview talked about looked at two-man teams versus self-contained.)
In all of the change literature, there is an emphasis on reflection, out in the PD I have seen, I have not found a great deal of that going on. Can you talk a little about why that might be?	
In the prior interview, I had asked you about how you broach the subject of the GPS with teachers. You mentioned that because they are all pretty aware of the stds, you don't actually talk in terms of standards but that you "access it wherever I figure out there's a gap", mentioning assessment and technology as places.	• Can you talk a little about why you do this and how this has worked? • Do you actively think of this whole issue of change? • How do you use what you know about change as a strategy? Why?
You mentioned previously your interest in how teachers learn (p.4) and "what things you have to set up in order for them to feel enough disequilibrium or confusion or concern that it actually becomes something they take ownership in" In your opinion, how important is teacher ownership?	• What would teacher ownership look like? What would those teachers be doing or what would they be saying that would indicated to you they had ownership? • What would keep them from taking ownership of this change in their classroom practice?

In our prior interview, you mentioned that you don't like to do the work in isolation you "bring the problems to them." Can you talk a little about that?	• Why do you do this? Why is it important? What kinds of results have you seen?
Reflection- you mentioned previously about your interest in teacher reflection.	• Can you talk about your personal philosophy about using reflection in professional learning? Can you talk about some strategies you use to encourage it? How often do you see reflection use in professional learning you have attended, why do you think that is the case?
Can you provide me some stories of teacher challenges that you are facing and how you are dealing with those challenges, relating to GPS.	• Can you describe what those teachers are doing? What are your plans for supporting their move to the GPS? • Can you describe a situation where a teacher has made a move to the GPS but not in the ways you and the framers had intended?
Can you provide me some teacher successes you have faced and why you think those successes occurred?	
In your position as Math Coordinator, you are responsible for the Math roll out and the staff that supports that effort. Can you describe your management style and why you think your system is working.	• Why do you think your way is working? • Is there anything you would do differently in hindsight?
Over the next 5 years, can you describe how you envision your role with the GPS?	• How do you see the GPS playing out in your district and what is your role in it?
Can you tell me your dissertation topic? What else are you reading to keep your math and pedagogy skills current?	

APPENDIX D

PARTICIPANT TWO (VICTORIA) – INTERVIEW PROTOCOL – ROUND TWO

I would like to get a sense of your work environment. Can you describe your perception of your autonomy? *	• Flexibility • Decision making • Prioritization of your schedule • Choices • Funding • Chain of command
Can you describe some other major district/system wide changes you have witnessed and how this change differs?**	• Good or bad in how the change effort was handled/supported?
In our prior interview, you mentioned that during the first year of preparation for the GPS rollout in a grade, you emphasized the need for teachers to "read, study and reflect" (moving from Saxon to GPS, etc.). Can you speak about that a little more?	• How are you or how could you support their need to reflect? • You mentioned also that the reading, studying and reflection was the "biggest excuse" for no buy-in, can you talk a little more about that?
Continuing on this notion of buy-in, you mentioned (read quote)	• What does ownership mean to you? • What does it look like? • 3rd folded page, you mention "they – the teachers – are beginning to understand a lot of the content… how important is that to this notion of ownership?
Also, in the first interview, you talked about teachers guiding the classroom discussion, how different is this for your teachers.	• How do you explain the importance of this guiding and the other process standards? • What would you tell your peers about how to support teachers' change to process standards.
You mentioned the whole "transparency" issue when talking about 30 year veteran teachers getting excited about this new way to teach.	• Can you describe what you mean by the transparency a little more. • Why is this important to the roll out of the GPS?
Beyond the CRCT results, the AYP scores, the school keys, etc. how else are you monitoring this GPS rollout?	• What kinds of measures, etc. (Last interview talked about looked at two-man teams versus self-contained.)
In all of the change literature, there is an emphasis on reflection, out in the PD I have seen, I have not found a great deal of that going on. Can you talk a little about	

why that might be?	
Realizing you are not directly training the teachers for Math 2, can you tell me about that training and how it differs from what the State has suggested?	• How training structured? • Why different from State? • How is Math 1 rollout proceeding?
Can you provide me some stories of teacher challenges that you are facing and how you are dealing with those challenges, relating to GPS.	• Can you describe what those teachers are doing? What are your plans for supporting their move to the GPS? • Can you describe a situation where a teacher has made a move to the GPS but not in the ways you and the framers had intended?
Can you provide me some teacher successes you have faced and why you think those successes occurred?	
In your position as Math Coordinator, you are responsible for the Math roll out and the staff that supports that effort. Can you describe your management style and why you think your system is working.	• Why do you think your way is working? • Is there anything you would do differently in hindsight?
Over the next 5 years, can you describe how you envision your role with the GPS?	• How do you see the GPS playing out in your district and what is your role in it?
Last observation, you told me up front that you would be talking a lot, can you tell me why you needed to go in that direction with that 3rd grade group?	• How will today be different? • What are your goals for today's session?